Initial Environmental Examination

Date: July 2026

Pakistan: Khyber Pakhtunkhwa Health Systems Strengthening Program (KPHSSP)

Revamping of Non-Teaching District Head Quarters (DHQs) Hospitals across KP, Phase-III

Prepared by Project Management Implementation Unit (PMIU), Communication and Works (C & W) Department, Government of Khyber Pakhtunkhwa, Pakistan for the Asian Development Bank

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CURRENCY EQUIVALENTS

(As of 15 April 2026)

Currency unit	Pakistani Rupees (PRs)
PRs1.00	= $ 0.0036
$1.00	= PRs 279

UNIT CONVERSIONS

1 gallon (US)	_	3.785 liter
1 gallon/day	_	0.003785 m^3/day
1 m^3/day	_	0.041 m^3/hr
1 Cusec	_	28.31 liters/sec
1km	–	1000m
1ft	–	12 inches
1 acre	–	4,046.8 m^2

LIST OF ABBREVIATIONS

ACMs	Asbestos Containing Materials
AOI	Area of Influence
ADB	Asian Development Bank
AHUs	Air Handling Units
AIP	Access to Information Policy
AJ&K	Azad Jammu and Kashmir
AMP	Asbestos Management Plan
AVVSU	Area Valve Service Unit
BCP	Building Code of Pakistan
CCTV	Closed-Circuit Television
CCU	Coronary Care Unit
CoC	Code of Conduct
COP	Conference of Parties
CPID	Consultations, participation, and information disclosure
CUs	Condensing Units
C&W	Communication and Works
DMCs	Developing Member Countries
DHQ	District Head Quarter
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
EMP	Environmental Management Plan
EHS	Environmental, Health, and Safety
E&S	Environmental and Social
ELV	Extra-Low Voltage
ERP	Emergency Response Plan
GBV	Gender-Based Violence
GHGs	Green House Gases
GoP	Government of Pakistan
GOKP	Government of Khyber Pakhtunkhwa
GRM	Grievance Redress Mechanism
GRC	Grievance Redress Committees
HVAC	Heating, Ventilation, and Air Conditioning
ICT	Information and Communication Technology
ICU	Intensive Care Unit
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IPC	Infection Prevention and Control
IUCN	International Union for Conservation of Nature
KPHSSP	Khyber Pakhtunkhwa Health Systems Strengthening Program
KP	Khyber Pakhtunkhwa
Km/h	Kilometer Per Hour
LAAP	Local Area Alarm Panel
NCS	National Conservation Strategy
NEQS	National Environmental Quality Standards
NESPAK	National Engineering Services Pakistan
NDMA	National Disaster Management Authority
NOC	No Objection Certificate
NPO	No Project Option
Mm	Millimeter

OIC	Organization of the Islamic Conference
O&M	Operation and Maintenance
OT	Operation Theater
OPD	Outpatient Department
OHS	Occupational Health and Safety
PCC	Plain Cement Concrete
PDA	Peshawar Development Authority
PEPA	Pakistan Environmental Protection Act
PHED	Public Health Engineering Department
PMIU	Project Management Implementation Unit
PPE	Personal Protective Equipment
PM	Particulate Matter
PGA	Peak Ground Acceleration
PVC	Polyvinyl Chloride
RCC	Reinforced Cement Concrete
SAARC	South Asian Association for Regional Cooperation
SC	Supervision Consultant
SH	Sexual Harassment
SGCs	Site Grievance Committees
SDGs	Sustainable Development Goals
SPS	Safeguard Policy Statement
SSEMP	Site Specific Environmental Management Plan
SEA	Sexual Exploitation and Abuse
SLGFPs	Site-Level Grievance Focal Points
Sq. Kms	Square Kilometers
TMA	Tehsil Municipal Administration
UNFCCC	United Nations Framework Convention on Climate Change
USEPA	United States Environmental Protection Agency
UNO	United Nations Organization
UG	Underground
VOCs	Volatile Organic Compounds
WSSP	Water and Sanitation Services Peshawar
SWM	Solid Waste Management
WHO	World Health Organization

WEIGHTS AND MEASURES

ºC	–	Degree Celsius
dB	–	Decibel
Km	–	Kilometer
Kph	–	Kilometer per hour
LAeq	–	Equivalent Continuous Sound Level 'A weighting' – 'A'- weighting = correction by factors that weight sound to correlate with the sensitivity of the human ear to sounds at different frequencies
m	–	Meter

NOTES

(i) The fiscal year (FY) of the Government of the Islamic Republic of Pakistan and its agencies ends on 30 June.
(ii) In this report, "$" refers to US dollars.

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Khyber Pakhtunkhwa Health Systems Strengthening Program

Revamping of Non-Teaching DHQ Hospitals across KP, Phase-III

INITIAL ENVIRONMENTAL EXAMINATION

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EXECUTIVE SUMMARY

INTRODUCTION

1. Khyber Pakhtunkhwa faces persistent healthcare challenges, including limited access to quality services and overburdened tertiary hospitals. To address these issues, the Government of Khyber Pakhtunkhwa has launched the Revamping of Non-Teaching DHQ Hospitals Program to strengthen secondary healthcare services through infrastructure upgrades, improved equipment, and enhanced service delivery.

POLICY, LEGAL AND ADMINISITRATIVE FRAMEWORK

2. The proposed project has been prepared in line with ADB Safeguard Policy Statement (SPS) 2009 and classified as Category B. The project complies with applicable national laws and policies, including environmental protection, water, labor, heritage, building, and waste management regulations, as well as provincial frameworks under the KP Environmental Protection Act (2014) and Environmental Assessment Rules (2021) International obligations, including ADB SPS (2009) and relevant ILO conventions, are also adhered to, ensuring compliance with environmental assessment, labor standards, and social safeguards.

DESCRIPTION OF THE PROJECT

3. The proposed project includes upgradation of eleven secondary healthcare facilities namely; in DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, DHQ Hospital Batkhela, Malakand, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Mardan, DHQ Hospital Alpuri, Shangla, DHQ Hospital Tank, DHQ Hospital Saidu Sharif Swat, and DHQ Hospital Dassu Upper Kohistan including rehabilitation of existing infrastructure, installation of modern medical and support systems, and improvement of utilities such as water supply, sanitation, electricity, drainage, and healthcare waste management. The project integrates civil, mechanical, electrical, ICT, and environmental interventions without any additional land requirements. The project will be implemented over 24 months with an estimated cost of Rs. 5617.154 million involving about 275 personnel across sites. Construction activities will use standard equipment and temporary arrangements in line with applicable codes and specifications.

DESCRIPTION OF THE ENVIRONMENT

4. Baseline conditions were established using primary and secondary data. Field surveys conducted by the NESPAK team in October 2025 and February 2026 covered physical, biological, and socio-economic aspects, and were supplemented with secondary sources and field observations to ensure reliability and comprehensive impact assessment.

5. The hospital project sites are located across eleven districts of Khyber Pakhtunkhwa, including Malakand, Swat, Battagram, Mansehra, Kohistan, Shangla, Chitral, Mardan,

Hangu, Lakki Marwat, and Tank, encompassing a wide range of physiographic, geological, and hydrological environments. The project area extends from fertile alluvial plains, piedmont zones, and intermountain valleys to the steep and rugged high-altitude landscapes of the Hindu Kush, Himalaya, and Karakoram mountain systems. The mountainous districts are characterized by complex folded and faulted geological formations, active seismic conditions, steep slopes, and high susceptibility to landslides, rockfalls, and erosion, while the plains and basin areas are dominated by Quaternary alluvial and sedimentary deposits supporting agriculture but vulnerable to flooding, erosion, and waterlogging. Surface water systems vary considerably across the project districts, with mountainous areas relying on glacier melt, snowmelt, springs, and perennial rivers such as the Indus, Swat, Kunhar, Chitral, and associated khwars, while southern and central districts depend largely on seasonal torrents, ephemeral streams, and groundwater resources.

6. The project districts exhibit a wide range of climatic conditions due to their diverse elevations, physiographic settings, and geographic locations across the Himalayan, Hindu Kush, Karakoram, and Trans-Indus regions. The climate varies from hot subtropical and semi-arid conditions in the southern and plain districts of Lakki Marwat, Tank, Hangu, and Mardan to humid subtropical, temperate, and high-altitude alpine climates in Battagram, Mansehra, Swat, Shangla, Chitral, and Upper Kohistan. Lower elevation areas experience extremely hot summers with maximum temperatures generally exceeding 40°C, mild winters, and rainfall concentrated mainly during the summer monsoon season, while mountainous districts experience cooler summers, freezing winters, snowfall, and precipitation influenced by both monsoon systems and western disturbances. High-altitude areas such as Chitral and Dassu exhibit severe winter conditions with sub-zero temperatures, prolonged snow periods, and limited summer warmth, whereas semi-arid districts face higher temperatures, low and irregular rainfall, and increased drought vulnerability. Across the project region, precipitation patterns are highly seasonal and variable, with intense rainfall events during monsoon periods contributing to flash flood risks, landslides, and erosion in mountainous areas, while prolonged dry spells affect water availability in arid and semi-arid zones. Relative humidity and wind conditions vary according to elevation and season, with moderate winds prevailing in most districts and stronger pre-monsoon winds in exposed areas.

7. The water supply and sanitation infrastructure across the project districts demonstrates significant variation due to differences in physiography, climate, settlement patterns, and available water resources. In mountainous districts including Battagram, Chitral, Mansehra, Shangla, Swat, and Upper Kohistan, water supply systems are predominantly dependent on natural springs, glacier-fed streams, and gravity-based pipeline schemes, while urban areas increasingly rely on groundwater extraction through tube wells and boreholes. However, declining spring discharge, climate variability, deforestation, and increasing demand have affected the reliability of traditional water sources. In semi-arid and plain districts such as Hangu, Lakki Marwat, Tank, and Mardan, groundwater remains the primary source of domestic water, although issues including declining water tables, salinity, brackish aquifers, and drought conditions pose major challenges to sustainable supply. Several areas depend on seasonal surface water, hill torrent systems, and rainwater storage ponds, which often carry risks of contamination. Sewerage and wastewater management facilities remain largely

inadequate throughout the project districts, with most areas lacking centralized sewer networks and wastewater treatment plants. Domestic sewage, greywater, and stormwater are commonly conveyed through open drains, masonry channels, or natural streams, resulting in contamination of rivers, agricultural lands, and groundwater sources. During monsoon events, inadequate drainage capacity and blockage by sediment and solid waste frequently cause flooding, stagnant wastewater accumulation, and increased risks of waterborne diseases.

8. The project districts are exposed to varying levels of flood risk due to differences in terrain, hydrological systems, climatic conditions, and land use patterns. The northern mountainous districts, including Chitral, Upper Kohistan (Dassu), Battagram, Shangla, and Swat, are highly vulnerable to flash floods, debris flows, landslide-induced flooding, and Glacial Lake Outburst Floods (GLOFs) associated with intense monsoon rainfall, snowmelt, and glacier-related processes. In contrast, lower elevation and plain districts such as Mardan, Hangu, Lakki Marwat, Tank, and Malakand are primarily affected by riverine flooding, seasonal torrent overflows, and localized urban flooding linked with major rivers, canals, and drainage channels. Major flood events, particularly those of 2010 and 2022, demonstrated the susceptibility of the region, causing extensive damage to infrastructure, agriculture, and settlements. Climate change impacts, including increased rainfall intensity, altered monsoon behavior, and glacier retreat, are expected to further intensify flood-related risks.

9. Solid waste management systems across the project districts remain generally inadequate. Waste collection and disposal practices vary from limited municipal services in urban centers such as Mardan and Saidu Sharif to predominantly informal and open dumping practices in remote mountainous and semi-arid districts. In many locations, mixed municipal waste is disposed of in open fields, riverbanks, dry stream beds, and roadside areas, while open burning remains common, resulting in soil and water contamination, air pollution, blocked drainage channels, and increased public health risks. Rapid urbanization, population growth, tourism activities, and increased plastic waste generation have further increased pressure on existing waste management systems. Although initiatives are underway in selected areas, including Dasu, Malakand, and Mardan, substantial improvements are required through the development of sanitary disposal facilities, organized collection networks, waste segregation, recycling mechanisms, and environmentally sustainable waste management practices to support resilient infrastructure development and safeguard community health.

10. Baseline environmental monitoring for the proposed hospital project was conducted in March 2026 by M/s PakGreen Laboratories, an EPA-KP certified laboratory, covering ambient air, noise, wastewater, and groundwater quality at all project sites. Results, assessed against the NEQS (2010), showed elevated $PM_{2.5}$ levels at Battagram, Hangu, Lakki Marwat, Batkhela (Malakand), Mansehra, Mardan, Alpuri (Shangla),Tank and Saidu Sharif mainly due to traffic, road dust, construction activities, and local climatic conditions, with dust in Dassu also influenced by its dry, mountainous terrain and unpaved roads. Noise levels exceeded NEQS limits for silence zones at all hospital sites. Wastewater quality indicated elevated BOD, COD, TSS, ammonia, copper, iron, and manganese at Hangu, Mansehra, Mardan, and Saidu Sharif, highlighting the need for improved wastewater management. Groundwater quality was generally satisfactory,

although biological contamination was detected at DHQ Hospital Lakki Marwat and DHQ Hospital Mansehra, while increased hardness was also recorded at Mansehra.

11. The proposed project will be implemented within existing hospital premises on already designated institutional land, with no requirement for land acquisition or change in land use. Surrounding areas are mainly residential, commercial, and mixed-use, and have been considered in assessing potential indirect impacts such as noise, dust, and temporary traffic disruption during construction.

12. Key sensitive receptors include hospital facilities such as wards, outpatient department (OPDs), emergency units, and operation theatres, along with on-site prayer areas. Nearby staff housing and mosques are also noted as external receptors; however, they are unlikely to experience significant impacts due to their distance from active construction zones.

ECOLOGICAL ENVIRONMENT

13. The proposed hospital sites are located in urban and semi-urban environments with modified ecological settings. Vegetation is dominated by common native and planted tree species, ornamental plants, shrubs, and grasses, while no rare, threatened, endemic, or ecologically significant flora were recorded. Aquatic habitats are absent within the project sites, with nearby rivers and other water bodies located outside the project areas. Faunal diversity is limited to common urban bird species, rodents, and domestic animals, and no endangered or protected wildlife species were observed. None of the project sites are located within or adjacent to protected areas, critical habitats, forests, wetlands, or other environmentally sensitive areas.

SOCIO-ECONOMIC ENVIRONMENT

14. The project districts are predominantly rural and are administered through district, tehsil, and local councils. The population is generally young and growing, with literacy rates varying across the districts. Pashto is the dominant language, along with regional languages including Khowar, Hindko, Gujari, Kohistani, Shina, and Saraiki. The local economy is primarily based on agriculture, livestock, trade, tourism, forestry, mining, public sector employment, and remittances. Population growth is increasing the demand for healthcare, education, water supply, sanitation, and other public infrastructure and services.

15. A total of 187 respondents were surveyed across selected healthcare facilities to understand the demographic characteristics, socio-economic conditions, access to basic amenities, existing hospital accessibility conditions, awareness levels, and community perceptions regarding the proposed hospital revamping project. The survey also highlighted community expectations regarding improved healthcare services, better hospital facilities, enhanced accessibility, and effective management of potential construction-related impacts. Overall, the assessment provides baseline socio-economic information to support inclusive project planning and the implementation of appropriate environmental and social management measures.

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

16. The proposed hospital revamp project is expected to yield significant positive outcomes, including improved healthcare infrastructure, enhanced service delivery, strengthened infection prevention and control, and improved patient safety and quality of care. During the design phase, considerations such as functional layout optimization, segregation of clean and contaminated zones, integration of infection control measures, selection of durable and easy-to-clean materials, energy- and water-efficient systems, and optimized utility planning will support sustainable and resilient healthcare operations.

17. During the construction phase, potential impacts include localized air and noise pollution, waste generation, temporary disruption to hospital services and access, occupational health and safety risks, and potential impacts on patient safety. These will be minimized through implementation of dust suppression and noise control measures, safe material storage, traffic and access management, scheduling of works to avoid critical hospital hours, installation of physical barriers, strict adherence to PPE usage, and effective segregation, handling, and disposal of construction and demolition waste., Additional measures such as emergency preparedness, worker training, and grievance redress mechanisms, and continuous coordination with hospital administration will further reduce risks.

18. During the operational phase, potential risks include increased healthcare waste generation, higher demand for water and energy, and lapses in maintenance and infection control practices. These will be addressed through structured operation and maintenance (O&M) systems, routine inspections, preventive maintenance schedules, implementation of healthcare waste management rules, wastewater treatment and safe disposal, resource efficiency measures, staff training, and regular audits of infection prevention and control practices.

19. Overall, with effective implementation of these mitigation and management measures, the project's long-term benefits will substantially outweigh its temporary adverse impacts.

ANALYSIS OF ALTERNATIVES

20. The hospital revamp project assessed multiple alternatives, including no-project, simultaneous, and phased implementation options. The no-project option is not viable due to continued service deterioration, while simultaneous implementation would create higher environmental and operational pressures. A phased implementation approach with integration of solar energy is considered most suitable, as it minimizes disruptions, improves resource efficiency, and allows gradual infrastructure upgrades. This option ensures environmental sustainability, operational continuity, and long-term improvements in healthcare services.

INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

21. Stakeholder consultations for the hospital revamp project were conducted in February 2026 at institutional and community levels to ensure inclusive participation and integration of feedback into project design. Stakeholders included government departments, hospital staff, patients, and local communities, and consultations identified key concerns such as waste management, wastewater treatment, infrastructure gaps, service delivery, and basic facility needs. In response, the project incorporates improved healthcare waste systems, sanitation and water supply upgrades, enhanced design features, and inter-agency coordination. A continuous engagement mechanism, including regular consultations and a grievance redress system, will be maintained throughout implementation to ensure transparency and sustainability.

GRIEVANCE REDRESS MECHANISM

22. A Grievance Redress Mechanism (GRM) has been established to address environmental and social concerns arising from the project in a timely and transparent manner. It is designed to receive, review, and resolve grievances related to construction activities and associated impacts. The GRM comprises a three-tier system, including Health center level (Tier-I GRC), Project Management Implementation Unit (PMIU) level (Tier-II GRC) and Department of Health Level (Tier-III GRC) to address any grievances Multiple channels (in-person, helplines, written complaints, email, and complaint boxes) will ensure accessibility for all stakeholders. Grievances will be documented, investigated, and resolved within defined timelines, with escalation provisions for unresolved cases. The mechanism will operate in compliance with national regulations and ADB SPS (2009), and will remain functional throughout project implementation, supported by consultations, awareness, and information disclosure to ensure effective engagement and accountability.

ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (EMP) has defined institutional arrangements, mitigation measures, monitoring, reporting requirements, and provisions for training and capacity building for the project. The Contractor will implement the EMP during construction under the supervision of the Supervision Consultant (SC) and Project Management Implementation Unit (PMIU), while hospital management will ensure compliance during operation. EMP costs, estimated at Rs. 101.92 million, are included in the project budget and linked to verified implementation. The Initial Environmental Examination (IEE) and EMP will form part of the contractor's contractual obligations. Environmental due diligence identified several pre-existing environmental management gaps at the hospitals, including deficiencies related to healthcare waste management, wastewater management, occupational health and safety, fire safety, environmental monitoring, and institutional capacity. A hospital-specific Corrective Action Plan (CAP) has been prepared to address these gaps, with defined mitigation measures, responsibilities, implementation timelines, monitoring indicators, and budget requirements. CAP implementation will be monitored and reported through project environmental monitoring reports.

CONCLUSION AND RECOMMENDATION

23. The IEE identifies potential environmental and social impacts of the hospital revamp project during construction and operation, including localized air and noise pollution, temporary service disruptions, waste generation, increased resource use, and patient safety risks. An EMP has been developed to mitigate these impacts through defined measures and monitoring requirements, with contractors bound to comply with national and provincial regulations and hospital management ensuring operational adherence. With effective implementation and coordination, the project is expected to remain environmentally and socially acceptable while improving healthcare service delivery.

1 INTRODUCTION

1.1 PROJECT BACKGROUND

24. Khyber Pakhtunkhwa (KP) continues to face significant healthcare challenges, with key health indicators remaining below desired levels and requiring substantial improvement to achieve the Sustainable Development Goals (SDGs). Neonatal, infant, and under-five mortality rates are estimated at 41, 53, and 64 per 1,000 live births, respectively, while the maternal mortality ratio stands at 175 deaths per 100,000 live births and is considerably higher in the merged districts. Limited access to quality healthcare services, particularly at the primary and secondary levels, has led many patients to seek care directly from tertiary hospitals. This places considerable pressure on higher-level facilities, resulting in overcrowding, increased healthcare costs, and reduced efficiency of service delivery across the health system.

25. To address these challenges, the Government of Khyber Pakhtunkhwa (GoKP) has launched the Revamping of Non-Teaching DHQ Hospitals Program to strengthen secondary healthcare services across the province. The program focuses on upgrading hospital infrastructure, modernizing medical equipment, improving service delivery, and enhancing operational efficiency to provide better quality healthcare and reduce pressure on tertiary hospitals. The initiative is aligned with Asian Development Bank (ADB) Strategy 2030 and the Pakistan Country Partnership Strategy (2021–2025), supporting improved healthcare access, institutional capacity, and health system resilience.

1.2 PROJECT OBJECTIVES

26. The project seeks to strengthen healthcare infrastructure, modernize medical equipment, improve human resource capacity, enhance emergency and diagnostic services, upgrade hospital operations and support systems, and improve patient safety and experience. In addition, the project will promote efficient hospital management through the use of information technology, standardized service delivery protocols, reliable utility systems, and improved healthcare waste management practices, thereby enhancing the overall quality, accessibility, and sustainability of secondary healthcare services across the province.

1.3 SCOPE OF WORK

27. The project will be implemented in four phases. This Report covers Phase III, which includes DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, DHQ Hospital Batkhela (Malakand), King Abdullah Teaching Hospital Mansehra, DHQ Hospital Mardan, DHQ Hospital Alpuri (Shangla), DHQ Hospital Tank, DHQ Hospital Saidu Sharif (Swat), and DHQ Hospital Dassu (Upper Kohistan).

28. The proposed interventions involve rehabilitation and renovation of existing hospital facilities, civil and architectural improvements, upgrading of electrical, mechanical, plumbing, and fire-fighting systems, installation of medical and support equipment, and associated external development works. All activities will be undertaken within existing hospital premises, and no major expansion beyond existing hospital boundaries or significant land acquisition is anticipated.

1.4 APPROACH AND METHODOLOGY

29. The IEE for the proposed upgradation of hospitals under Phase III of the Khyber Pakhtunkhwa Health Systems Strengthening Program (KPHSSP) was conducted in accordance with the ADB's Safeguard Policy Statement (SPS), 2009, and relevant national and provincial environmental requirements. The study adopted a structured and stepwise approach to assess potential environmental and social impacts associated with rehabilitation and upgradation works within existing hospital premises.

30. The assessment was based on both primary and secondary data sources. Primary data was collected through detailed site visits, field observations, and structured consultations with hospital administrations, medical staff, patients, and local stakeholders. These interactions helped in understanding site-specific conditions, operational constraints, and key environmental and social concerns. Secondary data was obtained from project design documentation, technical reports, relevant government records, and published literature to establish the baseline context of the project areas.

31. The methodology included a comprehensive review of proposed project components to identify activities with potential environmental implications during pre-construction, construction, and operational phases. Baseline environmental conditions were characterized in terms of physical environment (air quality, noise, water, and soil conditions), biological environment (flora and fauna, where applicable), and socio-economic environment, including healthcare service delivery, traffic conditions, and community health and safety aspects.

32. Potential environmental impacts were systematically identified and evaluated with particular emphasis on issues relevant to hospital rehabilitation projects, such as construction-related dust and noise, waste generation and disposal, occupational health and safety risks, disruption to hospital operations, infection control, utility interruptions, and increased pressure on existing services during construction activities.

33. Stakeholder consultations formed an integral part of the assessment process and were conducted to gather feedback, understand public concerns, and ensure that the views of affected parties were considered in project planning and impact mitigation. The outcomes of these consultations were incorporated into the environmental assessment and mitigation planning.

34. Based on the findings, an EMP was developed outlining practical mitigation measures, monitoring requirements, institutional roles and responsibilities, reporting mechanisms, and capacity-building needs to ensure effective environmental management throughout the project lifecycle. The overall approach ensured that environmental considerations

were integrated into project design and implementation in line with ADB safeguard requirements and good international industry practice.

1.5 STRUCTURE OF REPORT

35. The IEE report is organized into the following sections:

Section 1: Introduction provides the project background, objectives, scope of assessment, study approach, and methodology.

Section 2: Policy, Legal and Administrative Framework describes the applicable environmental policies, legislation, regulations, and ADB safeguard requirements relevant to the project.

Section 3: Description of the Project presents details of the proposed hospital upgradation works, project components, implementation arrangements, and associated activities.

Section 4: Description of the Environment: describes the existing physical, biological, and socio-economic conditions of the project sites and surrounding areas.

Section 5: Anticipated Impacts and Mitigation Measures identifies and evaluates potential environmental impacts and presents corresponding mitigation measures.

Section 6: Analysis of Alternatives evaluates the alternatives considered during project planning, including the no-project option and alternative design and implementation approaches, and provides the rationale for the selected option.

Section 7: Information Disclosure, Consultation and Participation summarizes stakeholder consultations, key concerns raised, and disclosure activities undertaken during project preparation.

Section 8: Grievance Redress Mechanism outlines the procedures for receiving, addressing, and resolving project-related grievances.

Section 9: Environmental Management Plan presents environmental mitigation, monitoring, institutional arrangements, reporting requirements, and implementation responsibilities.

Section 10: Conclusions and Recommendations summarizes the key findings of the IEE and provides recommendations for environmentally sustainable project implementation

2 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 GENERAL

36. This chapter provides an overview of the policy framework and legislation that applies to control the environmental consequences as a result of project implementation and operation. The project needs to comply with all the applicable environmental policies, laws, guidelines, acts and legislations of Government of Pakistan and the provincial government. The proposed project is being funded by the ADB, so ADB policies and guidelines related to the project have also been discussed.

2.2 SUMMARY OF RELEVANT STRATEGIES, POLICIES, ACTS AND LEGISLATION

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

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

Sr. No.	Policy/Strategy	Brief Coverage	Relevance to Project
1.	National Conservation Strategy, 1992	Pakistan National Conservation Strategy (NCS), which was approved by the federal cabinet in March 1992, is the principal policy document on environmental issues in the Country. The NCS outlines the Country's primary approach towards encouraging sustainable development, conserving natural resources and improving efficiency in the use and management of resources. The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment.	The core areas that are relevant in the context of the proposed project are pollution prevention during construction, conserving biodiversity and supporting forestry and plantation.
2.	National Environmental Policy, 2005	In March 2005, GoP launched its National Environmental Policy, which provides a framework for addressing the environmental issues. Section 5 of the policy commits for integration of environment into development planning as instrument for achieving the objectives of National Environmental Policy. It also provides broad guidelines to the Federal Government, Provincial Governments, Federally Administered Territories and Local Governments to address their environmental concerns and to ensure effective management of their environmental resources.	Clause (b) of sub-section 5.1 states that Environmental Assessment related provisions in Environmental Protection Act, 1997, will be diligently enforced for all developmental projects.
3.	National Drinking Water Policy, 2009	The National Drinking Water Policy provides a framework for addressing the key issues and challenges facing Pakistan in the provision of	This policy is applicable for the proposed project Phase-III hospitals during

Sr. No.	Policy/Strategy	Brief Coverage	Relevance to Project
		safe drinking water to the people. Drinking water is the constitutional responsibility of the provincial governments and the specific provision function has been devolved to specially created agencies in cities and Town and Tehsil Municipal Administrations under the Local Government Ordinance 2001.	construction and operation phase in terms of regular water quality monitoring.
4.	National Water Policy, 2018	The National Water Policy aims at efficient management and conservation of existing water resources, optimal development of potential water resources, steps to minimize time and cost overruns in completion of water sector projects, improving urban water management by increasing system efficiency and reducing non-revenue water through adequate investments to address drinking water demand, sewage disposal, handling of wastewater and industrial effluents; equitable water distribution in various areas and canal commands, measures to reverse rapidly declining groundwater levels in low-recharge areas, increased groundwater exploitation in high-recharge areas, effective drainage interventions to maximize crop production, improved flood control and protective measures, steps to ensure acceptable and safe quality of water, minimization of salt build-up and other environmental hazards in irrigated areas, institutional reforms to make the managing organizations more dynamic and responsive.	The core areas that are relevant in the context of the proposed project Phase-III are drinking water demand, sewage disposal, and handling of wastewater.
5.	National Forest Policy, 2015	The goal of this policy is to expansion, protection and sustainable use of national forests, protected areas, natural habitats and watersheds for restoring ecological functions, improving livelihoods and human health in line with the national priorities and international agreements. In line with the Federal functions of national policy, planning and implementation of international agreements, specific objectives of the National Forest Policy include: a) Promoting ecological, social and cultural functions of forests through sustainable management and use of forest produce including wood and non-wood forest products; b) Implementing a national level mass afforestation programme to expand and maintain optimum forest cover; c) Maximizing forest areas by investing in available communal lands/ shamlat, and Guzara forests and urban forestry;	The proposed Project Phase-III dose not involves any national forests, protected areas, natural habitats and watersheds, so this policy is not applicable.

Sr. No.	Policy/Strategy	Brief Coverage	Relevance to Project
		d) Facilitating and harmonizing inter-provincial movement, trade and commerce of wood and non-wood forest products through the Federal Forestry Board; e) Inter-linking natural forests, protected areas, wetlands and wildlife habitats to reduce fragmentation; f) Enhancing role and contribution of forests in reducing carbon emissions and enhancing forest carbon pools; g) Facilitating implementation of international conventions and agreements related to Forestry, Wetlands, Biodiversity and Climate Change; and h) Promoting standardized and harmonized scientific forest planning, research and education including for community-based management.	
6.	Khyber Pakhtunkhwa Health Policy (2018-2025)	The Khyber Pakhtunkhwa Health Policy (2018–2025) provides a comprehensive framework for strengthening the provincial health system through improved healthcare infrastructure, service delivery, governance, and quality of care. The policy emphasizes equitable access to essential health services, development of health facilities, infection prevention and control, and improved environmental health standards in healthcare institutions. Health service delivery is a devolved provincial subject, implemented through the Department of Health, Khyber Pakhtunkhwa, and its attached departments and healthcare facilities.	This policy is applicable to the proposed project Phase-III hospitals during the design, construction, and operational phases, particularly in terms of compliance with healthcare infrastructure standards, provision of safe and hygienic facilities, proper waste management arrangements, and ensuring that the hospital design supports quality healthcare delivery in line with provincial health objectives.
7.	Pakistan Labour Policy, 2010	The main objective of the Labour Policy, 2010 is the social and economic well-being of the labour of Pakistan. The Labour Policy, 2010 has following 4 parts: • Legal Framework; • Advocacy: rights of workers and employers; • Skill development and employment; and • Manpower export.	The labour force will be employed for construction of the proposed Project Phase-III. The provision of policy will apply to all the employed labourers.
8.	National Disaster Risk Reduction Policy, 2013	NDMA, being the lead focal agency for disaster preparedness and management, has therefore, embarked upon formulation of a comprehensive National Disaster Risk Reduction Policy through wider consultations with all stakeholders including all provinces, state of Azad Jammu and Kashmir (AJ&K) and regions. This policy covers disasters risk reduction in a more holistic way and introduces a proactive and	This policy will be elicit if any unforeseen natural and man-made disaster occurs during construction and operation phase of proposed Project Phase-III.

Sr. No.	Policy/Strategy	Brief Coverage	Relevance to Project
		anticipatory approach by laying special emphasis on risk assessment and prevention.	
9.	KP Climate Change Policy 2022	Following the 18th Constitutional Amendment, Khyber Pakhtunkhwa was the first province to develop a Provincial Climate Change Policy that was consistent with the updated National Climate Change Policy (2021). The Policy emphasizes the province of Khyber Pakhtunkhwa vulnerability to Climate Change and how to take protective measures such as adaptation and mitigation in relevant sectors of the economy. It focuses on the effects of Climate Change on the province's natural economy and emphasizes the need for the province to adapt and mitigate the effects of Climate Change. It also focuses on Climate Change awareness in the province. The adaptation approach to Climate Change seeks to reduce the vulnerability of natural and human systems or to capitalize on anticipated changes in climatic conditions, whereas mitigation seeks to reduce greenhouse gas emissions through technological advancement or by reducing activities that generate greenhouse gases. A salient feature of the Policy is the specific recommendations and strategies for the sectors where adaptation and Mitigation is required.	This policy will accelerate due to the emissions from the construction machinery and equipment.

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

Sr. No.	Act	Brief Coverage	Relevance to Project
1.	Khyber Pakhtunkhwa Environmental Protection Act 2014	Following the adoption of the 18th Constitutional Amendment in 2011, the subject of environment was devolved, and the provinces have been empowered for environmental protection and conservation. Subsequently, the KP Government amended PEPA 1997 as KP Environmental Protection Act 2014, and KP-EPA is responsible for ensuring the implementation of provisions of the Act in KP's territorial jurisdiction. KP-EPA is also required to ensure compliance with the NEQS and establish monitoring and evaluation systems. In case any project falls under Schedule I or II of this Act, the	The provision of the act is applicable to proposed Project for conducting an IEE/EIA according to section 13 and to obtain environmental approval from the EPA. The section 11 of this act prohibits certain discharges or emissions into the environment. Section 13 of this act also enables the agency to carry out strategic environmental assessment if the plan involves transport and infrastructure, whereas section 14 prohibits the import of hazardous substances. Similarly, the provisions of section 17 are also applicable to comply with the discharge or emission of any effluent,

Sr. No.	Act	Brief Coverage	Relevance to Project
		relevant IEE (or EIA where required) will be developed and submitted to EPA-KP for issuing NOC before commencing any physical work. This law will enforce the implementation of environmental legislations at provincial level and will be responsible for issuing No Objection Certificates (NOCs).	waste, air pollutant or noise or disposal of waste or handling of hazardous substance. Under section 18, penalties will apply if anyone fails to comply with the provisions of section 11, 12,13,14 and 17.
2.	Khyber Pakhtunkhwa Environmental Assessment Rules, 2021	These regulations set out: • Key policy and procedural requirements for filing an EIA / IEE; • The purpose of environmental assessment; • The responsibilities of proponents; • Duties of responsible authorities; • Provides schedules of proposals that the project requires IEE, EIA or GEA	As per Khyber Pakhtunkhwa Environmental Assessment Rules, 2021 the proposed project, KP-EPA has clarified that revamping, renovation, and internal repair activities, where no expansion or other scheduled components are involved, do not require submission of an IEE/EIA under the Khyber Pakhtunkhwa Environmental Assessment Rules, 2021; however, project implementation shall be carried out in accordance with the applicable environmental laws, regulations, and prescribed mitigation measures.
3.	The Khyber Pakhtunkhwa Public Health (Surveillance and Response) Act, 2017	The Khyber Pakhtunkhwa Public Health (Surveillance and Response) Act, 2017 establishes a legal framework for the surveillance, prevention, control, and response to public health risks and infectious diseases in the province. The Act mandates systematic monitoring of disease outbreaks, reporting from healthcare facilities, coordination of public health response mechanisms, and management of health hazards. It defines the responsibilities of health authorities and health institutions in notifying, recording, and managing communicable diseases and environmental health threats.	This Act is applicable to the proposed Project Phase-III hospitals during the construction and operational phases in terms of ensuring that the design and functioning of the hospitals incorporate provisions for disease surveillance, reporting systems, infection prevention and control measures, and compliance with public health safety standards. During construction, the project must coordinate with relevant health authorities to ensure that facilities for surveillance and response (such as isolation areas, waste management systems, infection control infrastructure, and reporting mechanisms) are aligned with the requirements of the Act to protect patient, worker, and community health.
4.	KP Climate Action Board Act (2025)	The 2025 KP Climate Action Board Act creates a robust, independent institution with the mandate,	Proposed Project, will be expected to comply with the latest environmental standards and integrate low-carbon

Sr. No.	Act	Brief Coverage	Relevance to Project
		capacity, and resources to spearhead provincial climate resilience—bridging policy, data, finance, and cooperation under a unified framework.	design, green building codes, and energy-efficient systems.
5.	KP Wildlife and Biodiversity Act, 2015	KP Wildlife Act is expedient to provide for the protection, preservation, conservation and management of wildlife in KP. The aims and objects of this Act are the: • Strengthening the administration of the organization to effectively manage wild animals and their habitats; • To holistically manage Protected Areas in sustainable manners for the best interest of the indigenous communities and local stakeholders; • Securing appropriately the goods and services produced from wild animals and their habitats at the level of local communities; • Fulfilling the obligations envisaged under the biodiversity related multilateral environmental agreements ratified by the Government of Pakistan; • Promotion of public awareness and capacity building for proper appreciation of the environmental significance and socio-economic values of wildlife; and • Conservation of biological diversity and realization of its intrinsic and extrinsic values through sustainable use and community participation.	The proposed Project Phase-III may involve the cutting of trees/bushes which may result in loss of habitat, therefore, the provisions of this law are applicable.
6.	KP Forest Ordinance 2022	This Ordinance prohibits construction of any building or shed, road or enclosure, or any infrastructure, or altering or enlarging any existing infrastructure in a reserved forest. It also bans any cutting, felling or uprooting any tree or brushwood listed in Schedule –I Furthermore, it also disallows to quarry stone from reserved forests. Due to the close proximity with a number of reserved forests, the mentioned provisions of this law will	This act might be trigged as the proposed Project Phase-III may involves the cutting of trees/bushes.

Sr. No.	Act	Brief Coverage	Relevance to Project
		need to be considered.	
7.	Khyber Pakhtunkhwa Antiquities Act, 2016	This act pertains to protect, preserve, develop and maintain antiquities in the Province the KP. It extends to the whole of the Province of the KP. This act contains VII Chapters. Clause 55& 56 of Chapter IV, Development Schemes, New Construction and use of Movable Antiquities is applicable and require NOC from Directorate in case of vicinity of any protected immovable antiquity.	The provisions of this act would also be applicable, if any accidental archaeological discoveries may occur during the excavation works for the construction of proposed Project Phase-III.
8.	KP Commission on Status of Women	The KP Commission on the Status of Women is a statutory advisory body established under the Khyber Pakhtunkhwa Act XIX of 2009 which was amended by the Khyber Pakhtunkhwa Assembly under the new Act XXVIII of 2016. The Commission in KP is the first ever Provincial Level Commission in the country, established with functions to oversee implementation of laws, policies and programs related to women and propose new measures where gaps exist. The third term of the Provincial Commission on the Status of Women was notified in January 2017	It is applicable as the proposed Project Phase-III may involve female labor force.
9.	Pakistan Penal Code, 1860	The Code deals with the offences where public or private property or human lives are affected due to intentional or accidental misconduct of an individual or organization. The Code also addresses control of noise, noxious emissions and disposal of effluents.	The provisions of the Penal Code, 1860 are applicable to the project in terms of penalties for effecting human lives and public property. It also addresses the control of noise, air emissions and effluent disposal.
10.	The Protection against Harassment of Women at the Workplace Act, 2010	The Protection Against Harassment of Women at the Workplace Act (2010) refers to sexual harassment at the workplace.	This Act will be applicable to the proposed Project Phase-III if women are employed for the construction activities.
11.	Labour Laws as part of Constitution of Pakistan 1973	The Constitution of Pakistan, 1973 provides the overarching legal framework for protection of labour rights and welfare. Key constitutional provisions include prohibition of forced and child labour (Article 11), freedom of association and unionization (Article 17), equality before law and non-discrimination (Article 25), and provision of just and humane working conditions including	These constitutional provisions and applicable labour laws are relevant to the proposed Project Phase-III during construction and operational activities to ensure fair employment practices, occupational health and safety, non-discrimination, prohibition of forced and child labour, and protection of workers' rights. Key applicable provincial labour laws include: • The Khyber Pakhtunkhwa Occupational Safety and Health Act, 2022;

Sr. No.	Act	Brief Coverage	Relevance to Project
		maternity benefits (Article 37(e)). Labour matters are regulated through federal and provincial legislation governing employment conditions, occupational health and safety, wages, working hours, child labour prohibition, workers' welfare, and compensation.	• Khyber Pakhtunkhwa Minimum Wages Act, 2013; • KP Workers Compensation Act, 2013; • Khyber Pakhtunkhwa Bonded Labour System (Abolition) Act, 2015; and KPK Factories Act, 2013.
12.	The Khyber Pakhtunkhwa Prohibition of Employment of Children Act, 2015	The Khyber Pakhtunkhwa Prohibition of Employment of Children Act, 2015 prohibits the employment of children under 14 years in any establishment, including construction and other hazardous work. The Act defines a child as anyone below 14 years and an adolescent as a person aged 14–18 years. It regulates working hours, weekly holidays, and health and safety measures for adolescents, specifies hazardous occupations they cannot engage in, and prescribes penalties for violations.	The relevance of this act to the Proposed Project Phase-III will be to prohibit child employment for construction and operation of the proposed project.
13.	Pakistan Climate Change Act, 2017	This Act aims to meet obligations under international conventions relating to climate change and to provide for adoption of comprehensive adaptation and mitigation policies, plans, programmes, projects and other measures required to address the effects of climate change and for matters connected herewith and ancillary thereto	This Act will be triggered due to the emissions from the construction machinery.
14.	Cutting of Trees (Prohibition) Act, 1975	The Act was enforced in 1975 to place restrictions on cutting of trees in order to restrain unchecked trend of tree felling without replacement plantations.	This act will be applicable to the subject Project Phase-III where the cutting of tree will be involved.
15.	The Khyber Pakhtunkhwa Protection of Trees and Brushwood Act, 1949	This act was enforced in 1949 to protect the trees and brushwood belonging to the Government and Local bodies.	This act will be applicable to the subject project Phase-III where the cutting of tree will be involved.

Sr. No.	Act	Brief Coverage	Relevance to Project
16.	Hazardous Substance Rule, 2003	The rule describes the procedure of handling, transportation and disposal of hazardous substances and hazardous waste. Inter alia, general safety precautions for handling hazardous substances as well as safety precautions for workers, and notification requirements in the event of an accident are described in these rules. Requirements for project waste management plans are also defined. These include a requirement for updating the plan every three years, the need to provide for management of hazardous waste in a manner that will prevent adverse environmental impacts and to ensure that hazardous and non- hazardous waste are not mixed.	This rule is applicable to the proposed Project Phase-III due to involvement of hazardous waste handling, use and disposal during the construction stage.
17.	Building Code of Pakistan, 2021	The provision of BCP shall apply for engineering design of building like structure and related components. The construction in violation of the building code shall be deemed as violation of professional engineering work. Moreover, a certificate for the proposed action will be obtained from Provincial Building Control Authority.	These codes shall be used in structural design of building area components constructed under this proposed project.
18.	The Hospital Waste Management Rules, 2005	The Hospital Waste Management Rules, 2005, framed under the Pakistan Environmental Protection Act, 1997, provide procedures for segregation, collection, storage, transportation, treatment, and disposal of healthcare waste in an environmentally sound manner. The Rules also require record keeping, waste minimization, and monitoring of healthcare waste management practices.	These Rules are directly applicable during the operational phase of the proposed Project Phase-III, and partially during construction activities, to ensure proper handling, segregation, storage, transportation, treatment, and disposal of infectious, hazardous, and general healthcare waste generated by the upgraded hospital facilities.
19.	Khyber Pakhtunkhwa Minimum Wages Act, 2013	This Act provides for the establishment of minimum wage rates for workers through the Minimum Wage Board and prohibits payment below the notified minimum wage. As of September	This Act will apply to all contracted and hired labor engaged under Project Phase-III to ensure compliance with provincial minimum wage requirements and fair labor practices during construction and

Sr. No.	Act	Brief Coverage	Relevance to Project
		2025, the minimum monthly wage in KP is Rs. 40,000.	operational activities.
20.	Khyber Pakhtunkhwa Occupational Safety and Health Act, 2022	This Act provides for the occupational safety and health of workers at the workplace and protects them against risks arising from occupational hazards. It promotes a safe and healthy working environment that addresses the physiological and psychological well-being of employees.	This Act be applicable during rehabilitation activities under the proposed project Phase-III to ensure implementation of occupational health and safety measures, provision of PPE, emergency preparedness, and safe working conditions for workers and staff.
21.	KP Workers Compensation Act, 2013	The KP Workers Compensation Act, 2013 requires employers to compensate workers for injuries, disabilities, or death arising out of and during the course of employment, subject to prescribed conditions. Compensation is determined based on the nature of injury and wage level of the worker.	This Act is relevant during both construction and operational phases of project Phase-III to ensure compensation and legal protection for workers in case of work-related accidents, injuries, or occupational incidents.

2.3 ASIAN DEVELOPMENT BANK REQUIREMENTS

38. The proposed project is funded by ADB, hence ADB's safeguard requirements must be complied with in all aspects.

2.3.1 ADB's Requirements for Preparation of Environmental Assessments of Projects

39. This IEE study is fully committed to the requirements of the ADB SPS 2009. The environmental studies carried out by NESPAK on behalf of Health Department, Khyber Pakhtunkhwa (KP) have been essentially guided by these rules as enunciated in the "Outline of an Initial Environmental Examination Report".

40. A project is classified as Category 'B' if it is likely to have less adverse environmental impacts than those of category A. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. In the light of significance devoted by ADB to various environmental impacts, the proposed project is to be assigned Category 'B', wherein an IEE is required.

41. The main rationale to assign Category 'B' is that the proposed hospital facility may result in limited and site-specific environmental and social impacts, including minor impacts on surrounding communities, land use, and existing vegetation such as trees or orchards, which are largely reversible and can be effectively managed through standard mitigation measures.

42. During the design, construction, and operation of the project, the borrower/client will implement pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When host country regulations differ from these levels and measures, the proponent will comply with whichever requirement is more stringent.

2.3.2 ADB's Access to Information Policy (AIP) 2018

43. ADB's new Access to Information Policy (AIP), reflects the ADB's ongoing commitment to transparency, accountability, and participation by stakeholders. The policy contains principles and exceptions to information sharing with external stakeholders, led by a new overarching principle of "clear, timely, and appropriate disclosure."

2.3.3 ADB's Accountability Mechanism Policy 2012

44. The objectives of the Accountability Mechanism is providing an independent and effective forum for people adversely affected by ADB-assisted projects to voice their concerns and seek solutions to their problems, and to request compliance review of the alleged noncompliance by ADB with its operational policies and procedures that may have caused, or is likely to cause, them direct and material harm. The Accountability Mechanism is a "last resort" mechanism.

2.3.4 ADB's Safeguard Policy Statement, 2009

45. ADB affirms that environmental and social sustainability is a cornerstone of economic growth and poverty reduction in Asia and the Pacific region. ADB's Strategy, 2020 therefore emphasizes assisting Developing Member Countries (DMCs) to pursue environmentally sustainable and inclusive economic growth.

46. The objectives of ADB's safeguards are to:

- Avoid adverse impacts of projects on the environment and affected people, where possible;
- Minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and
- Help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

47. ADB's SPS sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:

- Environmental safeguards;
- Involuntary resettlement safeguards; and
- Indigenous Peoples safeguards.

48. To achieve the policy objectives and deliver the policy principles, ADB carries out the actions described in the subsection i.e. "B. Policy Delivery Process". To help

borrowers/clients and their projects achieve the desired outcomes, ADB adopts a set of specific safeguard requirements that borrowers/clients are required to meet in addressing environmental and social impacts and risks. ADB staff, through their due diligence, will review, supervise and ensure that borrowers/clients comply with these requirements during project preparation and implementation. These safeguard requirements are as follows:

- Safeguard Requirements 1: Environment (Appendix 2 of SPS, 2009);
- Safeguard Requirements 2: Involuntary Resettlement (Appendix 3 of SPS, 2009);
- Safeguard Requirements 3: Indigenous Peoples (Appendix 4 of SPS, 2009); and
- Safeguard Requirements 4: Special Requirements for Different Finance Modalities (Appendix 5 of SPS, 2009).

Table 2.3: ADB Safeguard Policies 2009 Relevant to Project

Sr. No.	Safeguard Policies	Key Requirements	Remarks
1.	Environment	Projects and subprojects need Environmental Assessment to address important issues not covered by any applicable regional or sectoral EA.	Applicable to proposed project.
2.	Involuntary Resettlement	Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs. Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher	As of now, no involuntary resettlement is envisaged for the proposed project therefore, this policy does not apply to the proposed project.
3.	Indigenous Peoples	Measures to avoid potentially adverse effects on the Indigenous People's communities; and when avoidance is not feasible, minimize, mitigate, or compensate for such effects. Bank-financed projects are also designed to ensure that the Indigenous People receive social and economic benefits that are culturally appropriate and gender and inter generationally inclusive.	As per the ADB definition, there are no groups of people in the project area who could be categorized as indigenous people, therefore this policy does not apply to the proposed project.

2.3.5 Implications of ADB's safeguard policies on proposed project

49. The objectives of ADB's safeguards are to:

- Avoid adverse impacts of projects on the environment and affected people, where possible;
- Minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and
- Help borrowers/clients to strengthen their safeguard systems.

50. The objective of the environmental safeguards is to ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision-making process. ADB's policy principles are summarized in **Table 2.4** below.

Table 2.4: ADB Policy Principles

Sr. No.	Policy principle	Summary
1	Screening and categorization	Screening process initiated early to determine the appropriate extent and type of environmental assessment.
2	Environmental assessment	Conduct an environmental assessment to identify potential impacts and risks in the context of the project's area of influence.
3	Alternatives	Examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts, including no project alternative.
4	Impact mitigation	Avoid, and where avoidance is not possible, minimize, mitigate, and/or offset adverse impacts and enhance positive impacts. Prepare an EMP.
5	Public consultations	Carry out meaningful consultation with affected people and facilitate their informed participation. Involve stakeholders early in the project preparation process and ensure that their views and concerns are made known to and understood by decision makers and considered. Continue consultations with stakeholders throughout project implementation. Establish a grievance redress mechanism.
6	Disclosure of environmental assessment	Disclose a draft environmental assessment in a timely manner, in an accessible place and in a form and language(s) understandable to stakeholders. Disclose the final environmental assessment to stakeholders.
7	Environmental management plan	Implement the EMP and monitor its effectiveness. Document monitoring results, and disclose monitoring reports.
8	Biodiversity	Do not implement project activities in areas of critical habitats.
9	Pollution prevention	Apply pollution prevention and control technologies and practices consistent with international good practices. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges. Avoid the use of hazardous materials subject to international bans or phaseouts.
10	Occupational health and Community safety.	Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities

Sr. No.	Policy principle	Summary
11	Physical cultural resources	Conserve physical cultural resources and avoid destroying or damaging them. Provide for the use of "chance find" procedures.

2.3.6 Comparison of International and Local Environmental Legislations

51. The ADB SPS requires application of pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards. The SPS states that when host country regulations differ from these standards, the EA will achieve whichever is more stringent.

52. In order to select the most stringent standards applicable, a mix of local (NEQS) and international (IFC) regulations have been selected. The IFC Environmental, Health, and Safety (EHS) Guidelines, General EHS Guidelines: Environmental, Noise Management has noise level guidelines for daytime and night time, which are applicable. Considering the high baseline noise levels in the project area, it shall be ensured that the increase in noise levels is minimized as far as possible. Also, project related noise levels in the project area are not allowed to increase the existing levels by 3 dB or more. Furthermore, it shall be ensured that all necessary noise mitigation measures are implemented to minimize the noise levels in the project area.

53. **Table 2.5** presents IFC workplace noise standards that are applicable to the construction workers. It should also be noted that IFC EHS guidelines advise that where existing ambient noise levels already exceed thresholds, the Project should not result in an increase of more than 3 dB over existing ambient noise at the nearest receptor location off-site.

Table 2.5: IFC Work Environment Noise limits

Sr. No.	Type of Work, workplace	IFC General EHS Guidelines
1	Heavy Industry (no demand for oral communication)	85 Equivalent level Leq,8h
2	Light industry (decreasing demand for oral communication)	50-65 Equivalent level Leq,8h

54. A comparison of applicable local and international guidelines for ambient air quality has been provided in **Table 2.6** below. In the case of most pollutants, the NEQS standards for ambient air quality are more stringent in comparison to USEPA and WHO/IFC standards. The applicable and most stringent parameters for each respective pollutant are highlighted in green.

Table 2.6: Comparison of International and local Air Quality Standards*

Sr. No.	Pollutants	USEPA		WHO/IFC		Pak. NEQS	
		Avg. Time	Standard	Avg. Time	Standard	Avg. Time	Standard
1	SO_2	3 hrs 1 hr	0.5 ppm 75 ppb	24 hr 10 min	20 ug/m^3 500 ug/m^3	Annual Mean 24 hrs	80 ug/m^3 120 ug/m^3
2	CO	8 hrs 1 hr	9 ppm (11 mg/m^3) 35 ppm (43 mg/m^3)	-	-	8 hrs 1 hr	5 mg/m^3 10 mg/m^3
3	NO_2	Annual Mean 1 hr	100 ug/m^3 (53 ppb) 100 ppb	1 yr 1 hr	40 ug/m^3 200 ug/m^3	Annual Mean 24 hrs	40 ug/m^3 80 ug/m^3
4	O_3	8 hrs	0.07ppm (148 ug/m^3)	8 hrs	100 ug/m^3	1 hr	130 ug/m^3
5	TSP	-	-	-	-	Annual Mean 24 hrs	360 ug/m^3 500 ug/m^3
6	PM_{10}	24 hrs	150 ug/m^3	1 yr 24 hr	20 ug/m^3 50 ug/m^3	Annual Mean 24 hrs	120 ug/m^3 150 ug/m^3
7	$PM_{2.5}$	Annual Mean 24 hrs	15 ug/m^3 35 ug/m^3	1 yr 24 hr	10 ug/m^3 25 ug/m^3	Annual Average 24 hrs 1 hr	15 ug/m^3 35 ug/m^3 15 ug/m^3

**: The standards highlighted in green for each respective pollutant are the most stringent based on a comparison between local and international regulations and thus shall be applicable for the proposed project.*

** In instances where the airshed is significantly degraded and the pollutant levels are already exceeding the ambient pollutant concentrations provided in the table above, it shall be ensured that the project activities cause as small an increase in pollution levels as feasible and amounts to a fraction of the applicable short term and annual average air quality guidelines or standards as established in the project specific environmental assessment.*

55. Similar to the standards for air quality, the comparison of noise standards provided in **Table 2.7** clearly shows that NEQS standards for noise are more stringent in comparison to the IFC standards. The only exception is the daytime noise level standard for Industrial areas where the IFC standard is more stringent (70 dB(A)) in comparison to NEQS (75 dB(A)) and so for this particular parameter, the IFC standard will be used.

Table 2.7: Comparison of International and Local Noise Standards

Sr. No.	Category of Area/Zone	Limit in dB(A) Leq			
		NEQS		WHO/IFC	
		Day Time 06:00 – 22:00	Night Time 22:00-06:00	Day Time 07:00 – 22:00	Night Time 22:00-07:00
1	Residential area (A)	55	45	55	45
2	Commercial area (B)	65	55	70	70
3	Industrial area (C)	75	65	70	70
4	Silence zone (D)	50	45	55	45

**: The standards highlighted in green for each respective Area/Zone are the most stringent based on a comparison between local and international regulations and thus shall be applicable for the proposed project.*
** In instances where baseline noise levels are already exceeding the standards above, it will need to be ensured that the project activities do not cause an increment of more than 3 dB(A) from the baseline noise levels.*

56. The comparison of water quality standards provided in **Table 2.8** and **Table 2.9** clearly shows the NEQS standards for surface and drinking water quality as compare to WHO and FAO standards.

Table 2.8: Comparison of National and International Drinking Water Standards

Sr. No	Parameter	Units	Pak. NEQS	WHO Standards
1	Temperature (During Sample Collection)	^{O}C	NS	NS
2	Color	Pt-Co	≤15TCU	<15TCU
3	pH	pH unit	6.5-8.5	6.5-8.5
4	Turbidity	NTU	<5	<5
5	Total Hardness	mg/L	<500.00	NS
6	Total Dissolved Solid (TDS)	mg/L	<1000.00	<1000.00
7	Total Suspended Solid (TSS)	mg/L	NS	NS
8	Ammonia	mg/L	NS	NS
9	Fluoride F^-	mg/L	<1.50	1.50
10	Sulfate (SO_4^{-2})	mg/L	NS	NS
11	Chloride (Cl^-)	mg/L	<250.00	250
12	Nitrate $(NO_3)^-$	mg/L	<50.00	50.00
13	Odor	-	Non-Objectionable / Acceptable	Non-Objectionable / Acceptable
14	Taste	-	Non-Objectionable / Acceptable	Non-Objectionable / Acceptable
15	Sodium	mg/L	NS	NS
16	Iodine	ppm	NS	NS
17	Arsenic (As)	mg/L	< 0.05	0.01
18	Iron (Fe^{3+})	mg/L	NS	NS
19	Zinc (Zn^{2+})	mg/L	5.0	3.0
20	Conductivity	µS/cm	NS	NS
21	Bicarbonate	mg/L	NS	NS
22	Nitrite	mg/L	<3	3
23	Magnesium	mg/L	NS	NS
24	Calcium as Ca	mg/L	NS	NS

Sr. No	Parameter	Units	Pak. NEQS	WHO Standards
25	Phosphate	mg/L	NS	NS
26	Potassium	mg/L	NS	NS
27	Boron	mg/L	<0.3	0.3
28	SAR Iodine (I)	mg/L	NS	NS
29	Aluminum	mg/L	< 0.2	0.2
30	Antimony	mg/L	<0.005	0.02
31	Cadmium	mg/L	0.01	0.003
32	Mercury	mg/L	<0.001	0.001
33	Nickel	mg/L	<0.02	0.02
34	Selenium	mg/L	0.01	0.01
35	Barium	mg/L	0.7	0.7
36	Total Chromium	mg/L	<0.05	0.05
37	Copper	mg/L	2	2
38	Lead	mg/L	<0.05	0.01
39	Cyanide (CN)	mg/L	<0.05	0.07
	Manganese	mg/L	<0.5	0.5
40	Total Coliforms	cfu/100ml	0/100 ml	0/100 ml
41	Fecal Coli forms (E.Coli)	cfu/ml	0/100 ml	0/100 ml

NS = Not Specified
** The standards highlighted in green for each respective pollutant are the most stringent based on a comparison between local and international regulations and thus shall be applicable for the proposed project. Other are same in both case.*

Table 2.9: Comparison of National and International Surface Water Standards

Sr. No.	Parameter	Units	NEQS (National)	WHO Class V (Agriculture)	FAO Standards
1	Temperature	^{O}C	--	--	--
2	pH	pH unit	6-9	<5.3	6.0-8.5
3	COD	mg/L	150	>30	--
4	(BOD_5)	mg/L	80	--	--
5	Solids, Total dissolved (TDS)	mg/L	3500	--	0-2000
6	Solids, Total suspended (TSS)	mg/L	200	--	--
7	Chloride	mg/L	1000	--	0-1065
8	Fluoride (F^-)	mg/L	10	--	--
9	Oil & grease	mg/L	10	--	--
10	Phenols, Total (Phenolic Compounds)	mg/L	0.10	--	--
11	Cyanide(CN-)	mg/L	01.00	--	--
12	Anionic Detergents as MBAS	mg/L	20.00	--	--
13	Sulfate (SO_4^{-2})	mg/L	600	--	0-960
14	Sulfide (S)	mg/L	01.00	--	--
15	Ammonia NH_3	mg/L	40.00	--	--
16	Cadmium (Cd)	mg/L	0.10	>0.0039 mg/L	--
17	Chromium (Cr) as Hexavalent & Trivalent	mg/L	1.00	>0.016 mg/L	--
18	Copper (Cu)	mg/L	1.00	>0.018 mg/L	--

Sr. No.	Parameter	Units	NEQS (National)	WHO Class V (Agriculture)	FAO Standards
19	Lead	mg/L	0.50	>0.082 mg/L	--
20	Nickel	mg/L	1.00	>1.4 mg/L	--
21	Zinc	mg/L	5.00	>0.12 mg/L	--
22	Iron	mg/L	8.00	--	--
23	Manganese	mg/L	1.50	--	--
24	Selenium	mg/L	0.50	--	--
25	Silver	mg/L	1.00	--	--
26	Arsenic	mg/L	1.00	>0.36 mg/L	--
27	Barium	mg/L	1.50	--	--
28	Magnesium	mg/L	--	--	0-61
29	Nitrate	mg/L	--	--	0-10
30	Sodium	mg/L	--	--	0-920
31	Boron	mg/L	6.00	--	0-2
32	Mercury	mg/L	0.01	>0.0024 mg/L	--
33	Chlorine	mg/L	01.00	--	--
34	Total Toxic Metals	mg/L	02.00	--	--
35	Turbidity	NTU	NS	--	--
36	Oxygen, Dissolved	mg/L	NS	--	--
37	Pesticides	µg/L	NS	--	--
38	Nutrients as Potassium	mg/L	--	--	0-2
39	Nutrients as Nitrogen	mg/L	--	--	--
40	Nutrients as Phosphorous	mg/L	--	--	--
41	Total Coliform	MPN/100ml	--	--	--
42	Fecal Coliform	MPN/100ml	--	--	--

NS = Not Specified

** The standards highlighted in green for each respective pollutant are the most stringent based on a comparison between local and international regulations and thus shall be applicable for the proposed project. Other are same in both case.*

57. Based on the above comparison, local regulations or environmental quality standards (NEQS) are more stringent and consider more parameters than other and thus shall be applicable for the proposed project as far as regulations regarding other environmental parameters are concerned such as acceptable effluent disposal parameters, the local regulations i.e. NEQS take precedence over any other international regulations such as IFC.

2.4 INTERNATIONAL PROTOCOL / CONVENTIONS

58. As Pakistan is a member of a number of international organizations such as United Nations Organization (UNO), Organization of the Islamic Conference (OIC), South Asian Association for Regional Cooperation (SAARC), Economic Cooperation Organization (ECO) etc., so it has to follow the international protocols and obligations related to the environment. The major protocols, ratification dates by Pakistan and obligations related to the proposed project are provided in the **Table 2.10** below:

Table 2.10: International Agreements/Conventions Relevant to the Project

Sr. No.	Agreement/ Convention	Ratification	Description/Relevance
1.	UNESCO Convention on the Protection of the World's Cultural and Natural Heritage, 1972 Web Link: http://whc.unesco.org/en/%20convention%20text/	Pakistan ratified this convention on 23 July 1976.	Convention concerning the Protection of the World Cultural and Natural Heritage - requires parties to adopt a general policy on the protection of the natural and cultural heritage, to set up services for such protection, to develop scientific and technical studies, to take appropriate legal, technical, scientific and administrative measures and to foster training and education for such protection. The chance find procedure will be implemented if any cultural and heritage site is found within Project Area during construction.
2.	Sustainable Development Goals (SDGs) – 2015-2030 Web Link: https://sustainabledevelopment.un.org/focussdgs.html	Pakistan was the first country to adopt SDGs 2030 agenda through a unanimous resolution of the Parliament of Pakistan.	The Sustainable Development Goals (SDGs) are a good collection of 17 global goals set by the United Nations in 2015. Pakistan has recently committed to Agenda 2030 and has become signatory to SDGs where Goal 6 calls, among others, for ensuring availability and sustainable management of water and sanitation for all, water use efficiency and integrated water resources management. The SDG 5 on gender equality and women's empowerment emphasizes to ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life.
3.	United Nations Framework Convention on Climate Change (UNFCCC), 1992 Web Link: https://unfccc.int/process-and-meetings/the-convention/status-of-ratification/status-of-ratification-of-the-convention	Signed on 13 Jun 1992 and ratified on 1 Jun 1994.	The UN Framework Convention on Climate Change (UNFCCC) is a multilateral agreement to address the issue of climate change. The Convention, was sets out and opened for signature at the June 1992 UN Conference on Environment and Development (UNCED), also known as the Rio Earth Summit. The UNFCCC entered into force on 21 March 1994. Pakistan being signatory of this treaty is bound to control the GHG emissions and climate change. Recent conference of parties (COP) for UNFCCC was held from 6 to 17 Nov, 2017 in Bonn Germany. This is relevant as the proposed project will emit GHG emissions which will contribute to global warming and greenhouse effect.

Sr. No.	Agreement/ Convention	Ratification	Description/Relevance
4.	Paris Agreement, 2016 Web Link: https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement	Paris Agreement was signed on 22 April 2016 and ratified on 10 November 2016.	The Paris Agreement's long-term temperature goal is to keep the increase in global average temperature to well below 2 °C above pre-industrial levels; and to pursue efforts to limit the increase to 1.5 °C, recognizing that this would substantially reduce the risks and impacts of climate change. It also aims to increase the ability of parties to adapt to the adverse impacts of climate change, and make "finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development." Under the Paris Agreement, each country must determine, plan, and regularly report on the contribution that it undertakes to mitigate global warming. The proposed project will consider using green and sustainable design to reduce GHG emissions.
5.	International Union for Conservation of Nature and Natural Resources Red List, 2000 Web Link: https://www.iucnredlist.org/		This enlists wildlife species experiencing various levels of threats internationally. Some of the species indicated in the IUCN red list are also present in the wetlands of Pakistan. However, no wildlife species experiencing various levels of threats are present in and around the surroundings of Project Area.

59. The following international conventions and frameworks are relevant to the project and support its implementation in line with Pakistan's commitments to social inclusion, labor rights, gender equality, disability inclusion, stakeholder engagement, and human rights.

- Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) Ratified (1996) Ensures gender equality, non-discrimination, equal access to healthcare services, employment opportunities, and participation of women in project consultations and benefits.
- Convention on the Rights of the Child (CRC) Ratified (1990) Relevant to maternal and child healthcare services, protection of children from construction-related risks, and maintenance of safe hospital environments.
- Convention on the Rights of Persons with Disabilities (CRPD) Ratified (2011) Requires accessibility and inclusive design of hospital facilities for persons with disabilities, including ramps, accessible sanitation facilities, signage, and service delivery.
- International Covenant on Economic, Social and Cultural Rights (ICESCR) Ratified (2008) Supports the right to health, safe working conditions, adequate standards of living, and equitable access to healthcare services.

- International Covenant on Civil and Political Rights (ICCPR) Ratified (2010) Promotes stakeholder participation, access to information, consultation processes, and grievance redress mechanisms.
- Universal Declaration of Human Rights (UDHR) Endorsed Provides overarching principles relating to human dignity, equality, non-discrimination, and access to public services.
- ILO Convention No. 100 Equal Remuneration Convention Ratified Supports equal pay for equal work among project workers.
- ILO Convention No. 111 Discrimination (Employment and Occupation) Convention Ratified Prevents discrimination based on gender, religion, ethnicity, disability, or social status during recruitment and employment.
- ILO Convention No. 138 Minimum Age Convention Ratified Prohibits child labor in project construction activities.
- ILO Convention No. 182 Worst Forms of Child Labour Convention Ratified Prevents engagement of children in hazardous construction and waste-handling activities.
- ILO Convention No. 29 Forced Labour Convention Ratified Prohibits forced or compulsory labor in project activities.
- ILO Convention No. 105 Abolition of Forced Labour Convention Ratified Reinforces prohibition of coercive labor practices.
- ILO Convention No. 190 Violence and Harassment Convention International good practice Relevant to prevention of workplace harassment, gender-based violence (GBV), and sexual harassment during project implementation.
- Beijing Declaration and Platform for Action Endorsed Supports gender mainstreaming, women's participation, and equitable access to project benefits.
- 2030 Agenda for Sustainable Development Adopted Particularly relevant to SDG 3 (Good Health and Well-Being), SDG 5 (Gender Equality), SDG 6 (Clean Water and Sanitation), SDG 8 (Decent Work), and SDG 10 (Reduced Inequalities).

3 DESCRIPTION OF THE PROJECT

3.1 GENERAL

60. This section provides an overview of the proposed project for revamping secondary healthcare hospitals in different districts of Khyber Pakhtunkhwa. The initiative focuses on upgrading infrastructure, improving operational efficiency, and equipping hospitals with modern healthcare technologies. Secondary healthcare hospitals serve as a critical link between primary healthcare facilities and tertiary care institutions. These facilities receive a large number of patients from surrounding rural and urban areas and therefore require functional infrastructure, reliable utilities, and adequate medical equipment.

61. The project involves rehabilitation and renovation of existing hospital infrastructure, installation of advanced medical systems, and improvement of supporting services such as electricity, water supply, drainage, and waste management. The works will be carried out within the existing premises of the hospitals. The revamping initiative is expected to significantly improve healthcare service delivery and patient satisfaction across the targeted districts.

62. This section provides a comprehensive overview of the proposed project, detailing its core objectives, location and accessibility, workforce and water requirements etc.

3.2 OBJECTIVES OF THE PROJECT

63. The primary objective of the project is to upgrade and modernize secondary healthcare hospitals in order to improve accessibility, efficiency, and quality of healthcare services. It aims to make secondary hospitals fully equipped hospitals with pleasant buildings, qualified human resource and quality services to create patient-centered healthcare facilities that provide safe, efficient, and affordable medical services to the community.

64. The specific objectives of the project include:

- To provide high quality emergency services to the general public especially the low socio-economic strata of population.
- To improve the patient care by improving the number of medical staff including consultants, doctors, nurses and other health professionals in the system.
- To improve the doctor to patient ratio and nurse to bed ratio in secondary healthcare hospitals.
- To equip the secondary healthcare hospitals especially the emergency units and gynae & Obstetrics Wards with the state-of-the-art equipment so as to enable them to provide higher end medical services.
- To improve the OPD services by reducing the patient Waiting time through introducing IT based queue management & sequencing systems.

- To improve the quality of consultation between the doctor and the patient by decreasing the load on the consultant through introducing intermediary filtering mechanism.
- To improve the hospitals environment by renovating, improving and remodeling the existing hospitals structures, as far as possible
- To ensure that hospital operations are run on 24/7 basis and they are not hampered by any power outage or failure of other supplies
- To improve the hospital environment by improving the support services in the hospital through engaging private sector.
- To improve the quality of allied clinical services like pathology and radiology by outsource these services as far as possible.
- To improve the general feel of the hospitals from the perspective of a patient by providing him better non-clinical facilities at the hospital.
- To make the hospital soothing and comfortable places by improving the hospital interior decor.
- To ensure that the consumables used in the hospitals are internationally acceptable medical grade and not injurious to the safety of the patients.
- To make the hospital monitoring systems more robust, efficient and effective through the use of IT solutions.
- To ensure that the gaps in existing financial systems and inventory processes are plugged as far as possible.
- To institute a regime of periodical testing of services by 3rd parties for their conformance to the Minimum Health Services Delivery Package.
- To standardize the hospital protocols throughout the province so as similar patient anywhere get similar treatment.
- To document the treatment log of all patients so as to make all the clinical processes auditable at given time.
- To assimilate and dove-tail the hospital services with the services offered under the umbrella of vertical programs.
- To institute a comprehensive end-to-end waste management system with a view to arrest the spread of infection from the hospital waste.

3.3 LOCATION OF THE PROJECT

65. The Department of Health KP has planned a multi-phased plan to revamp the secondary healthcare hospitals. The project will be implemented in four phases, this report has been prepared for Phase-III. Following is **Table 3.1** showing names of hospitals assessed and their respective locations under Phase-III are shown in **Figure 3.1.**

Table 3.1:-Locations of Hospitals Assessed under Phase III

Sr. No.	Phase	Name of the Hospital	Coordinates
1.	III	DHQ Hospital, Batkhela	34°36'41.63"N, 71°57'37.92"E
2.		DHQ Hospital, Saidu Sharif Swat	34°45'28.74"N, 72°21'29.95"E
3.		DHQ Hospital, Battagram	34°40'29.68"N, 73° 1'55.06"E
4.		King Abdullah Teaching Hospital, Manshera	34°19'31.17"N, 73°12'3.05"E
5.		DHQ Hospital, Kohistan	35°16’31.12” N, 73°13’31.3” E
6.		DHQ Hospital, Shangla	34°55’14” N, 72°37’58” E

Sr. No.	Phase	Name of the Hospital	Coordinates
7.		DHQ Hospital, Chitral	35°51'9.05"N, 71°47'20.90"E
8.		DHQ Hospital, Mardan	34°11'28.15"N, 72° 2'43.16"E
9.		DHQ Hospital Hangu	33°30'6.72"N, 71° 2'17.94"E
10.		DHQ Hospital, Lakki Marwat	32°37'13.41"N, 70°47'41.53"E
11.		DHQ Hospital, Tank	32°12'53.11"N, 70°23'1.77"E

66. These hospitals are located within urban or district headquarters areas and serve large populations from surrounding rural and semi-urban communities.

3.4 ACCESSIBILITY OF THE PROJECT

67. The phase-III hospitals are accessible through existing provincial and district road networks. These facilities are connected with nearby residential areas, public transport routes, and major highways. Accessibility ensures convenient movement of patients, hospital staff, emergency vehicles, and supply vehicles transporting medical equipment and construction materials.

3.4.1 District Headquarter (DHQ) Hospital, Batkhela

68. DHQ Hospital Batkhela is located along the main National Highway N-45 (Dir–Malakand Road), which serves as a regional corridor. The direct frontage on N-45 allows smooth traffic flow and convenient approach via both public and private transport. The hospital is located at Coordinates 34°36'41.63"N, 71°57'37.92"E.

3.4.2 District Headquarter (DHQ) Hospital, Saidu Sharif Swat

69. DHQ Hospital Saidu Sharif is situated on the main Saidu Sharif Road within the urban center of Swat. Its central location within the city enhances connectivity and facilitates convenient access for patients coming from nearby settlements as well as remote areas of the district. DHQ Saidu sharif swat is located at 34°45'28.74"N, 72°21'29.95"E.

3.4.3 District Headquarter (DHQ) Hospital, Battagram

70. DHQ Hospital Battagram is strategically located along the National Highway N-35 (Karakoram Highway), a major inter-district and regional route. This location ensures strong connectivity and reliable access for patients and emergency services, particularly from remote and hilly areas. This hospital is located at 34°40'29.68"N, 73° 1'55.06"E.

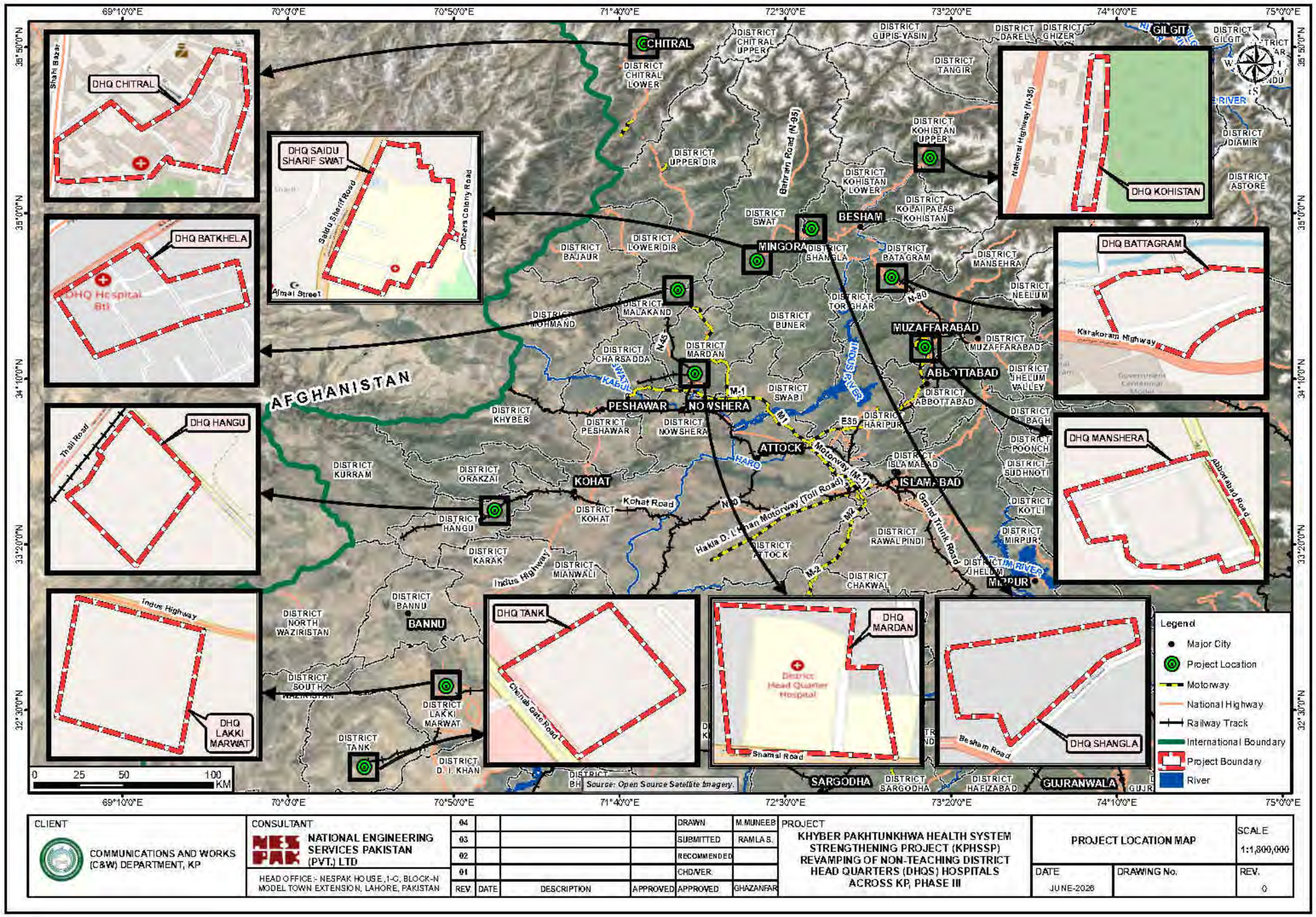


Figure 3.1: Project Location Map

3.4.4 King Abdullah Teaching Hospital, Mansehra

71. DHQ Hospital Mansehra is situated within the main urban area of Mansehra city. Its central location provides excellent accessibility, allowing easy movement for patients, staff, and emergency vehicles from across the district. Coordinates of the said hospital are 34°19'31.17"N, 73°12'3.05"E.

3.4.5 District Headquarter Hospital, Kohistan

72. DHQ Hospital Kohistan is located adjacent to the National Highway N-35 (Karakoram Highway) ensuring accessibility for populations residing in scattered and mountainous areas. The hospital is located at 35°16’31.12” N, 73°13’31.3” E.

3.4.6 District Headquarter (DHQ) Hospital, Shangla

73. DHQ Hospital Shangla is located in Alpuri, the district headquarters of Shangla. The hospital is easily accessible via local road networks connecting surrounding rural areas, ensuring convenient access for the district population. This hospital is located at 34°55’14” N, 72°37’58” E.

3.4.7 District Headquarter (DHQ) Hospital, Chitral

74. DHQ Hospital Chitral is located within the main Chitral Bazaar, facilitating convenient access for both local residents and patients from remote valleys of the district. Coordinates of the said hospital are 35°51'9.05"N, 71°47'20.90"E.

3.4.8 District Headquarter (DHQ) Hospital, Mardan

75. DHQ Hospital Mardan is located on Shamsi Road, one of the main roads in Mardan city. The hospital is uniquely divided into two sections situated on both sides of the road, with access points available from the main road. Its urban location ensures high accessibility and connectivity. Coordinates of DHQ Mardan are 34°11'28.15"N, 72° 2'43.16"E.

3.4.9 District Headquarter (DHQ) Hospital, Hangu

76. DHQ Hospital Hangu is located adjacent to the Thall–Hangu Road and can also be accessed via the Hangu–Lachi Road. Its position along these connecting routes ensures convenient accessibility for surrounding communities and supports efficient patient and emergency movement. This hospital is located at 33°30'6.72"N, 71° 2'17.94"E.

3.4.10 District Headquarter (DHQ) Hospital, Lakki Marwat

77. DHQ Hospital Lakki Marwat is situated along the Essa Khel Mianwali Road, a significant local route. The hospital has direct access from the main road, ensuring ease of approach for patients and visitors from both urban and rural areas. Coordinates of DHQ Lakki Marwat are 32°37'13.41"N, 70°47'41.53"E.

3.4.11 District Headquarter (DHQ) Hospital, Tank

78. DHQ Hospital Tank is located within the main city area of District Tank. The hospital is easily accessible via the main road network, allowing smooth movement for patients, visitors, and emergency services from across the district. This hospital is located at 32°12'53.11"N, 70°23'1.77"E.

3.5 COMPONENTS OF THE PROJECT

79. The project includes civil, electrical, mechanical, and environmental infrastructure improvements within the existing hospital premises. The scope of work to be performed, which is attached as **Annexure-I**, consists of revamping hospital buildings and associated infrastructure development, including dismantling works, civil, architectural, plumbing, electrical, mechanical and firefighting works, and external development works. Additionally, for execution of these works deployment of all necessary Material, Labor (s), Formwork, Tools & Machinery is also included.

80. The project encompasses comprehensive upgrades and service improvements across secondary healthcare hospitals in Khyber Pakhtunkhwa which includes;

3.5.1 Internal Upgrades

81. Internal improvements will include renovation of all patient related areas which includes burn units, isolation wards outpatient departments, washrooms, and administrative areas. Flooring, painting, ceiling systems, lighting fixtures, and ventilation systems will also be upgraded to enhance functionality and patient comfort.

3.5.2 External Works and Services

82. Rehabilitation of sewerage and drainage networks, electrification systems, installation of water filtration units, and integration of solar energy solutions to ensure reliable and sustainable utility services.

3.5.3 Specialized Units

83. Establishment of emergency stabilization rooms and pandemic response infrastructure to strengthen emergency preparedness and rapid response capacity.

84. Additional facilities such as isolation wards, emergency stabilization rooms and patient waiting areas will also be improved. Mechanical systems including Heating, Ventilation, and Air Conditioning (HVAC) units, firefighting systems, and medical gas pipelines will be installed to support safe hospital operations.

3.6 SALIENT FEAUTRES OF THE PROJECT

85. Key features of the proposed project include infrastructure rehabilitation, installation of modern healthcare equipment, improved patient management systems, and enhanced environmental health and safety practices. The project will introduce energy-efficient

lighting systems, improved water supply and sanitation infrastructure, rehabilitation and improvement of wastewater and drainage systems, strengthened firefighting and emergency safety systems, and universal accessibility measures, and reliable backup power systems. These improvements will enhance hospital functionality, reduce operational risks, and create a cleaner and safer environment for patients and healthcare staff. Major works/activities involve:

3.6.1 Civil and Building Works

86. This scope covers the renovation and upgrading of the existing building and surrounding areas. It includes repair and improvement of structural elements, roofing, flooring, surface finishes, painting, and interior spaces. External works include upgrading pavements, landscaping, boundary walls, waiting areas, and parking sheds. The scope also covers refurbishment of underground tanks for fire-fighting, sewage, and rainwater harvesting systems, as well as the elevated water tank. Additionally, roadways, walkways, paved areas, storm drainage, sewerage systems, and other civil works will be renovated to ensure the facility functions efficiently and safely.

87. Universal accessibility measures will also be incorporated to facilitate the safe and smooth movement of patients, persons with disabilities, elderly persons, and other persons with limited mobility within the hospital premises. These measures will include access ramps at relevant entrances and circulation areas, handrails and grab bars, accessible toilets, improvement of walkways and paved areas to facilitate wheelchair and patient movement, and maintenance of safe and unobstructed access routes within the hospital premises.

3.6.2 WATSAN and Fire-Fighting Works

88. This scope of work covers the installation of internal plumbing systems required for proper water supply and drainage throughout the building. Existing septic tanks will be rehabilitated/improved, while new septic tanks will be constructed at DHQ hospitals where such facilities are not available. It also includes the installation of the fire-fighting system, along with all necessary pipelines, valves, and related components to ensure compliance with safety standards. Fire protection arrangements will include dedicated fire-fighting water storage tanks, standby tanks, fire-fighting pumps, hose cabinets/hose reels, fire-fighting piping, valves, and associated fittings for distribution of fire-fighting water throughout the relevant hospital areas. Fire extinguishers and fire alarm systems, including smoke/heat detectors, manual call points, and audible/visual alarms, will also be provided or improved to strengthen fire detection and emergency response.

89. In addition, the work involves connecting the building to external water supply lines, drainage systems, and the rainwater harvesting network to support effective water management. The associated sewerage, drainage, and stormwater drainage networks will also be improved to ensure proper collection and conveyance of wastewater and stormwater and to minimize leakage, blockage, and localized flooding. The installation of natural gas piping is also included, ensuring the safe and efficient distribution of gas to the designated areas of the building.

90. The hospital waste treatment including waste water and solid waste is not included in the scope of the project.

3.6.3 Electrical and Information and Communication Technology (ICT) Works

91. This scope includes the installation of the building's main electrical distribution system, internal wiring, and power supply networks to ensure a reliable and efficient electricity supply throughout the facility. It also involves the installation of Information and Communication Technology (ICT) infrastructure, including data and communication networks to support modern connectivity and communication needs. In addition, the works cover the installation of Extra-Low Voltage (ELV) systems such as security systems, Closed-Circuit Television (CCTV), access control, and public address systems, which contribute to the overall safety, security, and effective operation of the building.

3.6.4 Mechanical Works

92. This scope of work includes the installation of Heating, Ventilation, and Air Conditioning (HVAC) systems to ensure a comfortable indoor environment by maintaining proper temperature, ventilation, and air quality within the building. It also involves the installation of the medical gas system necessary for hospital operations, providing a safe and reliable supply of essential medical gases to designated healthcare areas in accordance with relevant standards and operational requirements.

3.6.5 Climate-Responsive Design:

93. The project integrates climate-responsive design measures to enhance the resilience of healthcare facilities against identified climate hazards and strengthen their capacity to maintain safe, reliable, and uninterrupted healthcare services under current and future climate conditions. The key climate adaptation objectives include:

- Improved stormwater drainage, site grading, and rainwater harvesting systems to reduce flood risk, prevent waterlogging, and enhance water resource management.
- Rehabilitation of water supply, storage, and sanitation infrastructure to improve water security and maintain reliable services during periods of water scarcity.
- Installation of energy-efficient HVAC systems and rooftop solar photovoltaic (PV) systems to enhance thermal comfort, improve energy efficiency, and increase resilience to power outages.
- Upgrading of electrical, utility, and fire-fighting systems to strengthen the reliability of critical infrastructure and support uninterrupted hospital operations during emergencies.
- Rehabilitation and strengthening of buildings and associated civil infrastructure, including roads, walkways, drainage, and utility networks, to improve durability and resilience to climate-related stresses.

3.7 LAND ACQUISITION

94. All the work will be carried out within the existing premises of the hospitals; therefore, no land acquisition is required.

3.8 PROJECT ADMINISTRATIVE JURISDICTION

95. The proposed project falls under administrative jurisdiction of Malakand, Swat, Battagram, Mansehra, Kohistan, Shangla, Chitral, Mardan, Hangu, Lakki Marwat and Tank, Khyber Pakhtunkhwa.

3.9 PROJECT IMPLEMENTATION SCHEDULE

96. The proposed project is expected to be completed within 24 months.

3.10 COST OF THE PROJECT

97. Total Cost of infrastructure improvement along with revenue component for phase-III has been estimated **Rs. 5617.154 million**.

3.11 CONSTRUCTION MATERIAL

98. Major construction materials required for the project would include but not limited to; cement, sand, crushed aggregate, bricks and concrete blocks, reinforcing steel, structural steel sections, ceramic and porcelain tiles, marble and granite finishes, aluminum frames, glass panels, paints and coatings, gypsum boards, electrical wiring, Polyvinyl Chloride (PVC) and GI pipes, plumbing fixtures, insulation materials, and waterproofing compounds. These materials will be procured from approved suppliers and will comply with national construction standards and quality specifications.

99. Details of the materials to be used in the proposed project are given in the following **Table 3.2**

Table 3.2:-Construction Material for the proposed project

Sr. No.	Category	Sub-Category	Materials Included
1	Civil Construction Materials (Building Works)	Structural Materials	Cement (OPC / Sulphate Resistant Cement), Sand (Fine Aggregate), Crush / Gravel (Coarse Aggregate), Reinforcement Steel Bars (Deformed Bars), Plain Cement Concrete (PCC), Reinforced Cement Concrete (RCC), Brick Masonry, Stone Masonry
2		Finishing Materials	Cement Plaster, Gypsum Plaster / POP, Ceramic Tiles, Porcelain Tiles, Marble / Granite, Skirting Tiles, Ceiling Boards,

Sr. No.	Category	Sub-Category	Materials Included
			False Ceiling Framework
3		Doors & Windows	Aluminum Windows, UPVC Windows, Wooden Doors, Flush Doors, Steel Doors, Glass Panels, Door Hardware (Hinges, Locks, Handles)
4		Painting & Surface Treatment	Primer, Emulsion Paint, Enamel Paint, Weather Shield Paint, Waterproofing Chemicals
5	Plumbing Materials	Water Supply & Sanitary Fixtures	PPRC Water Supply Pipes, GI Pipes, PVC Pipes, HDPE Pipes, Valves (Gate Valves, Ball Valves), Faucets / Taps, Wash Basins, WC Units, Urinals, Shower Sets, Floor Traps, Water Tanks, Pipe Fittings (Elbows, Tees, Reducers)
5	Drainage & Sewerage Materials	Sewerage Network	RCC Sewer Pipes, PVC Sewer Pipes, Manhole Covers, Manhole Rings, Drain Channels, Concrete for Manholes, Inspection Chambers, Gully Traps, Bedding Sand
6	Road Works Materials	Pavement Construction	Subgrade Soil, Granular Sub Base (GSB), Aggregate Base Course, Crushed Aggregate, Asphalt / Bitumen, Prime Coat, Tack Coat, Asphalt Concrete, Road Marking Paint, Kerb Stones
7	Electrical Materials	Electrical Infrastructure	Electrical Cables, PVC Conduits, Cable Trays, Distribution Boards, Switches and Sockets, LED Lights, Panel Boards, Earthing System, Circuit Breakers

Sr. No.	Category	Sub-Category	Materials Included
8	ICT / Low Voltage System	Communication & Security	Data Cables (CAT-6 / Fiber Optic), Network Racks, CCTV Cameras, Access Control System, Fire Alarm Cables, Communication Panels
9	HVAC Materials	Heating, Ventilation & Air Conditioning	Air Handling Units (AHU), Ducting Sheets, Insulation Material, Copper Pipes, Refrigerant Gas, Diffusers and Grills, Chillers / Split Units, Exhaust Fans
10	Solar System Materials	Solar Power System	Solar Panels, Solar Inverters, Mounting Structures, DC Cables, Batteries, Charge Controllers, Earthing System
11	Medical Gas System Materials	Medical Gas Infrastructure	Oxygen Pipelines, Copper Medical Gas Pipes, Pressure Regulators, Gas Outlets, Alarm Panels, Vacuum Pumps

3.12 EXPECTED EQUIPMENT FOR CONSTRUCTION

100. Construction and renovation activities will require various types of machinery and equipment including excavators, backhoe loaders, concrete mixers, concrete vibrators, water pumps, diesel generators, air compressors, welding machines, steel cutting machines, drilling machines, scaffolding systems, dump trucks, and mobile cranes. In addition, smaller tools such as tile cutters, grinders, measuring instruments, and electrical testing equipment will be used during construction and installation activities.

101. The list of the machinery and the equipment expected to be used for the propose project are provided in **Table 3.3.**

Table 3.3: Machinery and Equipment Requirement for the Proposed Project

Sr. No.	Machinery Name	Sr. No.	Machinery Name
1	Grinding Machine	2	Concrete mixer machine
3	Vibratory Roller	4	Forklift
5	Water Tankers	6	Mini / Standard Excavator
7	Generators	8	Dump Truck
9	Scaffolding (Modular)	10	Concrete Vibrator

3.13 CONSTRUCTION CAMPS

102. For the hospital revamping project, one (01) construction camp will be established for each hospital site. The camps will be located outside the core operational areas of the hospitals or within designated zones that do not disrupt ongoing healthcare services. Prior to the commencement of construction activities, the Contractor will identify and establish camp sites in accordance with the following criteria:

- Camp sites must be situated away from sensitive receptors, including patient wards, residential areas, and critical healthcare service zones, to avoid disturbance.
- The selected sites must be in close proximity to the respective hospital, with proper access to main and link roads for efficient transportation of materials and workforce.
- Camps should be located in areas where drainage will not contaminate or adversely affect domestic or hospital water supply systems.
- Each camp site should be adequate in size to accommodate all required facilities, ensuring no overcrowding of structures or personnel.
- Site selection should avoid any damage to existing infrastructure, utilities, vegetation, and hospital services, including water supply and sewerage systems.
- Camp sites should not be located in flood prone or waterlogged areas;
- Environmentally and socially sensitive areas (if any) in the vicinity should be avoided to minimize adverse impacts.

3.14 WORKFORCE REQUIREMENTS

103. Manpower demand estimation is an essential component to facilitate deployment of manpower. The total manpower required for Phase-III is 275 personnel, which corresponds to 25 workers allocated per hospital to ensure efficient and timely execution of the revamping activities.

104. This workforce distribution has been planned to maintain adequate labor availability at each site, enabling simultaneous progress of construction and renovation works across all Phase-III hospitals.

3.15 SOURCE OF WATER

Construction Phase

105. The Contractor shall ensure that water is used in a manner that does not jeopardize existing hospital operations, community water supply, or any designated water uses, and that water quality is not adversely affected or deteriorated.

106. The source of water for construction and operational activities shall be identified and finalized subject to prior approval from the PMIU and the Supervision Consultant, based on technical verification and compliance with applicable environmental requirements and safeguard standards.

Operation Phase

107. The water requirement during the operational phase will be met through existing hospital water supply systems, ensuring efficient use without affecting existing users or water quality.

3.16 WATER REQUIREMENT

Construction Phase

108. The water consumption for phase-III is estimated to be 1250 gallons/day at each site and for phase-III it will be 13750 gallons/day for 275 workers during construction phase of the proposed project.[1]

Operational Phase

109. The water consumption during operation phase for the existing Phase-III hospitals has been estimated based on a standard requirement of 250 gallons per bed per day. Accordingly, the daily water demand is estimated at 87,500 gallons for DHQ Batkhela, 137,500 gallons for DHQ Saidu Sharif Swat, 30,000 gallons for DHQ Battagram, 27,500 gallons for DHQ Kohistan, 87,500 gallons for King Abdullah Teaching, Hospital Mansehra, 75,000 gallons for DHQ Shangla, 50,000 gallons for DHQ Chitral, 100,000 gallons for DHQ Mardan, 52,500 gallons for DHQ Hangu, 50,000 gallons for DHQ Lakki Marwat and 27,500 gallons for DHQ Tank, resulting in a cumulative demand of approximately 725,000 gallons per day.[1]

3.17 WASTEWATER GENERATION

Construction Phase

110. During construction phase, wastewater generation is primarily from domestic use by workers. For each site, with an estimated workforce of 25 workers, wastewater generation is approximately 1,000 gallons per day. For Phase-III (Eleven sites), the total wastewater generation is estimated at approximately 11,000 gallons per day, to be managed through appropriate on-site sanitation facilities.[2]

Operation Phase

111. The wastewater generation during operation phase for the existing Phase-III hospitals has been estimated based on the anticipated operational water use. Accordingly, the daily wastewater discharge is estimated at 70,000 gallons for DHQ Batkhela, 110,000 gallons for DHQ Saidu Sharif, 24,000 gallons for DHQ Battagram, 70,000 gallons for

[1] Design and Construction of Small Water Systems: A Guide for Managers, American Water Works Association, 1984, and Planning for an Individual Water System. American Association for Vocational Instructional Materials, 1982

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

King Abdullah Teaching Hospital, Mansehra, 22,000 gallons for DHQ Kohistan, 60,000 gallons for DHQ Shangla, 40,000 gallons for DHQ Chitral, 80,000 gallons for DHQ Mardan, 42,000 gallons for DHQ Hangu, 40,000 gallons for DHQ Lakki Marwat and 22,000 gallons for DHQ Tank, with a cumulative generation of approximately 580,000 gallons per day.[2]

3.18 SOLID WASTE ESTIMATION

Construction Phase

112. The solid waste generation for phase-III is estimated to be 178.75 kg/day, this includes 123.75 kg/day waste for 275 construction workers and 55 kg/day as general construction waste during construction phase of the proposed Project.[3]

Operational Phase

113. The operational solid waste generation for Phase-III hospitals has been estimated based on a standard rate of 2 kg/bed/day. Accordingly, the daily solid waste generation is estimated at 700 kg for DHQ Batkhela, 1100 kg for DHQ Saidu Sharif, 240 kg for DHQ Battagram, 700 kg for King Abdullah Teaching Hospital, Mansehra, 220 kg for DHQ Kohistan, 600 kg for DHQ Shangla, 400 kg for DHQ Chitral, 800 kg for DHQ Mardan, 420 for DHQ Hangu, 400 kg for DHQ Lakki Marwat and 220 kg for DHQ Tank resulting in a cumulative solid waste generation of approximately 5,800 kg/day.[4]

3.19 POWER REQUIREMENT/ POWER SOURCE

Construction Phase

114. During the construction/renovation phase, electrical power required for construction/renovation machinery and equipment will be arranged through temporary power connections from the existing utility supply available at the hospital premises. Diesel generator sets will also be used as standby power sources to operate construction equipment when required. The use of energy-efficient equipment will be encouraged to minimize power consumption during activities.

Operational Phase

115. During Operational Phase power would be supplied through temporary electrical connections from the local utility network or portable diesel generators where necessary. Proper wiring, Earthing, and safety arrangements will be ensured to prevent electrical accidents.

[3] The World Bank Report 2012 – What a Waste: A global review of solid waste management. Based on UNEP estimates for waste generation in the Asia Pacific. Average is 0.45 kg/capita/day. General construction waste was considered 5kg/day/hospital.

[4] A waste generation rate of 2 kg/bed/day has been adopted based on WHO guidelines and regional studies for developing countries.

4 DESCRIPTION OF THE ENVIRONMENT

4.1 GENERAL

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

4.2 PROJECT STUDY AREA

117. The existing environmental conditions have been assessed within the hospital premises and the immediate surrounding areas. The proposed interventions are limited to revamping and rehabilitation of existing buildings within the hospital boundary. No expansion, extension, or construction of new buildings is planned. Accordingly, the Area of Influence (AoI) is confined to the hospital premises and its adjacent areas.

118. The information has been collected from variety of sources, including published literature, previous environmental studies of the nearby areas, field observations, monitoring and surveys, conducted specifically for this project have been analyzed for this study.

119. Consultations were also held with the general public and stakeholders of the project area in order to seek the public opinion on the implementation of the proposed project. Map of AOI of the proposed project are attached as **Annexure-II**

4.3 FIELD VISIT

120. For the primary data acquisition, the NESPAK team conducted the detailed field visits to the proposed project site in October 2025 and February, 2026. The major objective of the field visit was to collect the baseline data on physical, biological and social aspects along with identification, assessment and categorization of the significant environmental impacts of the proposed project. The secondary data was collected from published sources/reports and relevant departments, which were also verified through visual observations during detailed surveys.

4.4 PHYSICAL ENVIRONMENT

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

4.4.1 Physiography and Topography

Battagram

122. Battagram is characterized by a predominantly mountainous and rugged landscape, forming a transition between the lower Himalayas and the Hindu Kush ranges. Elevations range from 500m to over 4,500m above sea level. The district is defined by narrow valleys and steep slopes, which makes the soil highly susceptible to erosion and significant landslide activity during the heavy monsoon periods documented between 2010 and 2025.[5] Topography of Project Area is presented in **Figure 4.1.**

Chitral

123. Chitral's topography is mostly hilly and rocky, characterized as a high altitude and high relief mountainous region representing the easternmost terrains of the Hindu Kush range. It ranges from an elevation of 1,093 m at Arandu to 7,727 m (25,290 ft) at Tirich Mir, the highest peak of the Hindu Kush. The main valley is 300 km (220 miles) long, with an average width of less than half a mile, though it opens up to about three miles at locations like Boroghil, Booni, Chitral Town, and Drosh.[6]

Hangu

124. Hangu District features a distinct intermountain valley topography, nestled between the rugged semi-arid mountain ranges of the North-Western Himalayas. The district is bounded by the Samana Range to the south and the Orakzai hills to the north, with elevations ranging from 600m in the valley floors to over 2,000m at the mountain crests. The main Hangu Valley runs east-west, forming a natural corridor. The terrain transitions sharply from steep, highly eroded mountain slopes to relatively flat, alluvial fans and terrace structures along the valley floor. This enclosed basin structure causes stormwater to drain rapidly from the steep surrounding hills into the narrow central valley.[7]

Lakki Marwat

125. Lakki Marwat District is primarily defined by a large, basin-like alluvial plain surrounded on almost all sides by rugged, low-altitude mountain ranges. It is bounded by the Marwat Range to the east and south, and the Bhittani Range to the west, with elevations ranging from 200m on the valley floors to about 1,000m at the ridge crests. The central landscape is an expansive, hyper-arid desert plain dominated by massive rolling sand dunes, flat clay patches (locally called Pat), and deeply incised dry ravines. This unique basin configuration channels rapid mountain runoff straight into the flat desert floor, where water quickly spreads across wide areas.[8]

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[5] Bacha, A. S., et al. (2023). Landslide susceptibility mapping using machine learning algorithms in the Battagram District, Pakistan. Land, 12(2), 415.
[6] Baig, S. A., Mahmood, Q., Nawab, B., Hussain, A., & Nafees, M. (2010). Assessment of seasonal variations in surface water quality of Chitral River, North West Frontier Province (NWFP), Pakistan. World Applied Sciences Journal, 9(6), 674–680.
[7] Ali, M., Khan, S., & Ahmad, I. (2024). Spatiotemporal analysis of urban expansion and environmental vulnerability mapping in District Mansehra, Pakistan, using geospatial techniques. Land, 13(4), 492. doi.org
[8] Government of Khyber Pakhtunkhwa. (2026). Draft Land Use Plan of District Lakki Marwat: Volume II - Sectoral Studies. Urban Policy & Planning Unit. Planning and Development Department. f

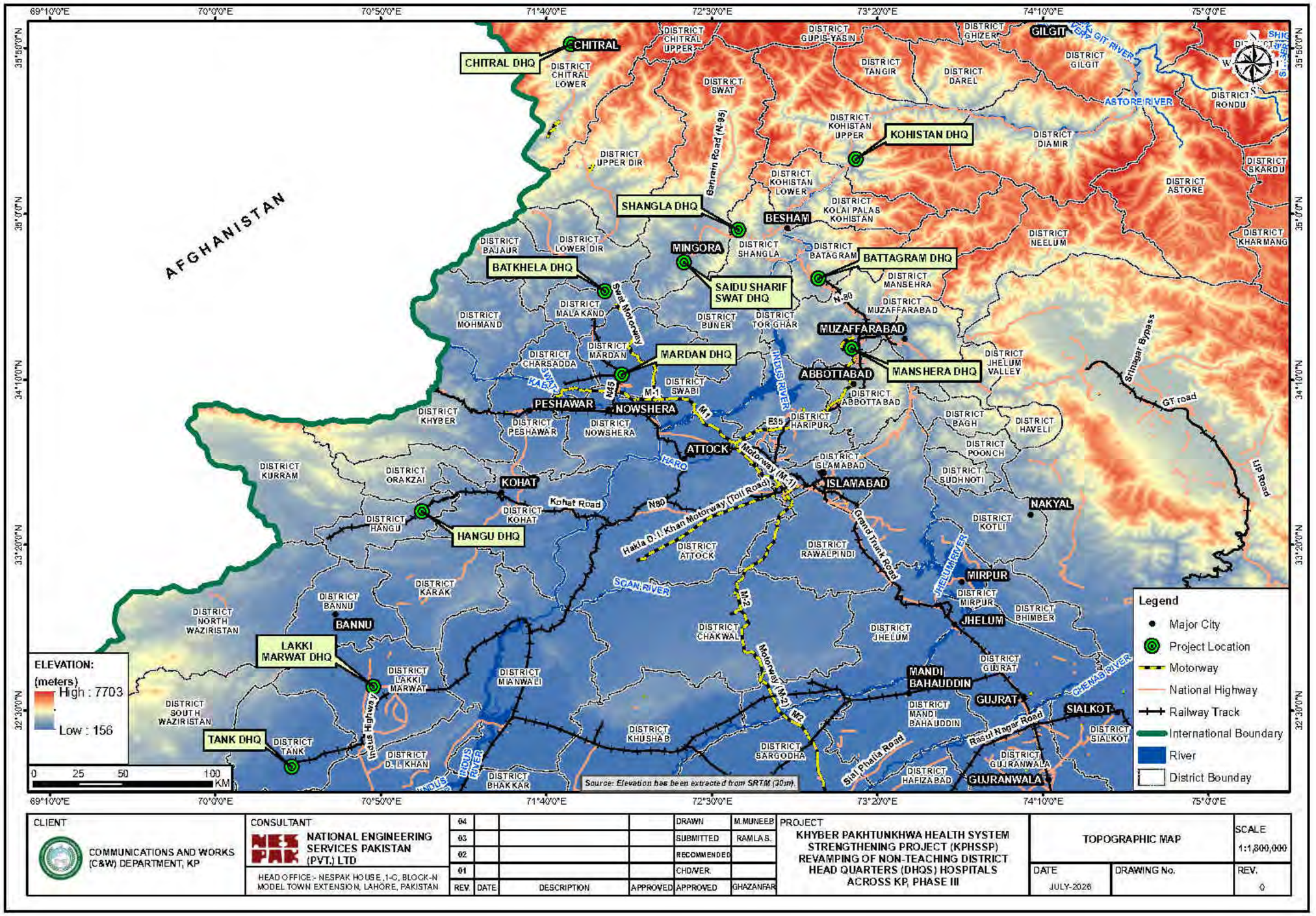


Figure 4.1: Topography Map of Proposed Project Area

Batkhela, Malakand

126. Batkhela is located in the Malakand region of northern Pakistan, at the entrance of the Swat River valley. The topography is mainly mountainous and hilly, as it lies within the foothills of the Hindu Kush ranges. The area has narrow valleys with steep surrounding hills, while some parts along the Swat River plain are relatively flat and suitable for settlement and agriculture. The terrain is generally rugged, and the landscape is shaped by river erosion and tectonic uplift.[9]

Mansehra

127. Mansehra District is characterized by a highly complex and rugged mountainous terrain, with elevations transitioning sharply from 600m in the southern plains to over 5,000m in the northern Himalayan peaks. The topography is dominated by the Kaghan Valley, a deep alpine glen flanked by lofty mountain ranges. This steep gradient creates high relief energy, which, combined with the region's active tectonic setting, makes the landscape exceptionally prone to mass wasting events, including landslides and rockfalls, especially during the monsoon season.[10]

Mardan

128. Mardan has two main topographic regions: a northeastern hilly area and a southwestern fertile plain. The northern side is surrounded by hills, including Pajja (Sakra) Peak (2,056 m) and Garo (Pato) Peak (1,816 m). The southwestern area consists of fertile alluvial plains that slope towards the Kabul River. Major streams include the Kalpani River and its tributaries.[11]

Shangla

129. Alpuri is the district headquarters and capital city of the mountainous Shangla District, positioned geographically at coordinates 34°54′00″N 72°39′00″E. The city features a high-altitude mountain terrain landscape with a mean average elevation of 1,587 meters (5,207 feet) above sea level. It is characterized by deep, narrow valleys and highly dissected, steep hillsides typical of the Hindu Kush perimeter.[12]

Tank

130. Tank District features a transitional terrain that contrasts sharply between semi-mountainous highlands and flat lowlands. The northern and western boundaries are bordered by the rugged foothills of the Sulaiman Mountain Range, which drop into a vast, hyper-arid piedmont plain known locally as the Daman tract. The altitude drops

[9] Shah, M. T., & Khan, A. M. (2012). Biogeochemical and environmental study of the chromite-rich ultramafic terrain of Malakand area, Pakistan. Environmental Earth Sciences, 65(4), 1145–1152. researchgate.net
[10] Imran, M., Manzoor, S. A., Ahmad, S., & Hussain, A. (2025). Assessing above-ground biomass dynamics and carbon sequestration potential using machine learning and spaceborne LiDAR in hilly conifer forests of Mansehra District, Pakistan. Forests, 16(2), 330.
[11] Asian Development Bank. (2021). Initial Environmental Examination (IEE): Khyber Pakhtunkhwa Cities Improvement Project (KPCIP) – Sewerage Treatment Plant and Urban Infrastructure at Mardan. ADB Project Reports.
[12] National Disaster Management Authority. (2007). District Profile Shangla (Mitigation and Planning Series). Government of Pakistan.

significantly toward the plain, creating an expansive level landscape dominated by shifting sand dunes, bare clay soils, and highly eroded ravines. This low-relief, basin-like topography means that even brief periods of mountain precipitation quickly accumulate and spread rapidly across the flat agricultural plains below.[13]

Saidu Sharif Swat

131. Saidu Sharif lies in the Swat River valley, a narrow mountainous basin in northern Pakistan. The Swat River originates from glacial and snowmelt streams at Kalam and flows through steep mountain ranges, forming a deep valley. The valley floor is flat and fertile due to alluvial deposits, while surrounding areas are rugged and mountainous.The river system eventually moves toward the Peshawar Plain and joins the Kabul River after a long course.[14]

Dassu Upper Kohistan

132. Dasu is situated in a highly elevated, rugged Himalayan terrain within the Upper Kohistan District. The topography is defined by extremely steep slopes, narrow mountain valleys, and deeply incised gorges along the Indus River corridor. Elevation levels in the immediate valley basin sit around 800 to 950 meters, surrounded abruptly by high-relief mountain peaks of the Karakoram and Hindu Kush boundaries.[15]

4.4.2 Geology

Battagram

133. Geologically, Battagram is situated in a highly volatile tectonic environment within the Indus Suture Zone, where the Indian and Eurasian plates collide. The rock formations are predominantly metamorphic, consisting of deeply weathered schists, phyllites, gneisses, and slates, which are structurally weak and frequently fractured. These formations are punctuated by older igneous intrusions and traversed by major active fault lines. This structural instability was the main catalyst for the widespread terrain destruction during the landmark 2005 earthquake, and continuous minor seismic activity up to 2025 ensures that the rock masses remain highly fractured and prone to failure under stress.[16] Geology of project area is presented in **Figure 4.2.**

Chitral

134. Chitral lies along the western edge of the Kohistan geological "island" between the Gondwana and Eurasian tectonic plates. It is a highly active neotectonic zone subject to routine intermediate-depth earthquakes. The region features unstable geologic

[13] *Badshah, L. (2013). Floristic inventory, ecological characteristics and biological spectrum of rangeland, District Tank. Pakistan Journal of Botany, 45(4), 1169-1175.*
[14] *Government of Khyber Pakhtunkhwa. (2023). Master Plan of Mingora / Saidu Sharif 2042: Task C Draft Report. Urban Policy & Planning Unit, Planning and Development Department. f*
[15] *Pakistan Water and Power Development Authority. (2013). Dasu Hydropower Project: Environmental Management Action Plan - Volume 1: Executive Summary (Dam Site Terrain Studies). WAPDA, General Manager (Hydro) Planning.*
[16] Shah, S. Z., et al. (2023). Tectonic evolution and seismic risk assessment of the Indus Suture Zone, Northern Pakistan. *Frontiers in Earth Science*.

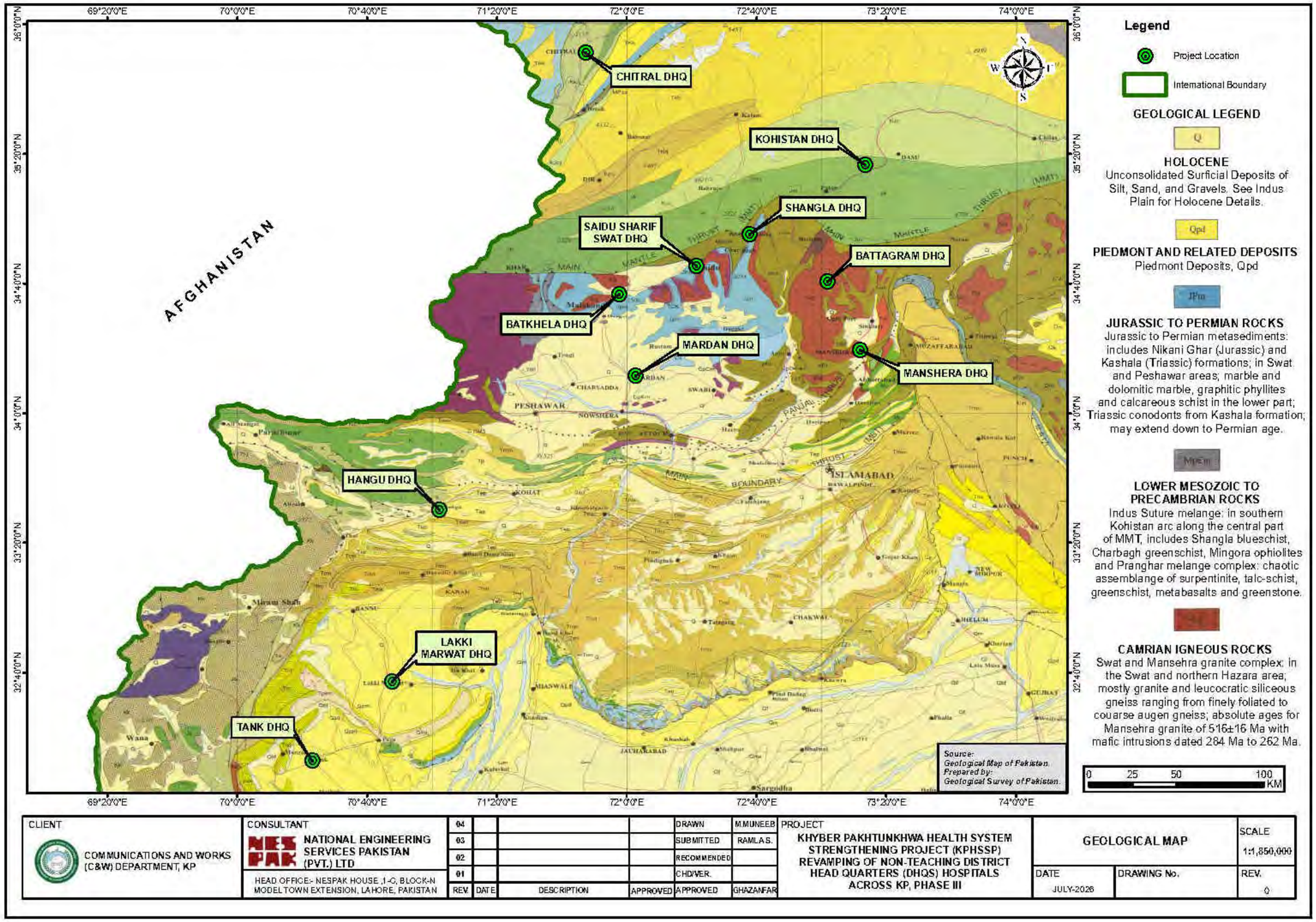


Figure 4.2: Geological Map of the Study Area

135. formations in its catchments (such as the Mulkhow River basin), creating a drainage network that is heavily tectonic-induced and deformed.[17]

Hangu

136. Geologically, Hangu belongs to the Kohat-Potwar Fold and Thrust Belt, presenting a complex structural geometry of tightly folded sedimentary sequences. The stratigraphic profile is famous for the Hangu Formation (Paleocene epoch), which consists predominantly of sandstones, shales, siltstones, and occasional coal seams, overlain by thick Lockhart Limestone. The region is heavily affected by tectonic thrust faults, rendering the rock formations highly fractured and jointed. The valley floor is covered by Quaternary-age coarse alluvial deposits, while the mountain slopes exhibit thin, rocky, and calcareous soil profiles with poor moisture retention.[18]

Lakki Marwat

137. Geologically, the central plain of Lakki Marwat consists of a deep layer of unconsolidated Quaternary-age eolian (wind-blown) sand and alluvial deposits (silt, clay, and gravel) washed down by the Kurram and Gambila rivers. The surrounding mountain ranges belong to the southern extensions of the Trans-Indus Salt Range, composed of tightly folded sedimentary rocks including Siwalik-group sandstones, shales, and conglomerates. The topsoil is predominantly sandy, porous, and lacks organic material. This structural weakness makes the soil highly vulnerable to extreme wind erosion during dry summer months and severe water gully erosion during flash floods.

Batkhela, Malakand

138. Batkhela lies in the Himalayan fold-and-thrust belt, where rocks are mainly limestone, slate, quartzite and shale. The area is structurally deformed due to the collision of the Indian and Eurasian plates. Valley floors contain recent alluvial deposits from Swat River erosion.

Mansehra

139. The geology of Mansehra is situated within the crystalline zone of the Lesser Himalayas, primarily defined by the Mansehra Granite, a massive granitic batholith dating back approximately 480 million years (Cambrian period). The northern regions, such as the Upper Kaghan Valley, consist of high-grade metamorphic rocks including schists, gneisses, and marbles belonging to the Sharda Group. The presence of the Main Central Thrust (MCT) and other local fault lines indicates a highly active seismic environment where ongoing crustal deformation continues to shape the rock mass.[19]

[17] Allan, Nigel J. R.. "CHITRAL i. Geography." Encyclopaedia Iranica. Published December 15, 1991.
[18] IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, 30 April 2026, A Study on Urban Platycladus orientalis Species Identification Using an Enhanced YOLO Model and High-Resolution Satellite Imagery
[19] Farooq et al. (2026) examine the tectono-stratigraphic evolution of the Upper Kaghan Valley in the Northwestern Himalayas through integrated field and remote-sensing analysis

Mardan

140. The geology of Mardan mainly consists of alluvial deposits, sedimentary rocks, and surrounding metamorphic formations. The plain areas of Mardan are covered with recent alluvium deposited by rivers and streams over time, making the soil highly fertile for agriculture. The northern and northeastern hilly areas contain older rocks, including limestone, shale, sandstone, and metamorphic rocks belonging to the Himalayan foothill geological formations. The district lies near the boundary of the Indian and Eurasian tectonic plates, which influenced the uplift of surrounding mountain ranges[20]

Shangla

141. The geological infrastructure of Alpuri is characterized by brittle, active tectonic faults and fragile rock formations vulnerable to landslides, heavily exacerbated by historic seismic shocks from the broader Hindu Kush boundary line. The underlying soil consists of weathered metamorphic fragments and loose debris, leading to massive land slips that alter local topography during intense weather patterns.[21]

Tank

142. Geologically, the plains of Tank District consist of a thick sequence of unconsolidated Quaternary alluvial deposits, including gravel sheets, silts, coarse sands, and clays washed down by the hill torrents over millennia. The western hilly borders are composed of tightly folded and faulted sedimentary rocks, primarily Tertiary-era sandstones, limestones, and shales that were pushed upward by regional tectonic forces. The topsoil is highly xerophytic, thin, and porous; it lacks organic matter and structural cohesion, which severely limits its capacity to retain moisture and increases its vulnerability to severe wind and water erosion.[22]

Saidu Sharif Swat

143. Saidu Sharif Swat lies in a mountainous geological setting of the Hindu Kush region. The area is dominated by metamorphic rocks (schist, gneiss), granite bodies, and sedimentary formations. Swat valley also contains alluvial deposits along river plains formed by erosion and river deposition.[23]

Dassu Upper Kohistan

144. The geologic framework of Dasu is located inside the highly active tectonic zone of the Kohistan-Ladakh Island Arc complex. The regional lithology consists of heavily deformed metamorphic and igneous rock units including quartzites, hornblende gneiss,

[20] Khan, A., & Ahmad, I. (2021). Environmental Profile of North West Frontier Province/Khyber Pakhtunkhwa, Pakistan: Land Degradation and Siltation in the Mardan and Peshawar Plains. ResearchGate Publications. researchgate.net
[21] Rahman, J. U., Shah, M. A., Aziz, S., Riaz, S., & Khan, G. M. (2025). Water Safety Under the Lens: A Field Survey and Rapid AI-Powered Escherichia coli Detection in Peshawar and Swat Regions. In 20th International Conference on Emerging Technologies (ICET).
[22] Farooq, M. (2026). Tectono-stratigraphic evolution of the Northwestern Himalayan Foothills: Insights from integrated field and remote-sensing analysis. Frontiers in Earth Science.
[23] Khan, M. H., Khan, S., & Rahman, L. (2020). Evaluation of the Swat River, Northern Pakistan, water quality using multivariate statistical techniques and water quality index (WQI) model. Environmental Science and Pollution Research / PMC.

mica schist, and marble formations. Due to structural discontinuities, weathering, and intense seismic activity near the Main Mantle Thrust (MMT), the slopes are fragile and highly prone to kinematic failures, rockfalls, and massive debris landslides.[24]

4.4.3 Soil[25]

Battagram

145. Soils are predominantly shallow to moderately deep, derived from weathered sedimentary and metamorphic rocks. They are generally loamy to sandy loam on valley floors and skeletal on steep slopes. Soil erosion is common due to rugged topography and seasonal rainfall

Chitral

146. Soils are generally shallow, coarse-textured, and gravelly, developed from weathered igneous and metamorphic rocks. Fertile alluvial soils occur along river valleys, supporting agriculture, while mountain slopes are prone to erosion.

Hangu

147. Soils range from alluvial loam in plains to shallow stony soils in hilly areas. They are moderately fertile and support rain-fed and irrigated agriculture, although erosion occurs on sloping land.

Lakki Marwat

148. The district is dominated by deep alluvial and aeolian soils, mainly sandy loam to loam in texture. Soil fertility varies from moderate to good, with irrigation significantly improving agricultural productivity.

Batkhela, Malakand

149. Soils are mostly shallow to moderately deep, formed from weathered limestone and other sedimentary rocks. Valley soils are fertile loams, whereas upland soils are stony and susceptible to erosion.

Mansehra

150. The district contains shallow mountain soils and deeper alluvial soils in valleys. Soil texture varies from sandy loam to loam, with moderate fertility. Steep terrain makes many areas vulnerable to soil erosion and landslides

[24] *Pakistan Water and Power Development Authority. (2013). Dasu Hydropower Project: Environmental Management Action Plan - Volume 2: Environmental Impact Assessment (Section 4: Subsurface Geology, Seismic Risk, and Geohazards). WAPDA, General Manager (Hydro) Planning.*
[25] *District Soil Survey Reports, Soil Survey of Pakistan*

Mardan

151. Mardan is characterized by deep, fertile alluvial soils, predominantly silt loam and clay loam. These soils are highly productive and support intensive irrigated agriculture.

Shangla

152. Soils are generally shallow, rocky, and developed over metamorphic and sedimentary rocks. Valley bottoms contain relatively deeper loamy soils suitable for cultivation, while steep slopes are highly erosion-prone.

Tank

153. The district mainly comprises alluvial and aeolian soils, ranging from sandy loam to loam. Fertility is generally moderate, although low rainfall and arid conditions limit agricultural productivity without irrigation.

Saidu Sharif Swat

154. Soils are predominantly alluvial in valley floors and shallow residual soils on surrounding hills. They are generally loamy, well-drained, and moderately to highly fertile, supporting orchards and agricultural crops.

Dassu Upper Kohistan

155. Soils are shallow, stony, and coarse-textured, developed from weathered igneous and metamorphic rocks. Limited fertile alluvial deposits occur along the Indus River and tributaries, while steep slopes are highly susceptible to erosion.

4.4.4 Surface Water Resources

Battagram

156. The hydrological network of Battagram is anchored by the Nandihar Khwar and the Allai Khwar, along with a dense system of perennial and ephemeral mountain streams that eventually drain westward into the Indus River. The district's hydrology is highly sensitive to seasonal changes, relying heavily on snowmelt from high altitudes during the spring and intense precipitation during the summer monsoon. Historical data up to 2025 indicates a noticeable shift in flow regimes, with accelerated runoffs causing a higher frequency of violent flash floods. These rapid surges routinely damage local terrace farming, stream-bank infrastructure, and small-scale civil engineering projects[26]. Surface Water Hydrology near Study Area is presented in **Figure 4.3.**

[26] *Zahid, M. (2025). Flood susceptibility mapping in Northern Pakistan using machine learning. Journal of Water and Climate Change, 13(10), 3745-3762.*

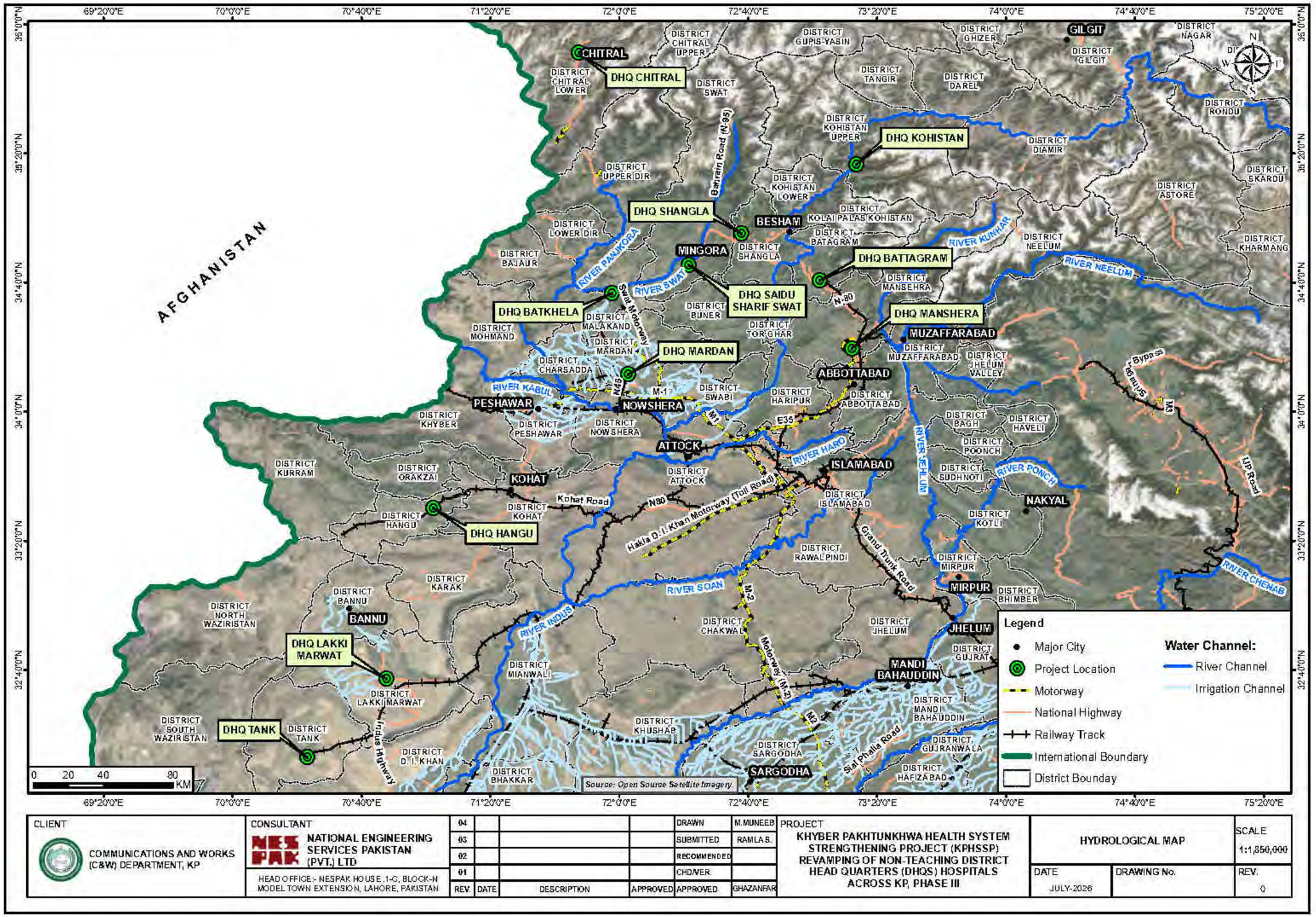


Figure 4.3: Surface Water Hydrology Near Study Area

Chitral

157. The main sources of water are glaciers, springs, heavy winter snow melting, and a rainfall range of 250 mm to 1000 mm. The Chitral River rises in the Chiantar glacier and serves as the uppermostreach of the Kunar-Kabul drainage system.

158. The river reaches its peak flow in July due to seasonal snowmelt and generates enormous sediment loads; it contributes roughly one-third of the annual runoff and nearly 66% of the sediment load to the Kabul River from just 13% of the catchment area.[27]

Hangu

159. The hydrological network of Hangu is characterized by seasonal streams and torrents, locally referred to as *Algads*, with the Khanki Toi and Miranzai Valley streams serving as the primary drainage arteries. The district has limited perennial surface water and relies heavily on flash runoffs from the northern and southern mountain ridges during the monsoon and winter rains. Data spanning 2010 to 2025 shows that shifting precipitation patterns have led to erratic stream flows, causing sudden, violent flash floods in the narrow valley streams during downpours, followed by rapid drying that leaves the region heavily dependent on subterranean water resources.[28]

Lakki Marwat

160. The hydrological framework of Lakki Marwat is defined by two main semi-perennial rivers: the Gambila River (Tochi) and the Kurram River, which enter the district from the west and merge before flowing toward the Indus River. The rest of the district relies on a network of ephemeral hill torrents flowing from the western tribal hills. Data from 2010 to 2025 indicates a highly volatile hydrologic cycle. Due to shifting monsoon patterns, these rivers are prone to sudden, violent flash floods that breach banks and submerge flat agricultural fields, alternating with prolonged, hyper-arid dry spells where surface streams completely dry up.

Batkhela, Malakand

161. Hydrology is dominated by the Swat River system, which receives snowmelt and glacial runoff from upstream areas. Groundwater recharge occurs through river seepage and rainfall infiltration. Springs and shallow aquifers are major local water sources.[29]

[27] *Baig, S. A., Mahmood, Q., Nawab, B., Hussain, A., & Nafees, M. (2010). Assessment of seasonal variations in surface water quality of Chitral River, North West Frontier Province (NWFP), Pakistan*
[28] *Gilbert Hinge, Mohamed A. Hamouda, Mohamed M. Mohamed, 2024, Department of Civil Engineering, National Institute of Technology Durgapur, Durgapur 713209, India, Department of Civil and Environmental Engineering, United Arab Emirates University, Al Ain P.O. Box 15551, United Arab Emirates, National Water and Energy Center, United Arab Emirates University, Al Ain P.O. Box 15551, United Arab Emirates*
[29] *Khan, D., Ahmad, I., & Marwat, G. S. (2021). Appraisal of groundwater quality, health risk assessment and source identification using multivariate statistical tools in Malakand District, Pakistan. Environmental Technology & Innovation, 24, 101968. sciencedirect.com*

Mansehra

162. The hydrological framework is centered on the Kunhar River, a major tributary of the Jhelum River that drains the entire Kaghan Valley. Hydrological data from 2010 to 2025 indicates significant variability in streamflow, driven by both glacial melt from the upper reaches and intense seasonal rainfall. The basin experiences high peak discharges during July and August; however, climate change has shifted the timing of these peaks, increasing the frequency of flash floods that threaten infrastructure and riparian ecosystems along the river's path.[30]

Mardan

163. The hydrology of Mardan is mainly based on groundwater resources, including dug wells, hand pumps, bore wells, and tube wells used for domestic water supply. The groundwater is recharged mainly by precipitation and the Dargai irrigation canal, which originates from the River Swat.

Shangla

164. The primary hydrology network around Alpuri is dominated by high-discharge mountain streams and natural khwars (seasonal torrents) like the Lilownai Khwar and Amnavi Khwar, which drain directly into the primary regional artery, the Indus River. The area experiences heavy seasonal precipitation averaging 1,040 mm annually, with peak hydrologic discharge occurring during the monsoon season in July, registering a monthly sub-average of 155 mm.[31]

Tank

165. The hydrological framework of Tank District is hyper-sensitive and completely lacks perennial rivers within its borders. Instead, its hydrology is dominated by ephemeral hill torrents known as *Zams* most notably the Tank Zam and torrents linked to the Gomal River basin, which originate in the neighbouring highlands of Waziristan. Data from 2010 to 2025 demonstrates a severe climate-induced shift, where these dry channels experience violent, sudden flash floods during seasonal storms, followed by prolonged periods of intense drought. Because the surface water disappears rapidly through runoff and evaporation, the district faces acute water scarcity for most of the year.[32]

Saidu Sharif Swat

166. Hydrology of Saidu Sharif is mainly controlled by the Swat River system and groundwater aquifers. Water sources include springs, tube wells, and river-fed recharge zones. Groundwater is mainly recharged through precipitation and river infiltration.

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[30] Zahid, A., Hasan, H., Khan, S., Ahmed, M., & Ahmed, S. I. (2025). Flood risk assessment for Kunhar River Basin using GIS-based multi-criteria decision analysis (MCDA). Journal of Water and Climate Change, 16(12), 3586–3609.
[31] Khan, D., Ahmad, I., & Marwat, G. S. (2024). Examining drinking water quality: Analysis of physico-chemical properties and bacterial contamination with health implications for Shangla district, Khyber Pakhtunkhwa, Pakistan (Scientific Diagram Entry). ResearchGate.
[32] Hood, J. W. (1970). Water resources and related geology of Dera Ismail Khan District, West Pakistan, with reference to the availability of ground water for development. U.S. Geological Survey Water-Supply Paper 1608-K.

Dassu Upper Kohistan

167. The hydrological network of Dasu is completely dominated by the Indus River, which acts as the main drainage artery for the Upper Indus Basin. The catchment area at the Dasu node encompasses roughly $158,800km}^2$, yielding an immense average river discharge of $2,102\text{ m}^3/\text{s}$. The hydrological cycle experiences extreme seasonal fluctuations, with peak volumes occurring during summer glacier-melt and monsoon influxes, carrying massive sediment loads that require dedicated flushing tunnels.[33]

4.4.5 Seismology

Battagram

168. The project area falls close to the boundary between Kohistan Island Arc and northwestern Himalayan fold-thrust belt of Indian plate and is characterized by complex geological structures formed by the ongoing collision of Indian mass with the Kohistan Island Arc. The geology of Battagram area is influenced by a complex, collisional tectonic environment where the Indian and Eurasian plates meet, resulting in a combination of igneous, metamorphic rocks mainly of Paleozoic age, folded sedimentary sequences and Quaternary fluvial deposits in the valleys. The area is part of the northern Hazara region and features a diverse array of geological structures, including thrust faults and folds.

169. The project area falls in seismically active zone due to its proximity to the collisional zone between the two tectonic plates. This region has been subjected to severe shaking in the past due to crustal earthquakes, notably Kashmir Magnitude 7.6 earthquake of 2005 and also by deep earthquakes of the Hindukush Seismic Zone which are felt frequently in the project area. The main active crustal tectonic feature near the project area is Bagh-Muzaffarabad-Balakot fault which is the source of 2005 devastating earthquake. The northwestern extension of this fault possibly extends towards Battagram area and passes at a closest distance of more than 10 km northeast of the project area. Other important fault is the Main Boundary Thrust (MBT) looping around the northern most part of Hazara-Kashmir syntaxial bent and passing at a closest distance of about 30 km east of the project area. The Main Mantle Thrust (MMT) dipping towards north is also passing at a closest distance of about 30 km north of the project area. All these features are considered active and are capable of producing damaging earthquakes.

Chitral

170. The project area is located in the Karakorum fold belt which represents the southern boundary of the Eurasian tectonic plate in northern part of Pakistan. The southern boundary of the Karakorum fold belt is represented by the regionally extending Main Karakorum Thrust (MKT).

[33] *Pakistan Water and Power Development Authority. (2012). Hydrologic Study of Basha Dam and Upper Indus Cascade for Inflow Patterns at Kalabagh, Dasu, and Tarbela. WAPDA Water Resource Division. Cited in WAPDA (2013), EMAP Volume 7: Cumulative and Induced Impact Assessment.*

171. This region has been subjected to severe shaking in the past due to crustal earthquakes in Chitral region and Kohistan Islan Arc and also due to deep earthquakes in the most active Hindukush seismic zone. Kohistan Island Arc itself shows low to moderate level of seismicity. However, Chitral region and deep Hindukush zone northwest of Chitral shows high to very high level of seismicity due to active subduction of Indian plate beneath the Eurasian plate. The main active tectonic feature representing the boundary between Kohistan Island Arc and Eurasian mass is the Main Karakorum Thrust (MKT) which is passing at a closest distance of about 21 km southeast of the project area. Another important fault near the project area is the Reshun fault which is passing at a closest distance of less than 8 km west of the project area. All these features are considered active and are capable of producing damaging earthquakes.

Hangu

172. The project area falls in seismically active zone due to its proximity to the collisional zone between the two tectonic plates. The Project area is located close to the north central part of the Kohat plateau which is bounded by Main Boundary Thrust (MBT) in the north and Karak Thrust in the south. This region has been subjected to severe shaking in the past due to earthquakes, including the deep earthquakes of the Hindukush Seismic Zone which are felt frequently in the project area. Kohat plateau itself shows low to moderate level of seismicity. The most important active crustal tectonic feature of regional extent is the Main Boundary Thrust (MBT) which is oriented almost east to west and dipping towards north passes at a closest distance of about 13 km north of the project area. Khairabad fault passes at a closest distance of about 50 km north of the project area. Another important fault is the Karak Thrust; a north dipping fault located on the boundary between the Bannu Basin and the Kohat Plateau. It is oriented from almost east to west. This fault is passing at a closest distance of 38 km south of the project area. All these features are considered active and are capable of producing damaging earthquakes.

Lakki Marwat

173. The project area falls in southern part of Bannu Basin which is an active foreland basin in northwestern Pakistan formed by the Himalayan orogenic collision, bordered by the Kohat Plateau in the north, Surghar-Marwat Ranges in the east, Pezu-Bhittani in the south and Kurram Thrust in the west. The basin acts as a foreland basin to the Himalayan fold-and-thrust belt experiencing significant deformation due to the India-Eurasia plate collision. The basin is underlain by Salt Range Formation, which acts as a detachment for overlying sediments and flows along thrust faults, causing salt diapirism.

174. This region has been subjected to severe shaking in the past due to shallow earthquakes associated with active crustal tectonic features, and also due to deep earthquakes of the Hindukush Seismic Zone which are felt frequently in the project area. Within the Kohat plateau in the north, a moderate level of seismicity is observed. However, three earthquakes of magnitude 6 and greater are located northeast the project area in the Kohat plateau which may be related to the subsurface extension of the Karak thrust which runs along the northern boundary of the Bannu Basin.

175. The active crustal tectonic features around the project area are the Karak Thrust, the Kurram Thrust, Pezu Fault, Khisor frontal thrust and Surghar Range Thrust. The Karak Thrust, a north dipping fault, is located on the boundary between the Bannu basin and the Kohat plateau. This fault is oriented almost east to west and is passing at a closest distance of about 55 km north of the project area. The north-south running Kurram Thrust dipping towards west passes at a closest distance of about 50 km west of the project area. Pezu strike-slip fault is present at a closest distance of about 25 km southwest of the project area while Khisor Frontal Thrust is present at a closest distance of about 45 km southeast of the project area. The almost north-south running Surghar Range Thrust passes at a closest distance of more than 30 km east-northeast of the project area. All these features are considered active and are capable of producing damaging earthquakes.

Batkhela Malakand

176. The project area falls in tectonically active zone due to its location near the collisional zone between the two tectonic plates. It is located close to the northern side of the Peshawar basin which is bounded by Main Mantle Thrust in the north and Khairabad/Hissartang and Main Boundary Thrust faults in the south. This region has been subjected to severe shaking in the past due to earthquakes, including the deep earthquakes of the Hindukush Seismic Zone which are felt frequently in the project area. Peshawar basin itself shows low level of seismicity. The active crustal tectonic features of the project region are Main Mantle Thrust (MMT) which passes at a distance of about 12 km north of the project area and Panjal-Khairabad fault which passes at a distance of about more than 75 km south of the project area. All these features are considered active and are capable of producing damaging earthquakes.

Mansehra

177. The project area falls in northwestern Himalayan fold-thrust belt which is characterized by complex geological structures formed by the ongoing collision of Indian plate with Kohistan Island Arc. The geology of Mansehra area is influenced by a complex, collisional tectonic environment where the Indian and Eurasian plates meet, resulting in a combination of metamorphic bedrock, folded sedimentary sequences and Quaternary fluvial deposits in the valleys. The area is part of the Hazara region and features a diverse array of geological structures, including thrust faults and folds.

178. The project area falls in seismically active zone due to its proximity to the collisional zone between the two tectonic plates. This region has been subjected to severe shaking in the past due to crustal earthquakes, notably Kashmir Magnitude 7.6 earthquake of 2005 and also by deep earthquakes of the Hindukush Seismic Zone which are felt frequently in the project area. The main active crustal tectonic feature near the project area is Panjal-Khairabad fault. This fault dipping towards northwest passes at a closest distance of about 13 km east of the project area. Other important faults running north-south along the western side of Hazara-Kashmir syntaxial bend is the Murree fault (a part of Main Boundary Thrust), a thrust fault dipping towards west and passing at a closest distance of about 23 km east of the project area. All these features are considered active and are capable of producing damaging earthquakes.

Mandan

179. The project area falls in tectonically active zone due to its location near the collisional zone between the two tectonic plates. It is located in the central part of the Peshawar basin which is bounded by Main Mantle Thrust in the north and Khairabad/Hissartang and Main Boundary Thrust faults in the south. This region has been subjected to severe shaking in the past due to earthquakes, including the deep earthquakes of the Hindukush Seismic Zone which are felt frequently in the project area. Peshawar basin itself shows low level of seismicity. The active crustal tectonic features of the project region are Main Boundary Thrust (MBT) which passes at a distance of about 50 km south, Panjal-Khairabad fault passes at a distance of about 30 km south of the project area and Main Mantle Thrust (MMT) zone passes at a distance of about 40 km north of the project area. All these features are considered active and are capable of producing damaging earthquakes.

Alpuri Shangla

180. The project area falls in the Kohistan Island Arc physiographic province, a seismically active region which is sandwiched between the converging Indian and the Eurasian tectonic plates. Kohistan Island Arc is bounded by Main Karakorum Thrust (MKT) in the north and Main Mantle Thrust (MMT) in the south. The project area is located very close to the southern boundary of Kohistan Island with the Indian plate. This region has been subjected to severe shaking in the past due to crustal earthquakes in Kohistan and western Himalayas and also due to deep earthquakes in the most active Hindukush seismic zone. Kohistan Island Arc itself shows low to moderate level of seismicity. The active tectonic features on the southern boundary of Kohistan Island Arc are the Main Mantle Thrust (MMT) and associated Kohistan fault. The project area falls very close to MMT fault which passes within a closest distance of less than 3 km east of the project area. The strike-slip type Kohistan fault also passes a closest distance of about 3 km west of the project area. The north-south running Chakesar fault zone on the Indian mass passes at a closest distance of about 15 km east of the project area. These features are considered active and are capable of producing damaging earthquakes.

Tank

181. The project area falls in the Suleiman foredeep near the northwestern corner of the Punjab plain, close to the northern termination of Suleiman range. Structurally, the project area is bounded by Khisor and Marwat ranges on the east, Bhittani range on the north, northern tip of the north-south running Suleiman range and Manzai range in the west and vast Punjab plain in the south.

182. The nearest tectonic feature is the Pezu strike slip fault running along Bhittani range and passes at a closest distance of about 32 km northeast of the project area. The Khisor thrust running along the frontal face of Khisor range passes at a closest distance of about 55 km east of the project area. Kund fault running along the Manzai range and dipping towards northwest is passing at a closest distance of about 25 km northwest of the project area. Two prominent faults running N-S along the frontal face of the northern part of Suleiman range are Chaudhwan Fault and Domanda Fault. The frontal face of

northern part of seismically active Suleiman range is present at a closest distance of about 37 km southwest of the project area. While low level of seismicity has been recorded in Punjab plain, the active faults of the Trans-Indus ranges and Suleiman range show significant associated seismicity and therefore have the potential to produce moderate to large earthquakes which can cause appreciable ground motion in the project area.

Saidu Sharif Swat

183. The project area is located in the Kohistan Island Arc physiographic province, a seismically active region which is sandwiched between the converging Indian and the Eurasian tectonic plates. Kohistan Island Arc is bounded by Main Karakorum Thrust (MKT) in the north and Main Mantle Thrust (MMT) in the south. The project area is located in the southwestern part of the Kohistan Island Arc close to the MMT. This region has been subjected to severe shaking in the past due to crustal earthquakes in Kohistan and western Himalayas and also deep earthquakes in the most active Hindukush seismic zone. Kohistan Island Arc itself shows low to moderate level of seismicity. The active tectonic features on the southern boundary of Kohistan Island Arc are the Main Mantle Thrust (MMT) and associated Kohistan fault and the project area falls within the MMT zone, the nearest fault passes within 5 km of the project area. These features are considered active and are capable of producing damaging earthquakes.

Dassu Upper Kohistan

184. The project area is located in the Kohistan Island Arc physiographic province, a seismically active region which is sandwiched between the converging Indian and the Eurasian tectonic plates. Kohistan Island Arc is bounded by Main Karakorum Thrust (MKT) in the north and northwest and Main Mantle Thrust (MMT) in the south. The project area is located in the middle part of the Kohistan Island Arc.

185. This region has been subjected to severe shaking in the past due to crustal earthquakes in Kohistan and Chitral regions. Deep earthquakes in the most active Hindukush seismic zone in the northwest are also frequently felt in the project area. Kohistan Island Arc itself shows low to moderate level of seismicity. The active tectonic features are the Main Mantle Thrust (MMT) on the southern boundary of Kohistan Island Arc and the Main Karakoram Thrust (MKT) on the northern boundary of Kohistan Island Arc. MMT is passing at a closest distance of about 55 km south of the project area while MKT is passing at a closest distance of about 120 km north of the project area. As MMT is dipping towards north, the project area is on the hanging wall of this fault which is passing at depth below the project area. These tectonic features are considered active and are capable of producing damaging earthquakes.

Table 4.1: Spectral Horizontal Acceleration Values

Sr. No.	Spectral Horizontal Acceleration Values	Unit	Battagram	Chitral	Hangu	Lakki Marwat	Batkhela, Malakand	Mansehra	Mardan	Alpuri, Shangla	Tank	Saidu Sharif Swat	Dassu Upper Kohistan
1.	Short Period Spectral Acceleration (Ss)	g	1.0356	0.9540	0.7596	0.9878	0.9356	1.1709	0.7578	0.9725	1.0223	1.0577	1.0507
2.	Long Period Spectral Acceleration (S1)	g	0.3506	0.4098	0.2066	0.1984	0.3417	0.3599	0.3226	0.3518	0.1985g	0.3957	0.0818
3.	PGA (RP 2475 Years)	g	0.4803	0.4475	0.3705	0.4603	0.4406	0.5564	0.3630	0.4546	0.4761	0.4789	0.4845
4.	RP 475 Years	g	0.2802	0.2684	0.1887	0.2620	0.2524	0.3159	0.2146	0.2636	0.2717	0.2670	0.2757

4.4.6 Water Supply System

Battagram

186. The water supply infrastructure in Battagram is almost completely dependent on the exploitation of natural mountain springs (Chashmas) and high-altitude surface streams. In rural and mountainous communities, water is captured at the source and distributed downward via gravity-fed pipeline networks without any centralized chemical treatment or filtration. In low-lying valley floors, shallow dug wells and individual boreholes are used to tap into unconfined aquifers. However, extensive regional deforestation and shifting weather patterns over the 2010–2025 period have caused a major drop in the seasonal yield of these traditional springs, triggering severe drinking water shortages during dry pre-monsoon months.[34]

Chitral

187. Historically, water was largely supplied via open, contaminated irrigation channels shared with cattle. International interventions by agencies like KfW and WASEP established over 100 gravity-fed village water supply systems using spring captures and distribution grids to achieve 24-hour supply meeting WHO standards. However, systems requiring power-driven pumps suffer severe multi-month outages during rainy seasons due to frequent electricity grid failures, forcing populations back to contaminated surface water.[35]

Hangu

188. Due to limited surface water availability, the water supply infrastructure in Hangu is heavily reliant on groundwater aquifers and natural springs. In the valley plains, domestic water is secured through deep tube wells, private boreholes, and hand pumps, while rural hill communities depend on gravity-fed pipelines connected to mountain springs. Data through 2025 indicates that excessive pumping, coupled with reduced seasonal recharge over the past decade, has led to a progressive decline in water tables across the valley floor. Furthermore, proximity to unlined open drains poses a consistent risk of biological contamination to shallow groundwater sources.

Lakki Marwat

189. Securing safe drinking water is a critical challenge in Lakki Marwat, as shallow groundwater aquifers across most of the sandy plains are highly brackish, saline, and unfit for consumption. Fresh groundwater is only available in narrow zones running parallel to the banks of the Kurram and Gambila rivers, where deep public tube wells pump water for distribution. In distant rural villages, residents must rely on gravity-fed pipelines from northern springs or collect highly turbid rainwater in open, unhygienic

[34] Ali, S., & Khan, M. (2025). Analysis of spring discharge and water security in Battagram District, Pakistan. Pakistan's Multidisciplinary Journal for Arts & Science.
[35] Khan, D., Ahmad, I., & Marwat, G. S. (2023). Water Quality Assessment from Spring Source in Chitral Watershed of Northern Pakistan. ResearchGate Publications. n

ponds (Tobas). Data up to 2025 shows that a dropping water table and recurring droughts have severely depleted these fresh lenses, leading to chronic water scarcity.[36]

Batkhela

190. Batkhela was given a massive gravity-based water supply scheme completed at a cost of Rs. 780 to 785 million from the Swat River to feed thousands of residents. However, locals face severe water shortages, receiving water for only one hour a day. Additionally, the Public Health Engineering Department has failed to replace leaky and rusty pipelines that run directly through open drains, causing contaminated water to reach consumers.

Mansehra

191. The water supply infrastructure relies heavily on the exploitation of natural mountain springs and groundwater aquifers. In rural and high-altitude areas, gravity-fed pipe schemes are the primary method of distribution, tapping into perennial springs. In urban centers, however, there is an increasing dependence on deep tube wells and boreholes. Research suggests that as traditional spring yields decline due to environmental degradation, the district faces a growing challenge in maintaining a consistent and safe water supply for its expanding population.[37]

Mandan

192. Water supply in Mardan is mainly dependent on groundwater resources. The city and surrounding areas use tube wells, bore wells, and hand pumps for domestic water needs. The Water and Sanitation Services Company Mardan (WSSCM) is responsible for urban water supply management, including operation of tube wells and distribution networks. In rural areas, water supply is mostly community-based and relies on shallow groundwater extraction.[38]

Alpuri Shangla

193. Alpuri (Shangla) lacks any modern or structured underground wastewater treatment and sewerage grid. Domestic wastewater and raw effluents from over 40% unimproved (kacha) or semi-structured latrines discharge directly into open surface drains and roadside channels, which regularly overflow into streets and local markets during intense mountain downpours. This untreated blackwater and graywater flows unchecked into seasonal torrents (*nullahs*) and natural mountain streams like the Lilownai and Amnavi Khwars, which eventually empty the raw sewage directly into the main Indus River line.[39]

[36] *Marwat, G. S., Khan, D., & Ahmad, I. (2016). Heavy metals analysis in drinking water of Lakki Marwat District, KPK, Pakistan. Journal of Chemical Society of Pakistan, 38(1)*
[37] *Ashraf, A. (2025). Spring distribution, associated environment and strategies for sustainable development in Khyber Pakhtunkhwa Province, Pakistan. Pakistan's Multidisciplinary Journal for Arts & Science.*
[38] *Shah, M., Khan, S., & Rahman, L. (2024). Spatial assessment of drinking water quality and tube well distribution in Mardan City. Pakistan Academy of Sciences (PAS-B), 61(3).*
[39] *Salam, M., Bo, D., Alam, F., Uddin, I., Hossain, M. N., Hayat, F., & Ullah, W. (2024). Examining drinking water quality: Analysis of physico-chemical properties and bacterial contamination with health implications for Shangla district, Khyber Pakhtunkhwa, Pakistan. Environmental Geochemistry and Health, 46(6), 209. doi.org*

Tank

194. Securing a safe water supply is one of Tank District's most critical environmental challenges, as the vast majority of shallow groundwater aquifers are highly brackish, saline, and unfit for consumption. The population depends heavily on the seasonal capture of fresh surface water via traditional *Rod-Kohi* (hill torrent diversion) systems, natural springs along the hills, or deep public tube wells. In many rural communities, water is stored in open, unhygienic rainwater ponds called *Tobas*. Data up to 2025 reveals that dropping groundwater tables and recurring droughts have severely compromised these water sources, frequently forcing residents to rely on contaminated surface water.[40]

Saidu Sharif

195. Water supply in Saidu Sharif depends mainly on groundwater abstraction (tube wells, bore wells) and spring water systems. Public water supply schemes are managed by local authorities and municipal services. Many areas rely on direct groundwater extraction.[41]

Dassu Upeer Kohistan

196. Under the Social and Resettlement Management Plan for the Dasu Hydropower Project funded by the World Bank, the "Area Development and Community Support Programs" have explicitly allocated an estimated budget of 190 Million Pakistani Rupees (equivalent to 2.0 Million USD) specifically for the "Water Supply and Sanitation Improvement in Dasu and Komila". This designated fund is structured to upgrade the rudimentary gravity-fed mountain spring channels into organized, clean public water supply networks and modern filtration grids for the local populations and resettlement townships affected by the dam's construction.[42]

4.4.7 Sewerage System

Battagram

197. The district lacks any centralized municipal sewage network or wastewater treatment plants (WWTPs), leaving sanitation to rely entirely on primitive, open gravity-flow masonry drains. Domestic greywater, commercial effluent, and stormwater runoff are collected in the same open channels, which run through congested residential areas. This untreated blackwater and greywater is channeled directly into local streams, causing extreme biological contamination of the natural aquatic environment. During monsoon downpours, these drains regularly choke with silt and uncollected solid waste, causing contaminated backwater to flood roads and low-lying residential sectors.[43]

[40] *Budhie Wijatna, A., & Aris Sunantyo, T. (2018). Approach to topographic map, hydrogeological and environmental isotopes analysis to delineation of watersheds in drought-prone areas. E3S Web of Conferences, 42, 01017.*
[41] *Jehan, S., Ullah, I., Khan, S. et al. Evaluation of the Swat River, Northern Pakistan, water quality using multivariate statistical techniques and water quality index (WQI) model. Environ Sci Pollut Res 27, 38545–38558 (2020).*
[42] *World Bank. (2014). Pakistan - First Stage of the Dasu Hydropower Project: Environmental and Social Assessment (Reviewed Draft Report - Volume 2: Rural Potable Water Access and Infrastructure Gaps). World Bank Group. rightsindevelopment.org*
[43] *National Disaster Management Authority (NDMA). (2025). District disaster management plan: Battagram.*

Chitral

198. Existing sewerage and liquid waste management systems in Chitral are almost non-existent. Due to a mountainous, scattered physiography and haphazard habitations compressed into narrow valleys, about 15% to 25% of houses in Chitral town discharge their raw latrine effluents directly into open surface drains. These drains convey the untreated sewage directly into the main river line.[44]

Hangu

199. Hangu completely lacks formal wastewater treatment plants or integrated closed sewerage networks. Sanitation relies entirely on open, gravity-flow roadside masonry drains that collect greywater, commercial discharge, and storm runoff simultaneously. This untreated wastewater flows directly into the natural drainage *algads* and agricultural fields, presenting severe environmental hazards. During heavy rain events, these open channels frequently choke due to accumulated silt and solid waste dumping, causing toxic overflows into residential sectors and low-lying commercial zones.[45]

Lakki Marwat

200. The district relies on an outdated and highly fragmented open masonry drainage system designed to collect both domestic greywater and stormwater runoff simultaneously. There are no municipal wastewater treatment facilities anywhere in the district, meaning raw, untreated blackwater is discharged directly into open fields, irrigation canals, or the Kurram and Gambila rivers. During intense monsoon downpours, these open channels regularly choke due to accumulated sand, silt, and dumped solid waste, causing highly toxic sewage water to back up and flood low-lying residential and commercial zones.[46]

Batkhela Malakand

201. In Malakand division, local municipal mechanisms historically limit liquid waste disposal to open ditches, cesspools, and clogged drains. When emergency rescue services or administrative updates are executed for neighboring towns like Adenzai, they have to rely on resources traveling far distances from Batkhela's main hub.[47]

Mansehra

202. The district utilizes a combined drainage system where domestic sewage, commercial wastewater, and storm runoff are collected in open masonry channels. Due to the lack of dedicated wastewater treatment plants (WWTPs), this untreated effluent is discharged directly into the Kunhar River and its tributaries. During heavy rainfall events,

[44] KfW Entwicklungsbank. (2006). Pakistan: Drinking Water Supply and Sanitation Measures in the Northern Uplands/Chitral District (Ex-post evaluation report). KfW Entwicklungsbank.
[45] Atif M, Ayub G, Shakoor F, et al. Evolution of waterborne diseases: A case study of Khyber Pakhtunkhwa, Pakistan. Sage Open Medicine. 2024;12. doi:10.1177/20503121241263032
[46] Atif M, Ayub G, Shakoor F, Farooq M, Iqbal M, Zaman Q, Ilyas M. Evolution of waterborne diseases: A case study of Khyber Pakhtunkhwa, Pakistan. SAGE Open Med. 2024 Jul 31;12:20503121241263032. doi: 10.1177/20503121241263032. PMID: 39092162; PMCID: PMC11292715.
[47] Auditor General of Pakistan. (2021). Performance Audit Report on Solid Waste Management and Sanitation Services in Tehsil Municipal Administration (TMA) Batkhela, District Malakand. Government of Pakistan. agp.gov.pk

these drains frequently reach full capacity and overflow, leading to urban flooding and the spread of waterborne pathogens within densely populated areas.[48]

Mardan

203. The drainage system of Mardan is mainly natural, controlled by seasonal streams (locally called *khawars*) that flow from the surrounding hills toward the south and ultimately join the Kabul River. The most important drainage channel is the Kalpani River, which carries stormwater and hill runoff through Mardan city. During heavy rains, these natural drains often carry high discharge, and waterlogging can occur in low-lying urban areas due to inadequate urban storm drainage infrastructure.[49]

Alpuri Shangla

204. The drainage framework in Alpuri consists largely of open, kacha (unimproved), and semi-paka surface ditches rather than underground conduits. Due to the rapid grade changes of the hilly terrain, raw latrine effluents and untreated domestic wastewater are discharged into open surface drains that flow down into local natural streams without passing through liquid waste treatment plants.[50]

Tank

205. The district relies on a fragmented, outdated, and poorly maintained open masonry drainage network designed to handle both greywater and storm runoff. There are no municipal wastewater treatment facilities in the district, forcing raw sewage to discharge directly into open fields, agricultural channels, or dry torrent beds. During the monsoon season, the influx of water from hill torrents routinely overwhelms and blocks these open drains. This causes highly contaminated backwater to flood residential zones, leaving stagnant pools that persist for weeks and trigger widespread outbreaks of waterborne infectious diseases.[51]

Saidu Sharif

206. Drainage of Saidu Sharif is part of the Swat River drainage basin**.** The area has a dendritic drainage pattern with numerous tributaries and seasonal streams flowing toward the Swat River. Drainage is highly influenced by mountainous slopes and rainfall runoff.[52]

[48] *National Disaster Management Authority (NDMA). (2025). A comprehensive study of flood events in Pakistan 1950-2025.*
[49] *Asian Development Bank. (2021). Initial Environmental Examination (IEE): Khyber Pakhtunkhwa Cities Improvement Project (KPCIP) – Sewerage Treatment Plant and Urban Infrastructure at Mardan. ADB Project Reports. f*
[50] *Salam, M., Bo, D., Alam, F., Uddin, I., Hossain, M. N., Hayat, F., & Ullah, W. (2024). Examining drinking water quality: analysis of physico-chemical properties and bacterial contamination with health implications for Shangla district, Khyber Pakhtunkhwa, Pakistan. Environmental Geochemistry and Health, 46(6), 209. doi.org*
[51] Atif, M., Ayub, G., Shakoor, F., Farooq, M., Iqbal, M., Zaman, Q., & Ilyas, M. (2024). Evolution of waterborne diseases: A case study of Khyber Pakhtunkhwa, Pakistan. *SAGE Open Medicine*, *12*, 1–11.
[52] *Government of Khyber Pakhtunkhwa. (2023). Master Plan of Mingora / Saidu Sharif 2042: Task C Draft Report. Urban Policy & Planning Unit, Planning and Development Department. f*

Dassu Upper Kohistan

207. The drainage system in the main rural areas of Dasu consists primary of unlined open surface ditches, cesspools, and pit latrines. Liquid waste is discharged directly into local streams without running through treatment plants. To rectify this in newly constructed administrative layouts, integrated urban wastewater systems and composite drainage layouts have been designed under the Local Area Development Program for WAPDA and localized project affectees.[53]

4.4.8 Climate of Battagram

208. Batagram features a subtropical continental climate, characterized by extremely hot summers, cool winters, and a pronounced monsoon-driven precipitation regime. Based on meteorological baseline data (2010–2025), mean monthly maximum temperatures typically range from a winter low of approximately 15°C to summer peaks of 44°C, with June and July routinely serving as the hottest months. In contrast, mean monthly minimum temperatures regularly drop to a winter low of 4°C in January, while rising to a maximum summer average of 31°C during July. The average annual maximum temperature spans between 29.0°C and 31.6°C, while the average annual minimum ranges from 16.8°C to 19.4°C. Precipitation is abundant and heavily concentrated during the summer monsoon, exhibiting a pronounced peak in July–August; the heaviest monthly deluge on record was 582.3 mm, occurring in July 2010. Mean relative humidity fluctuates broadly between 18% in the drier autumn months and 66% during the winter and monsoon periods. Wind patterns remain gentle to moderate throughout the year, with annual averages ranging from 5.5 to 7.0 km/h and experiencing slightly elevated velocities during the spring and early summer months.

4.4.9 Climate of Chitral

209. Chitral experiences a highly alpine, continental, semi-arid climate characterized by freezing, snow-dominated winters, warm summers, and a precipitation regime heavily skewed toward late winter and spring rather than monsoon rainfall. Based on meteorological baseline data (2010–2025), mean monthly maximum temperatures typically range from a severe winter daytime low of -11°C in January (2012) to summer peaks of 23°C in July (2022/2024/2025) and August (2025), while mean monthly minimum temperatures plunge to freezing depths of -19°C in January (2012) and rise to modest summer overnight averages of 14°C in July (2025). The average annual maximum temperature spans between 4.25°C and 11.25°C, whereas the average annual minimum ranges from -3.92°C to 2.75°C. Precipitation in Chitral is driven heavily by Western Disturbance systems in late winter and spring, peaking in March and April with wet spells reaching up to 294.6 mm in March 2021 and 302.7 mm in April 2023, while summer monsoons are highly muted, though occasional spikes occur like the 235.3 mm in August 2022. Mean relative humidity fluctuates significantly, dropping to dry, crisp autumn and winter lows of 24% (November 2025) and climbing to humid, snow-dense winter peaks of 94% in February (2010), while average annual values generally span between 42.25% and 60.92%. Wind patterns across the high-altitude

[53] *Pakistan Water and Power Development Authority. (2013). Dasu Hydropower Project: Environmental Management Action Plan - Volume 6: Environmental Baseline Quality (Surface Water Quality, Chemical Runoff, and Drainage Patterns). WAPDA, General Manager (Hydro) Planning.*

valley remain gentle to moderate, with annual average speeds ranging from 5.89 to 8.24 km/h, peaking during late spring and summer convective periods at 10.1 km/h in May (2010).

4.4.10 Climate of Hangu

210. Hangu features a subtropical continental climate, characterized by extremely hot summers, cool winters, and a pronounced monsoon-driven precipitation regime. Based on meteorological baseline data (2010–2025), mean monthly maximum temperatures typically range from a winter low of approximately 13°C to summer peaks of 41°C, with June and July routinely serving as the hottest months. In contrast, mean monthly minimum temperatures regularly drop to a winter low of 4°C in January, while rising to a maximum summer average of 30°C during July. The average annual maximum temperature spans between 27.2°C and 31.1°C, while the average annual minimum ranges from 17.4°C to 19.4°C. Precipitation is abundant and heavily concentrated during the summer monsoon, exhibiting a pronounced peak in July–August; the heaviest monthly deluge on record was 669.5 mm, occurring in July 2010. Mean relative humidity fluctuates broadly between 16% in the drier autumn months and 63% during the winter and monsoon periods. Wind patterns remain gentle to moderate throughout the year, with annual averages ranging from 5.7 to 7.5 km/h and experiencing slightly elevated velocities during the spring and early summer months.

4.4.11 Climate of Lakki Marwat

211. Lakki Marwat features a subtropical arid to semi-arid continental climate, characterized by intensely hot summers, mild winters, and a monsoon-driven precipitation regime that is heavily concentrated during the summer months. Based on meteorological baseline data (2010–2025), mean monthly maximum temperatures typically range from a winter low of approximately 16°C to summer peaks of 46°C, with June and July routinely serving as the hottest months. In contrast, mean monthly minimum temperatures regularly drop to a winter low of 7°C in January, while rising to a maximum summer average of 34°C during July. The average annual maximum temperature spans between 30.3°C and 33.7°C, while the average annual minimum ranges from 20.1°C to 22.5°C. Precipitation is scarce yet seasonally concentrated, exhibiting a pronounced peak during the summer monsoon (July–August); the heaviest monthly deluge on record was 337.7 mm, occurring in July 2022. Mean relative humidity fluctuates broadly between 14% in the drier spring months and 70% during the winter and monsoon periods. Wind patterns remain gentle to moderate throughout the year, with annual averages ranging from 6.5 to 9.0 km/h and experiencing significantly elevated velocities during the spring and pre-monsoon periods.

4.4.12 Climate of Batkhela, Malakand

212. Batkhela (Malakand) experiences a continental semi-arid to sub-tropical climate characterized by hot, dry early summers, cold winters, and double-season precipitation cycles spanning both late-winter/spring storms and late-summer monsoons. Based on meteorological baseline data (2010–2025), mean monthly maximum temperatures typically range from a winter daytime low of 12°C in January to summer peaks of 38°C,

with June and July routinely serving as the hottest months, while mean monthly minimum temperatures plunge to a cold winter low of 2°C in January and February and rise to a maximum summer average of 26°C in July. The average annual maximum temperature spans between 25.1°C and 27.7°C, whereas the typical average annual minimum ranges from 13.5°C to 15.3°C (excluding the anomalous 2012 baseline reading). Precipitation is highly variable and seasonally concentrated, exhibiting significant wet peaks during the spring season (March–April) and the summer monsoons (July–August), with the heaviest monthly rainfall recorded being 622.81 mm in August 2024, contrasted by dry winter periods that occasionally receive 0 mm. Mean relative humidity fluctuates broadly throughout the year, dropping to dry autumn and winter lows of 19% and rising to humid monsoon peaks of 75% in August. Wind patterns remain gentle to moderate, with annual averages ranging from 6.4 to 8.9 km/h and experiencing slightly elevated velocities up to 10.2 km/h during late spring.

4.4.13 Climate of Mansehra

213. Mansehra features a humid subtropical to temperate continental climate, characterized by hot summers, mild to cool winters, and a pronounced monsoon-driven precipitation regime. Based on meteorological baseline data (2010–2025), mean monthly maximum temperatures typically range from a winter low of approximately 9°C to summer peaks of 36°C, with June and July routinely serving as the hottest months. In contrast, mean monthly minimum temperatures regularly drop to near freezing, reaching as low as -1°C in January, while rising to a maximum summer average of 22°C during July. The average annual maximum temperature spans between 21.5°C and 24.1°C, while the average annual minimum ranges from 10.0°C to 13.2°C. Precipitation is abundant and heavily concentrated during the summer monsoon, with a secondary peak in spring; the heaviest monthly deluge on record was 541.8 mm, occurring in August 2024. Mean relative humidity fluctuates broadly between 20% in the drier winter months and 81% during the peak monsoon. Wind patterns remain gentle to moderate throughout the year, with annual averages ranging from 7.2 to 8.3 km/h and experiencing slightly elevated velocities during the spring and pre-monsoon periods.

4.4.14 Climate of Mardan

214. Mardan District experiences a semi-arid to sub-tropical continental climate characterized by hot summers, mild winters and a monsoon influence during July to September. Based on available data (2010–2024), mean monthly maximum temperatures generally range from about 14°C in winter to 43°C in peak summer, with the highest temperatures commonly recorded during June, while mean monthly minimum temperatures vary from around 4°C in January to 30°C in summer. Average annual maximum temperature ranges between 27.8°C and 31.0°C, whereas annual minimum temperature varies from 17.7°C to 18.9°C. Rainfall is irregular and seasonally concentrated, with higher precipitation during monsoon months and spring; the highest monthly rainfall recorded was about 588.7 mm in July 2010. Mean relative humidity generally ranges from 18% to 67%, with comparatively higher humidity during monsoon months. Average wind speed remains moderate, ranging from approximately 5.2 to 7.3 km/h annually, with relatively stronger winds during late spring and summer months.

4.4.15 Climate of Alpuri, Shangla

215. Alpuri, the headquarters of the Shangla District, experiences a humid subtropical to humid continental highland climate characterized by mild, pleasant summers, moderately cold winters, and high year-round precipitation. Based on meteorological baseline data (2010–2025), mean monthly maximum temperatures peak in the summer months of June and July, reaching up to 34°C (June 2024, June/July 2025), while winter daytime maximums drop to a chilly 8°C in January (2012/2020), keeping the average annual maximum temperature within a steady range of 20.75°C to 23.67°C. Overnight minimum temperatures regularly plunge below freezing during winter, bottoming out at -3°C in January (2011/2012) and February (2012), while summer nights remain comfortably cool, averaging between 16°C and 22°C. The region receives abundant precipitation, with a dual-peak pattern driven by heavy summer monsoons and spring Western Disturbances; the highest monthly rainfall reached an intense 539.91 mm in July 2010, alongside significant winter dry spells where precipitation drops as low as 0.2 mm (November 2010, December 2014). Mean relative humidity fluctuates in tandem with

4.4.16 Climate of Tank

216. Tank features a subtropical arid to semi-arid continental climate, characterized by intensely hot summers, mild winters, and highly erratic, scanty precipitation with no distinct wet season. Based on meteorological baseline data (2010–2025), mean monthly maximum temperatures typically range from a winter low of approximately 21°C to summer peaks of 43°C, with June and July routinely serving as the hottest months. In contrast, mean monthly minimum temperatures remain relatively elevated, dropping to a winter low of 15°C in January, while rising to a maximum summer average of 30°C during July. The average annual maximum temperature spans between 27.1°C and 30.1°C, while the average annual minimum ranges from 23.2°C to 26.1°C. Precipitation is extremely scarce and irregularly distributed, exhibiting occasional convective bursts; the heaviest monthly deluge on record was 184.1 mm, occurring in June 2010, though most months remain virtually dry. Mean relative humidity fluctuates broadly between 37% in the drier winter months and 83% during the peak summer. Wind patterns remain moderate to brisk throughout the year, with annual averages ranging from 13.1 to 15.8 km/h and experiencing significantly elevated velocities during the spring and pre-monsoon periods.

4.4.17 Climate of Saidu Sharif Swat

217. Saidu Sharif (Swat District) features a humid sub-tropical to sub-alpine continental climate, characterized by relatively warm, brief summers, cold winters, and double-season precipitation cycles spanning both the spring and summer monsoon periods. Based on meteorological baseline data (2010–2025), mean monthly maximum temperatures typically range from a winter low of approximately 8°C to summer peaks of 34°C, with June and July routinely serving as the hottest months. In contrast, mean monthly minimum temperatures regularly plunge below freezing to -3°C in January, rising to a maximum summer average of 22°C during July. The average annual maximum temperature spans between 20.8°C and 25.3°C, while the average annual

minimum ranges from 8.8°C to 11.7°C. Precipitation is abundant yet seasonally concentrated, exhibiting significant peaks during the spring wet season (March) and the late summer monsoon (July–August); the heaviest monthly deluge on record was 539.9 mm, occurring in July 2010. Mean relative humidity fluctuates broadly between 18% in the dry winter months and 79% during the peak monsoon. Wind patterns remain gentle to moderate throughout the year, with annual averages ranging from 6.9 to 8.8 km/h and experiencing slightly elevated velocities during the spring months.

4.4.18 Climate of Dassu Upper Kohistan

218. Dassu, Upper Kohistan, features a high-altitude alpine continental climate, characterized by severely cold, protracted winters, brief and mild summers, and a precipitation regime heavily concentrated during the late summer monsoon period. Based on meteorological baseline data (2010–2025), mean monthly maximum temperatures typically range from a winter low of approximately -19°C to summer peaks of 10°C, with July and August routinely serving as the hottest months. In contrast, mean monthly minimum temperatures regularly plunge below freezing, reaching as low as -33°C in January, while rising to a maximum summer average of 3°C during August. The average annual maximum temperature spans between -5.4°C and -3.2°C, while the average annual minimum ranges from -18.8°C to -14.2°C. Precipitation is moderate yet seasonally concentrated, exhibiting a sharp peak during the late summer monsoon (July–August); the heaviest monthly deluge on record was 160.2 mm, occurring in August 2023. Mean relative humidity fluctuates broadly, peaking above 90% during the harsh winter months and dropping as low as 28% in the drier autumn period. Wind patterns remain gentle to moderate throughout the year, with annual averages ranging from 7.3 to 10.2 km/h and experiencing slightly elevated velocities during the winter and spring months.

4.4.19 Floods

219. The project districts are exposed to varying degrees of flood hazard owing to their diverse topography, drainage patterns, and climatic conditions. The northern mountainous districts, including Chitral, Upper Kohistan (Dassu), Battagram, Shangla and Swat are primarily susceptible to flash floods, debris flows, and landslide-induced flooding triggered by intense monsoon rainfall, snowmelt, and Glacial Lake Outburst Floods (GLOFs). However, the plains and riverine districts such as Mardan, Hangu, Lakki Marwat, Tank, and Malakand are more vulnerable to riverine flooding, seasonal stream overflows, and localized urban flooding associated with the Kabul, Swat, Indus, Kurram, Tochi, and other seasonal rivers and nullahs. Historical flood events, particularly those of 2010 and 2022, caused widespread damage to infrastructure, agricultural land, and settlements across these districts, highlighting their vulnerability to recurrent flood hazards. Climate change, increasing rainfall intensity, glacier retreat, and changing monsoon patterns are expected to further increase the frequency and severity of flood events in Khyber Pakhtunkhwa.[54]

[54] *National Disaster Mitigation Plan - Pakistan Remodeled NDMP-II 2023*

4.4.20 Climate Change

220. The project districts are located across diverse physiographic and climatic zones of Khyber Pakhtunkhwa, ranging from the high mountainous regions of Chitral, Upper Kohistan, Shangla, Battagram, Mansehra, and Swat (Saidu Sharif) to the plains of Mardan, Malakand (Batkhela), Lakki Marwat, and Tank. The northern mountainous districts experience cold winters, moderate summers, heavy snowfall at higher elevations, and are susceptible to landslides, flash floods, and glacial or snowmelt-induced flooding. In contrast, the southern districts of Lakki Marwat and Tank are characterised by hot, semi-arid climatic conditions, prolonged dry periods, water scarcity, dust storms, and occasional flash flooding following intense rainfall. Mardan and Batkhela experience warm summers and moderate rainfall, with localized flooding occurring during the monsoon season. Overall, the project area is exposed to a range of climate-related hazards, including riverine and flash floods, landslides, drought, extreme temperatures, and seismic events, reflecting the varied topography and climatic conditions of the province.

4.4.21 Solid Waste System

Battagram:

221. Solid waste management in Battagram is severely limited and currently lacks any scientifically engineered infrastructure, such as sanitary landfills or material recovery facilities. Due to rapid population growth and commercial expansion in urban centers like Battagram Bazar and Kuza Banda between 2010 and 2025, municipal waste production has far outpaced local administrative capacities. Municipalities rely on crude open-dumping practices, often discharging mixed waste directly onto hillsides, open fields, or near the banks of the Nandihar Khwar. This results in severe plastic pollution, vector breeding, and toxic leachate migrating into localized soil and surface water systems.[55]

Chitral

222. Approximately 10 tons of municipal waste are generated in Chitral town every day. The state of solid waste management is unsustainable; there is a lack of viable, integrated collection and disposal. Waste is routinely burned in the open atmosphere along the river banks, or individual households burn, bury, or dump their rubbish directly into the Chitral River, causing severe degradation of the aquatic ecosystem.[56]

Hangu

223. Solid waste management in Hangu is highly decentralized and severely under-resourced, lacking any engineered sanitary landfills or regulated recycling facilities. In urban pockets like Hangu City and Thall, municipal waste collection covers only a fraction of the population. The majority of domestic and commercial solid waste is disposed of via open dumping along roadsides, vacant plots, and seasonal stream beds.

[55] United Nations Development Programme (UNDP). (2022). *Baseline study on solid waste management in Khyber Pakhtunkhwa*.
[56] *Ali, M., & Nafees, M. (2016). Solid Waste Management in Chitral. ResearchGate.*

Between 2015 and 2025, commercial growth and population pressure from transient communities have escalated plastic and municipal refuse volumes, leading to blocked drainage pathways and significant visual and environmental degradation.[57]

Lakki Marwat

224. Solid waste management in Lakki Marwat is highly underdeveloped, with a complete absence of engineered sanitary landfills or formal material recovery setups. In urban areas like Lakki City, Serai Naurang, and Tajazai, municipal solid waste collection is restricted by limited vehicles and staff. Most domestic, commercial, and market waste is openly dumped into empty plots, roadsides, or directly into the dry beds of seasonal streams. The sharp increase in single-use plastic usage from 2015 to 2025 has created a major environmental hazard, as wind-blown plastics clog local water channels and accumulate across the sandy rangelands.[58]

Batkhela Malakand

225. Solid waste disposal, drainage, and sewerage collection are the direct mandatory municipal services assigned to the Local Council Board and the respective TMAs. Under the regional developmental allocations, projects are distributed through Municipal Committees (MCs) to handle heavy equipment procurement like compactors and multi-loaders for waste cleaning.

Mansehra

226. Solid waste management in Mansehra remains largely informal and lacks integrated engineering solutions like sanitary landfills. With the surge in tourism and rapid urban expansion between 2010 and 2025, the volume of municipal solid waste (MSW) has surpassed the collection capacity of local government agencies. Consequently, waste is often disposed of through open-air burning or illegal dumping in natural ravines (nullahs), which leads to the blockage of drainage pathways and severe soil and water contamination.**[59]**

Mardan

227. Solid waste management in Mardan is handled by the Water and Sanitation Services Company Mardan (WSSCM). The city currently manages municipal solid waste through collection services, while some areas still practice open dumping. According to official records, solid waste collection is carried out through about 500 workers and 19 vehicles.[60]

[57] United Nations Development Programme. (n.d.). Solid waste management in Khyber Pakhtunkhwa. UNDP Pakistan. undp.org
[58] World Bank. (2021). Environmental and Social Management Plan (ESMP) for Khyber Pakhtunkhwa Hydropower Projects. World Bank Group.
[59] National Institute of Public Administration (NIPA). (2022). Khyber Pakhtunkhwa climate change policy and action plan.
[60]United Nations Economic and Social Commission for Asia and the Pacific. (2013). Baseline Study for Solid Waste Management (SWM) in Mardan, Pakistan: Generation, Composition, and Disposal Practices. UN-ESCAP Reports.

Alpuri Shangla

228. Alpuri faces immense challenges regarding structured municipal solid waste management. Roughly 40% to 60% of municipal trash is uncollected, leading to waste being scattered across vacant mountainous plots, streets, and natural hillsides. The missing links in scientific sorting or regional landfill infrastructure compel municipal workers and individual households to resort to open dumping and unmonitored waste incineration, leading to environmental hazards.[61]

Tank

229. Solid waste management in Tank is fundamentally underdeveloped and suffers from a total absence of modern sanitary engineering solutions, such as lined landfill sites or waste-to-energy projects. In urban centers like Tank City, municipal solid waste collection is severely constrained by a lack of institutional funding, mechanical transport, and personnel. The vast majority of domestic and commercial refuse is openly dumped in dry natural watercourses (*nullahs*) or on the fringes of public rangelands. Between 2015 and 2025, a massive rise in single-use plastic consumption has caused extensive littering, which blocks local drainage channels and causes long-term soil toxicity.[62]

Saidu Sharif

230. Solid waste in Saidu Sharif is generated from households, markets, and hospitals. Waste is mostly managed through municipal collection systems**,** but improper dumping and lack of modern landfill facilities are common issues. Hospital waste also contributes significantly to solid waste problems in the area.[63]

Dassu Upeer Kohistan

231. Municipal solid waste management within Dasu town lacks formal modern collection machinery and integrated recycling networks. Solid waste disposal relies heavily on basic manual collection and open burning along vacant areas. However, because of specialized localized development funding from international banks and national water authorities, engineered solid waste management systems and dedicated corporate social responsibility sanitation programs are actively being introduced exclusively inside the residential colonies and resettlement villages.[64]

[61] *Ali, M., Nafees, M., Khan, A., & Ahmad, I. (2025). Assessing municipal solid waste generation, management practices, and health impacts towards sustainable waste management and environmental protection. Environment, Development and Sustainability.*
[62] *United Nations Development Programme (UNDP). (2022). Baseline study on solid waste management in Khyber Pakhtunkhwa.*
[63] *Asian Development Bank. (2021). Environmental Impact Assessment (EIA): Pakistan: Khyber Pakhtunkhwa Cities Improvement Project (KPCIP) – Solid Waste Management Facility Development at Mingora/Saidu Sharif. ADB Project Reports.*
[64] National Transmission and Dispatch Company. (2019). Environmental and Social Impact Assessment for Dasu Transmission Line Project: Main Report (Socio-Environmental Base Mapping and Municipal Dumping Deficits). ESIC NTDC Publications. worldbank.org

4.4.22 Environmental Monitoring

232. Environmental monitoring, sampling, and testing of the proposed project were carried out in March 2026 by a third-party laboratory, M/s PakGreen Laboratories, certified by EPA-KP. The sampling for the proposed environmental monitoring of ambient air, noise and water for proposed project is shown in **Plate 4.1**. Results of Air, Noise and Water are provided in **Table 4.2 to 4.5.** Detailed environmental monitoring, sampling and testing results have been provided as **Annexure-III** of this report.

Ambient Air

233. Ambient air quality data for CO, SO_2, NO, NO_2, CO_2, O_3, PM_{10} and $PM_{2.5}$ was monitored at one (01) point at each project location. The results were compared with the NEQS 2010. The concentrations of $PM_{2.5}$ exceeded at DHQ Hospital Battagram , DHQ Hospital Hangu , DHQ Hospital, Lakki Marwat , DHQ Hospital, Batkhela, Malakand , King Abdullah Teaching Hospital, Mansehr , DHQ Hospital Mardan , DHQ Hospital Alpuri, Shangla , DHQ Hospital Tank , and DHQ Hospital, Saidu Sharif. Most of the project sites are located in urban or Semi urban areas with considerable surrounding traffic, commercial activities, and ongoing development, contributing to elevated ambient air pollution levels. In contrast, the relatively higher $PM_{2.5}$ concentrations observed at DHQ Hospital Dassu, Upper Kohistan, may be attributed to the area's dry climate conditions, rugged mountainous terrain, unpaved road sections, and dust generated from construction and vehicular movement rather than heavy urban traffic.

Noise Level

234. Noise level monitoring was conducted at each hospital facility, and the recorded values were compared with the National Environmental Quality Standards (NEQS) for Silence Zone (D), i.e., 50 dB(A) during daytime and 45 dB(A) during nighttime. Elevated noise levels exceeding applicable standards were recorded at all project hospitals, mainly due to their location within busy urban areas with continuous traffic flow, commercial activity, and public movement.

Wastewater

235. The wastewater quality was measured at one (01) location from each of the specified hospitals mentioned in the project area. The water sample were analyzed for the parameters specified in NEQS, 2010. Higher BOD and COD was observed at DHQ Hospital Hangu, King Abdullah Teaching Hospital, DHQ Hospital Mardan, and DHQ Hospital Saidu Sharif and higher TSS was observed at DHQ Hospital Mardan and DHQ Hospital Saidu Sharif and higher Ammonia was observed at King Abdullah Teaching Hospital, DHQ Hospital Mardan, and DHQ Hospital Saidu Sharif and higher Copper at DHQ Hospital Mardan and higher Iron at DHQ Hospital Mardan, and DHQ Hospital Saidu Sharif and higher Manganese at DHQ Hospital Saidu Sharif.

Groundwater / Drinking Water

236. To assess the existing groundwater quality within the AOI, one (01) groundwater sample was collected from each of the specified hospitals. The sample was properly labeled, preserved, and transported to the laboratory for comprehensive analysis. It was tested against all relevant physico-chemical and biological parameters. Biological contamination was observed at locations like, DHQ Hospital Lakki Marwat and King Abdullah Teaching Hospital Mansehra and Total hardness at King Abdullah Teaching Hospital, Mansehra. Other parameters were within the NEQS limits.

Plate 4.1: Environmental Monitoring of Ambient Air, Noise and Water for proposed project



DHQ Hospital Batkhela


DHQ Hospital Battagram


King Abdullah Teaching Hospital, Mansehra



DHQ Hospital Alpuri Shangla

Table 4.2: Ambient Air Monitoring Results

Sr. No.	Parameters	Monitoring Duration	Limits as Per NEQS, 2010	Average Concentration DHQ Hospital Battagram	Average Concentration DHQ Hospital Chitral	Average Concentration DHQ Hospital Hangu	Average Concentration DHQ Hospital Lakki Marwat	Average Concentration DHQ Hospital Batkhela	Average Concentration King Abdullah Teaching Hospital	DHQ Hospital Mardan	DHQ Hospital Alpuri	DHQ Hospital Tank	DHQ Hospital, Saidu Sharif	DHQ Hospital Dassu
1.	Nitrogen Dioxide (NO_2)	24 Hours	80 µg/m^3	35.13	29.78	34.5	37.79	32.74	35.62	34.07	32.63	28.79	36.85	29.16
2.	Nitrogen Oxide (NO)	24 Hours	40 µg/m^3	14.50	11.89	12.04	13.6	11.31	9.44	13.45	11.89	9.87	12.04	8.75
3.	Sulphur Dioxide (SO_2)	24 Hours	120 µg/m^3	41.86	37.23	39.21	41.57	42.68	39.73	43.59	41.69	40.67	44.10	37.09
4.	Carbon Monoxide (CO)	8 Hours	5.0 mg/m^3	1.82	1.40	1.53	1.88	1.75	1.43	1.74	1.63	1.92	1.70	1.35
5.	Ozone (O_3)	1 Hour	130 µg/m^3	63.6	59.8	57.3	61.5	60.2	56.7	63.2	62.9	56.2	58.4	48.4
6.	Particulate Matter (PM_{10})	24 Hours	150 µg/m^3	146.3	142.5	141.5	143.8	143.9	140.6	146.8	147.3	148.5	142.8	141.2
7.	Particulate Matter ($PM_{2.5}$)	24 Hours	35 µg/m^3	**41.7***	26.8	**39.4***	**43.5***	**46.4***	**38.2***	**42.6***	**49.5***	**60.1***	**51.6***	32.8
8.	Lead	24 Hours	1.5 µg/m^3	0.02	0.01	0.03	0.02	0.03	0.02	0.01	0.01	0.02	0.01	0.01
9.	SPM	24 Hours	500 µg/m^3	449.1	420.6	435.2	462.6	452.3	443.9	439.5	458.2	452.6	467.4	420.3

µg/m^3: micrograms per cubic meter **NEQS:** National Environmental Quality Standards

Table 4.3: Noise Level Monitoring Results

Sr. No	Name of the Hospital	Coordinates		Duration	Average Noise Level in dB(A)		NEQS (Silence Zone (D)
		Latitude	Longitude				
1	**DHQ Hospital Battagram**	34.675415°N	73.0313067°E	24 Hours	Day Time	**61.2**	50
					Night Time	**54.5**	45
2	**DHQ Hospital Chitral**	35.85232°N	71.78833°E	24 Hours	Day Time	**52.9**	50
					Night Time	**46.7**	45
3	**DHQ Hospital Hangu**	33.300515ºN	71.021727°E	24 Hours	Day Time	**58.3**	50
					Night Time	**46.7**	45
4	**DHQ Hospital Lakki Marwat**	32.371359°N	71.474145°E	24 Hours	Day Time	**64.7**	50
					Night Time	**53.2**	45
5	**DHQ Hospital Batkhela**	34.364137°N	71.573803°E	24 Hours	Day Time	**57.9**	50
					Night Time	**52.4**	45
6	**King Abdullah Teaching Hospital**	34.193134°N	33.120313°E	24 Hours	Day Time	**62.4**	50
					Night Time	**51.6**	45
7	**DHQ Hospital Mardan**	34.112828ºN	72.024318ºE	24 Hours	Day Time	**68.1**	50
					Night Time	**56.4**	45
8	**DHQ Hospital Alpuri Shangla**	34.551451ºN	72.375757ºE	24 Hours	Day Time	**55.4**	50
					Night Time	**50.7**	45
9	**DHQ Hospital Tank**	32.125321ºN	70.230190ºE	24 Hours	Day Time	**62.7**	50
					Night Time	**50.4**	45
10	**DHQ Hospital, Saidu Sharif**	34.452877ºN	72.212989ºE	24 Hours	Day Time	**59.2**	50
					Night Time	**51.8**	45
11	**DHQ Hospital Dassu**	35.161620ºN	73.132975ºE	24 Hours	Day Time	**58.3**	50
					Night Time	**55.9**	45

Day Time hour: 06:00am to 10:00pm **Night Time hour:** 10:00pm to 06:00am

Table 4.4: Surface Water/Wastewater Sampling Results

Sr. No.	Parameter	Units	NEQS 2010	DHQ Hospital Battagram	DHQ Hospital Chitral	DHQ Hospital Hangu	DHQ Hospital Lakki Marwat	DHQ Hospital Batkhela	King Abdullah Teaching Hospital	DHQ Hospital Mardan	DHQ Hospital Alpuri	DHQ Hospital Tank	DHQ Hospital, Saidu Sharif	DHQ Hospital Dassu
Field Analysis														
1	Temperature	°C	40	23.5	23.4	23.4	23.8	24.3	23.4	23.8	23.8	25	24	23.4
Laboratory Analysis														
2	pH**		6 - 9	7.294 at 23.5°C	7.409 at 23.4°C	7.593 at 23.4ºC	7.438 at 23.8°C	7.250 at 24.3°C	7.476 at 23.4°C	7.356 at 23.4°C	8.274 at 23.8°C	8.321 at 25°C	6.891 at 24°C	7.905 at 23.4°C
3	Biochemical Oxygen Demand (BOD_5) *	mg/L	80	56	28	**108**	18	34	**558***	**739.4***	48	73	**2588***	06
4	Chemical Oxygen Demand (COD)**	mg/L	150	88	48	**168**	28	56	**248***	**1192***	72	125	**4176***	10
5	Total Suspended Solids (TSS)**	mg/L	200	30	15	100	10	130	100	**550***	30	62	**2480***	5
6	Total Dissolved Solids (TDS)**	mg/L	3500	210	410	1160	890	1100	1290	540	80	839	1120	190
7	Phenolic Compounds (as Phenols) *	mg/L	0.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
8	Grease and Oil**	mg/L	10	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
9	Chloride (Cl^-)**	mg/L	1000	20	30	195	125	235	170	30	5	80	100	5
10	Fluoride (F^-)**	mg/L	10	0.2	0.4	1.0	0.9	1.4	1.2	0.4	0.1	0.5	1.2	0.1
11	Cyanide (CN-)*	mg/L	1.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12	An-ionic Detergents (as MBAs) *	mg/L	20.0	0.010	0.038	0.095	0.0219	0.210	0.84	0.110	0.075	0.087	4.068	0.028
13	Sulfate ($SO_4^{-2)}$ **	mg/L	600	25	25	134	110	140	112	65	10	93	108	23
14	Sulfide (S^{-2}) *	mg/L	1.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Ammonia (NH_3) *	mg/L	40	1.6	3.9	14.8	1.1	7.9	**44.6***	**88.6***	2.5	7.6	**96.8***	0.2
16	Cadmium (Cd)	mg/L	0.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Chromium (Cr)	mg/L	1.0	BDL	0.1385	0.1503	BDL	BDL	BDL	0.0995	0.1576	0.2096	0.2547	BDL
18	Copper (Cu)	mg/L	1.0	BDL	BDL	0.0305	0.0219	BDL	BDL	**1.3058***	0.0195	0.0291	0.4713	BDL
19	Lead (Pb)	mg/L	0.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Mercury (Hg)	mg/L	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Selenium (Se)	mg/L	0.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Nickel (Ni)	mg/L	1.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Silver (Ag)	mg/L	1.0	BDL	BDL	BDL	BDL	BDL	0.0394	BDL	0.1309	BDL	0.0374	BDL
24	Total Toxic Metals	mg/L	2.0	BDL	0.1385	0.1808	0.0219	BDL	BDL	1.4053	0.3080	0.2387	0.7634	BDL
25	Zinc (Zn)	mg/L	5.0	0.2199	0.0325	0.1372	0.0219	0.0916	0.0666	4.6051	0.0609	0.0634	2.1423	BDL
26	Arsenic (As)	mg/L	1.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Barium (Ba)	mg/L	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	Iron (Fe)	mg/L	8.0	1.6509	1.3011	5.5080	1.6671	0.4688	1.7008	**65.6616***	2.5251	3.2160	**132.9055***	0.0222
30	Manganese (Mn)	mg/L	1.5	0.1824	0.1182	0.2398	0.0997	0.0629	0.0195	0.7342	0.0875	0.1674	**4.0417***	BDL
31	Boron (B)	mg/L	6.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
32	Residual Chlorine (Cl_2)	mg/L	1.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

NEQS = National Environmental Quality Standards **BDL=** Below detective Level

Table 4.5: Groundwater / Drinking Water Sampling Results

Sr. No.	Parameter	Units	NEQS Limits	DHQ Hospital Battagram	DHQ Hospital Chitral	DHQ Hospital Hangu	DHQ Hospital Lakki Marwat	DHQ Hospital Batkhela	King Abdullah Teaching Hospital	DHQ Hospital Mardan	DHQ Hospital Alpuri Shangla	DHQ Hospital Tank	DHQ Hospital, Saidu Sharif	DHQ Hospital Dassu Upper Kohistan
Field Analysis														
1	Temperature	°C	---	23.4	24.7	24	23.9	22.5	23.2	20.5	23.8	23	23	23
Laboratory Analysis														
2	Color*	TCU	≤ 15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	Taste*	---	Non-Objectionable	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4	Odor*	---	Non-Objectionable	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5	Turbidity*	NTU	< 5	0.20	0.35	0.40	0.20	0.24	0.28	0.30	0.25	0.26	0.20	0.20
6	Total Hardness (as CaCO3) **	mg/L	< 500	200	310	210	180	260	**600**	230	190	257	310	190
7	Total Dissolved Solids (TDS)**	mg/L	< 1000	310	425	595	630	430	480	430	290	316	450	260
8	pH**	---	6.5- 8.5	7.547 at 23.4ºC	7.816 at 24.7ºC	7.790 at 24ºC	7.770 at 23.9ºC	7.546 at 22.5ºC	7.868 at 23.2ºC	7.873 at 20.5ºC	8.131 at 23.8ºC	7.825 at 23ºC	7.309 at 23ºC	7.828 at 23ºC
9	Aluminum (Al)	mg/L	≤ 0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10	Antimony (Sb)	mg/L	≤ 0.005	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11	Arsenic (As)	mg/L	≤ 0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12	Barium (Ba)	mg/L	0.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13	Boron (B)	mg/L	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14	Cadmium (Cd)	mg/L	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Chloride (Cl^-) **	mg/L	< 250	20	20	85	60	35	40	25	15	20	30	5
16	Chromium (Cr)	mg/L	≤ 0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Copper (Cu)	mg/L	2.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.0173	BDL
18	Cyanide (CN^-)*	mg/L	≤ 0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Fluoride (F^-)**	mg/L	≤ 1.5	0.3	0.4	0.6	0.6	BDL	0.4	BDL	0.2	BDL	0.2	0.3
20	Lead (Pb)	mg/L	≤ 0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Manganese (Mn)	mg/L	≤ 0.5	BDL	0.0133	0.0243	BDL	BDL	0.0201	BDL	BDL	BDL	BDL	BDL
22	Mercury (Hg)	mg/L	≤ 0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Nickel (Ni)	mg/L	≤0.02	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Nitrate (NO^{-3}) **	mg/L	≤ 50	BDL	BDL	0.028	0.684	0.009	0.096	0.006	BDL	BDL	BDL	BDL
25	Nitrite (NO^{-2}) *	mg/L	≤ 3.0	BDL	BDL	BDL	0.244	0.124	BDL	0.124	BDL	BDL	BDL	BDL
26	Selenium (Se)	mg/L	0.01 mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Residual Chlorine (Cl^2) *	mg/L	0.2 to 0.5 at Consumer & 0.5-1.5 at Source	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Phenolic Compounds (as Phenols)	mg/L	NGVS	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	Zinc (Zn)	mg/L	5.0	0.5136	BDL	BDL	BDL	0.0507	0.2834	BDL	BDL	0.0173	0.0934	BDL
30	Iron (Fe)	mg/L	-	0.0281	BDL	BDL	BDL	BDL	0.0286	BDL	BDL	0.0391	BDL	BDL
Microbiological Analysis														
31	E. Coli	Number/100 mL	Must not be detectable in any 100 ml sample	NIL	NIL	NIL	**40.4***	NIL	**40.4***	NIL	NIL	NIL	NIL	NIL
32	Total Coliforms	Number/100 mL	Must not be detectable in	NIL	NIL	NIL	**114.4***	NIL	**114.4***	NIL	NIL	NIL	NIL	NIL

Sr. No.	Parameter	Units	NEQS Limits	DHQ Hospital Battagram	DHQ Hospital Chitral	DHQ Hospital Hangu	DHQ Hospital Lakki Marwat	DHQ Hospital Batkhela	King Abdullah Teaching Hospital	DHQ Hospital Mardan	DHQ Hospital Alpuri Shangla	DHQ Hospital Tank	DHQ Hospital, Saidu Sharif	DHQ Hospital Dassu Upper Kohistan
			any 100 ml sample											
33	Fecal Coliforms	Number/100 mL	Must not be detectable in any 100 ml sample	NIL	NIL	NIL	**113.4***	NIL	**113.4***	NIL	NIL	NIL	NIL	NIL

NEQS = National Environmental Quality Standards **BDL=** Below detective Level **NO =** Non-Objectionable

4.4.23 Land Use Pattern

237. The proposed project is confined to the existing hospital premises, where the land is already designated for institutional (healthcare) use. No land acquisition or change in land use is required. The surrounding areas comprise predominantly residential, commercial, and mixed-use developments, which have been considered in the assessment of potential indirect impacts, including noise, dust emissions, and temporary traffic disturbances during project implementation. **Table 4.6** provide statistical data regarding proportion of Land use in project boundary.

Table 4.6: Landuse land use characteristics within hospital premises

Landuse Type	DHQ Hospital Battagram	DHQ Hospital Chitral	DHQ Hospital Hangu	DHQ Hospital Lakki Marwat	DHQ Hospital Batkhela	King Abdullah Teaching Hospital Mansehra	DHQ Hospital Mardan	DHQ Hospital Alpuri	DHQ Hospital Tank	DHQ Hospital, Saidu Sharif	DHQ Hospital Dassu
	Area (acres)										
Barren / Open Land	2.834	3.649	24.237	20.377	1.558	0.351	1.375	0.489	0.477	0.385	3.826
Built-up Area	5.432	11.019	3.992	7.435	10.285	9.806	8.606	3.324	5.037	10.459	3.432
Parking	0.240	0.101	4.673	1.180	0.678	0.541	-	0.160	-	0.690	-
Road / Track	1.461	1.811	-	3.081	2.373	3.196	2.129	0.644	1.120	1.441	2.173
Cultivated Land	-	-	-	-	-	-	-	-	-	-	-
Graveyard	-	-	-	-	-	-	-	-	-	-	-
Park	-	-	-	0.697	-	-	0.129	0.278	0.175	-	-
Stream / Nullah	0.140	-	-	-	-	-	-	-	-	-	-
Trees / Bushes	-	-	-	-	-	-	-	-	-	-	-

4.4.24 Environmental Sensitive Receptors

238. Sensitive receptors for the hospital project include internal and nearby facilities that may be affected by construction and operational activities. Although the AOI is defined as the project boundary, adjacent surroundings have also been considered for a precautionary assessment. Within the hospital premises, key sensitive receptors include patient care units (wards, OPDs, emergency, and operation theatres) as well as on-site prayer areas/mosques.

239. In the surrounding area, staff residential colonies and nearby mosques are also identified as receptors; however, these are not expected to be directly impacted due to their distance from core construction activities.

240. Land use and sensitive receptors map is attached as **Annexure-IV**

4.4.25 Environmental Compliance Status

241. Environmental Compliance Status of Hospital facilities in Phase III given in following **Table 4.7** whereas pictorial representation is given in **Plate 4.2.** The identified environmental management deficiencies constitute existing environmental liabilities. To address these issues, a Corrective Action Plan (CAP) has been developed and is presented in Section 9.13. The CAP outlines corrective measures, implementation responsibilities, monitoring requirements, and timelines to achieve compliance with national regulations, WHO EHS Guidelines, and ADB SPS (2009).

Table 4.7: Environmental Compliance Status of Hospital facilities in Phase III

Environmental Aspect	DHQ Hospital, Battagram	DHQ Hospital, Chitral	DHQ Hospital,Hangu	DHQ Hospital, Lakki Marwat	DHQ Hospital, Batkhela, Malakand	King Abdullah Teaching Hospital, Mansehra	DHQ Hospital, Mardan	DHQ Hospital Alpuri, Shangla	DHQ Hospital, Tank	DHQ Hospital, Saidu Sharif Swat	DHQ Hospital, Dassu Upper Kohistan
Permit Requirements	Existing hospital; No environmental approval required for rehabilitation works.										
Healthcare Waste Management	For generation rates refer section 3.18										
	• No segregation; • Limited Colour coded bins available; • Open Dumping of waste • No on-site treatment; • Poor record keeping.	• No segregation; • Limited Colour coded bins available; • Open Dumping of waste • No on-site treatment; • Incinerator available but not functional; • Poor waste records.	• No segregation; • Open Dumping of waste • No on-site treatment; • No colour Coded Bins; • Poor waste records.	• No segregation; • No colour coded bins; • Open dumping of waste; • No on-site treatment; • Incomplete records.	• Inadequate segregation practiced; • No colour coded bins; • Open dumping of waste; • No on-site treatment; • Incomplete records.	• No segregation; • No colour coded bins; • Open dumping of waste; • Incinerator available and functional; • Incomplete records.	• Inadequate segregation practiced; • No colour coded bins; • Open dumping of waste • Incinerator available and not functional; • Incomplete records.	• No segregation; • No colour coded bins; • Open dumping of waste; • No on-site treatment; • Incomplete records	• No segregation; • Limited Colour coded bins available; • Open Dumping of waste • No on-site treatment; • Poor record keeping	• Inadequate segregation; • Colour coded bins were available; • Incinerator is available but not functional • Open Dumping of waste • Poor record keeping	• No segregation; • Limited Colour coded bins available; • Open Dumping of waste • No on-site treatment; • Poor record keeping
Wastewater Management	For generation rates refer section 3.17										
	• No on-site treatment. • Direct discharge to municipal sewer	• No on-site treatment. • Direct discharge to municipal sewer	• No on-site treatment. • Direct discharge to municipal sewer	• No on-site treatment. • Direct discharge to municipal sewer	• Soakage pits are available • Discharge to municipal sewer after retention in soakage pits.	• No on-site treatment. • Direct discharge to municipal sewer	• No on-site treatment. • Direct discharge to municipal sewer	• No on-site treatment. • Direct discharge to municipal sewer	• No on-site treatment. • Direct discharge to municipal sewer	• No on-site treatment. • Direct discharge to municipal sewer	• No on-site treatment. • Direct discharge to municipal sewer
Air Quality	Refer Table 4.2										
Noise	Refer Table 4.3										
Wastewater Quality	Refer Table 4.4										
Drinking Water Quality	Refer Table 4.5										
Occupational Health and Safety	Partial compliance with Occupational health and safety (OHS) requirements. Gaps were observed in: • Availability and proper use of PPE; • Electrical safety, including exposed wiring and inadequate protection of electrical installations; • Poor Housekeeping practices, resulting in slip, trip, and fall hazards • Safe storage and handling of hazardous materials and chemicals • Safety Signage and hazard communication • Biological exposure, Sharps handling and infection prevention and control										

Environmental Aspect	DHQ Hospital, Battagram	DHQ Hospital, Chitral	DHQ Hospital,Hangu	DHQ Hospital, Lakki Marwat	DHQ Hospital, Batkhela, Malakand	King Abdullah Teaching Hospital, Mansehra	DHQ Hospital, Mardan	DHQ Hospital Alpuri, Shangla	DHQ Hospital, Tank	DHQ Hospital, Saidu Sharif Swat	DHQ Hospital, Dassu Upper Kohistan
Emergency Preparedness	• No fire extinguishers; • The fire hose cabinet was installed and in satisfactory condition; • No evidence of routine inspection, and maintenance • No Emergency escape routes, assembly points, • No documented emergency response procedures, staff training, or mock drills.	• No fire extinguishers • No fire alarms available. • No Emergency escape route; assembly points, and fire safety signage • No documented emergency response procedures, staff training, or mock drills	• Inadequate Fire extinguishers and not calibrated • fire alarms available but not functional. • Emergency escape routes, assembly points, and fire safety signage not adequately designated • No documented emergency response procedures, staff training, or mock drills.	• No fire extinguishers; • No fire detection and alarm system or fixed firefighting system. • No Emergency escape routes, assembly points, and fire safety signage. • No documented emergency response procedures, staff training, or mock drills.	• Fire extinguishers available. • limited fire detection and alarms; • no evidence of routine inspection and operational status was unverifiable. • Emergency escape routes, assembly points, and fire safety signage not adequately designated. • No documented emergency response procedures, staff training, or mock drills.	• Fire extinguishers available. • limited fire detection and alarms; • no evidence of routine inspection and operational status was unverifiable. • Emergency escape routes, assembly points, and fire safety signage not adequately designated. • No documented emergency response procedures, staff training, or mock drills.	• Fire extinguishers, fire Alarms and Fire hose reel is available; • no evidence of routine inspection and operational status was unverifiable. • Emergency escape routes, assembly points, and fire safety signage not adequately designated. • No documented emergency response procedures, staff training, or mock drills.	• Fire extinguishers; • No fire alarms available. • No Emergency escape route; assembly points, and fire safety signage • No documented emergency response procedures, staff training, or mock drills	• Fire extinguishers; • No fire alarms available. • No Emergency escape route; assembly points, and fire safety signage • No documented emergency response procedures, staff training, or mock drills	• Fire extinguishers, fire Alarms and Fire hose reel is available; • no evidence of routine inspection and operational status was unverifiable. • Emergency escape routes, assembly points, and fire safety signage not adequately designated. • No documented emergency response procedures, staff training, or mock drills	• Fire extinguishers; • No fire alarms available. • No Emergency escape route; assembly points, and fire safety signage • No documented emergency response procedures, staff training, or mock drills
Environmental Monitoring	No structured environmental monitoring programme.										
Institutional Arrangements	No dedicated environmental staff or EMS; limited training, budget, and monitoring resources.										

Plate 4.2: Environmental Compliance Status of Hospital facilities in Phase III






DHQ HOSPITAL, BATTAGRAM






DHQ HOSPITAL, CHITRAL






DHQ HOSPITAL, HANGU







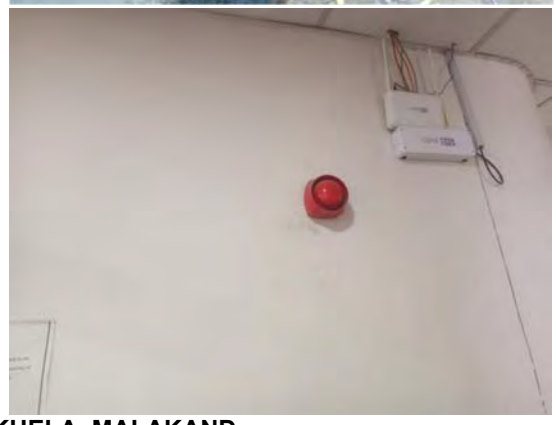


DHQ HOSPITAL, LAKKI MARWAT









DHQ HOSPITAL BATKHELA, MALAKAND













KING ABDULLAH TEACHING HOSPITAL, MANSEHRA

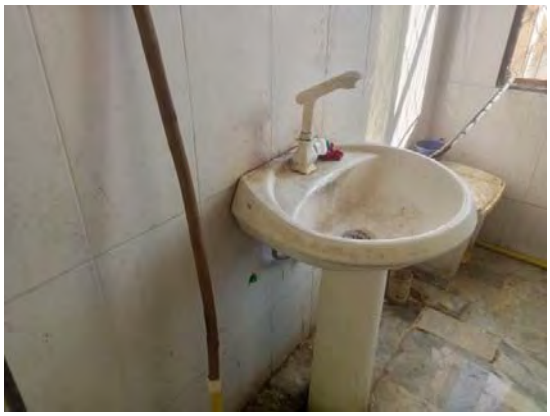









DHQ HOSPITAL MARDAN









DHQ HOSPITAL ALPURI, SHANGLA

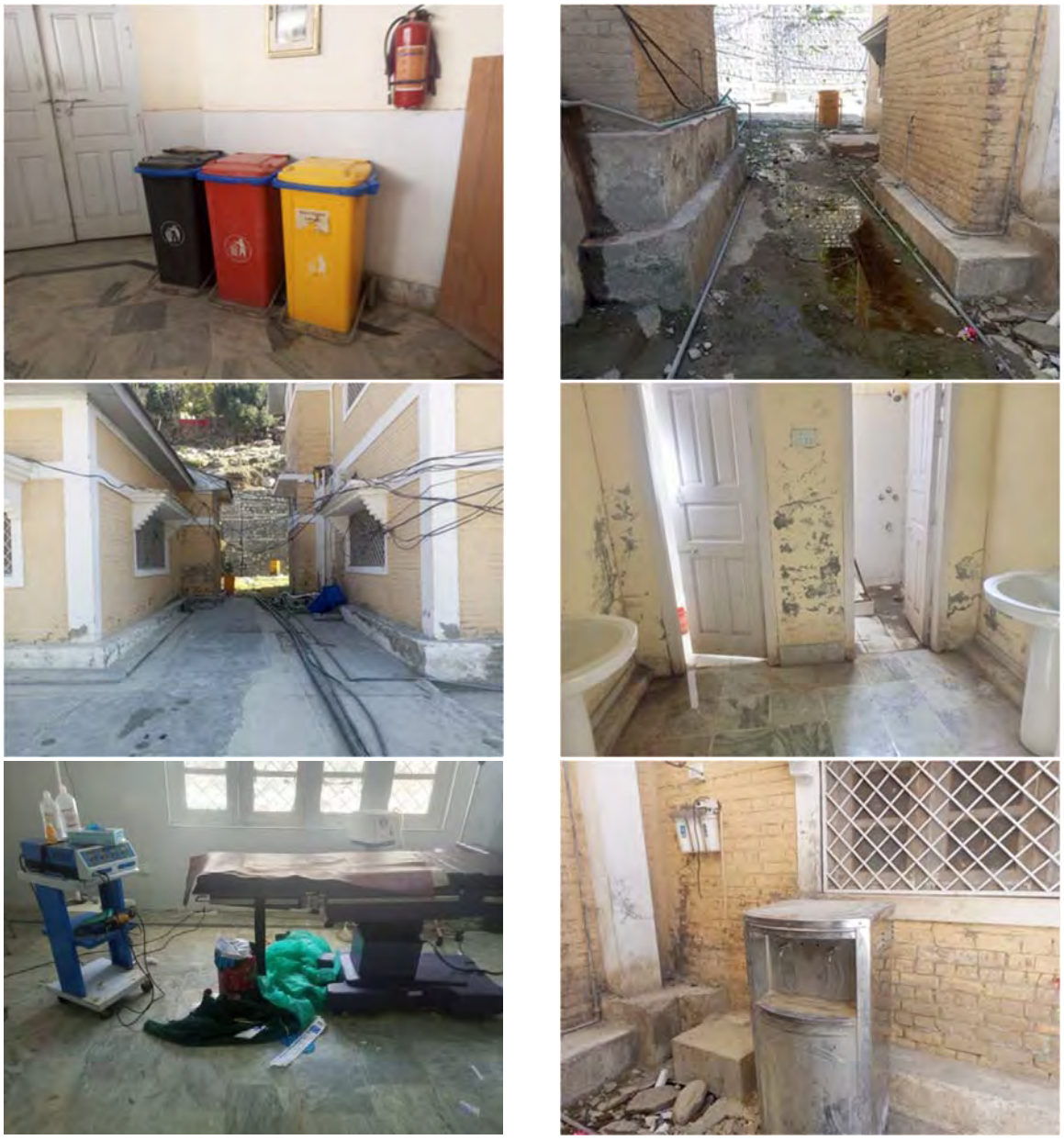








DHQ HOSPITAL SAIDU SHARIF , SWAT



DHQ HOSPITAL DASSU, UPPER KOHISTAN

4.4.26 Existing Environmental Liabilities and Associated Risks

242. The assessment of environmental compliance identified a number of pre-existing environmental management deficiencies including waste management, occupational health and safety, and emergency preparedness at the hospitals in Phase III. These conditions indicate existing environmental liabilities and are not attributable to the proposed rehabilitation activities. These liabilities may result in continued environmental degradation, occupational and public health risks, and non-compliance with applicable environmental, healthcare waste management, occupational health and fire and safety requirements. The principal existing liabilities and associated risks are summarized in **Table 4.8.**

243. The **Table 4.8** presents pre-existing environmental liabilities, which are distinct from project-induced impacts associated with the proposed rehabilitation activities. Project-induced impacts will be managed through the Environmental Management Plan (EMP), while existing liabilities will be addressed through hospital-specific Corrective Action Plans (CAPs). Corrective actions within the project scope will be incorporated into project design and implementation arrangements, while those outside the project scope will be referred to the respective hospital/Health Department for appropriate action.

Table 4.8: Environmental Liabilities and Associated Risks

Sr. No.	Hospital	Existing Environmental Liability	Associated Environmental, Health and Safety Risks / Impacts
1.	**DHQ Battagram**	• No segregation of healthcare waste; limited colour-coded bins; open dumping; no on-site treatment; poor records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Gaps in PPE, electrical safety, housekeeping, hazardous-material handling, safety signage, sharps handling and biological exposure controls. • No fire extinguishers; fire hose cabinet available but routine inspection/maintenance not evidenced; inadequate escape routes, assembly points and signage; no documented emergency procedures, training or drills. • No structured environmental monitoring program and limited institutional capacity.	• Increased risk of infectious and sharps exposure and healthcare-associated infection due to poor waste segregation and disposal. • Potential pollution and pathogen exposure associated with untreated wastewater discharge. • Increased occupational injury, chemical and biological exposure risks. • Elevated fire and life-safety risk and potentially delayed evacuation during emergencies. • Weak monitoring and institutional arrangements may delay identification and correction of environmental deficiencies.
2.	**DHQ Chitral**	• No healthcare waste segregation; limited colour-coded bins; open dumping; no on-site treatment; Incinerator available but not functional poor waste records. • No on-site wastewater treatment; direct discharge to municipal sewer. • OHS deficiencies covering PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • No fire extinguishers or fire alarms; inadequate escape routes, assembly points and fire-safety signage; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	• High risk of inappropriate handling and disposal of infectious/sharps waste. • Potential environmental contamination and pathogen exposure from untreated wastewater. • Increased occupational health and safety risks. • Significant fire, evacuation and life-safety risks. • Weak monitoring may allow deficiencies to persist without timely corrective action.
3.	**DHQ Hangu**	• No healthcare waste segregation; open dumping; no colour-coded bins or on-site treatment; poor records. • No on-site wastewater treatment; direct discharge to municipal sewer. • 4.Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls.	• Increased risk of infectious/sharps exposure and improper healthcare waste disposal. • Potential pollution and pathogen exposure from untreated wastewater. • Increased occupational injury and biological/chemical exposure risks. Elevated fire and life-safety risks due to inadequate firefighting and alarm systems.

Sr. No.	Hospital	Existing Environmental Liability	Associated Environmental, Health and Safety Risks / Impacts
		• Fire extinguishers inadequate/not calibrated; fire alarms available but non-functional; escape routes, assembly points and signage inadequately designated; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	• Lack of monitoring may delay corrective action.
4.	**DHQ Lakki Marwat**	• No healthcare waste segregation or colour-coded bins; open dumping; no on-site treatment; incomplete records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Drinking Water quality is not reliable • Gaps in PPE, electrical safety, housekeeping, hazardous-material handling, signage, sharps and biological exposure controls. • No fire extinguishers, fire detection/alarm or fixed firefighting system; inadequate escape routes, assembly points and signage; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	• Increased risk of infectious/sharps exposure and uncontrolled healthcare waste disposal. • Potential contamination and pathogen exposure from untreated wastewater. • Increased risk of waterborne diseases among patients, healthcare workers, and visitors. • Increased occupational injury and exposure risks. High fire and evacuation risk due to absence of basic fire protection systems. • Weak environmental oversight may result in continued non-compliance.
5.	**DHQ Batkhela**	• Inadequate healthcare waste segregation; no colour-coded bins; open dumping; no on-site treatment; incomplete records. • Soakage pits available, with discharge to municipal sewer after retention in soakage pits; no treatment system identified. • Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • Fire extinguishers available; limited fire detection/alarms; routine inspection and operational status not verified; inadequate escape routes, assembly points and signage; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	• Increased risk of infectious/sharps exposure and inappropriate waste disposal. • Potential soil/groundwater contamination or public-health exposure if soakage pits are inadequately maintained, overloaded or leak. • Potential exposure risks associated with wastewater and sludge management • Increased occupational health and safety risks. • Higher fire and emergency-response risks due to inadequate/uncertain fire protection arrangements. • Weak monitoring may delay corrective measures.

Sr. No.	Hospital	Existing Environmental Liability	Associated Environmental, Health and Safety Risks / Impacts
6.	**King Abdullah Teaching Hospital, Mansehra**	• No healthcare waste segregation or colour-coded bins; open dumping; incinerator available and functional; incomplete records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Drinking Water quality is not reliable • Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • Fire extinguishers and limited fire detection/alarms available, but routine inspection and operational status not verified; inadequate escape routes, assembly points and signage; no documented emergency procedures, training or drills. • No structured environmental monitoring program and limited institutional capacity.	• Increased risk of waste accumulation, improper handling and disposal of infectious waste • Air emissions, soil and water contamination, and potential occupational exposure associated with incinerator operation, particularly in the event of malfunction or inadequate maintenance • Increased infection, sharps and occupational exposure risks. • Potential pollution and pathogen exposure from untreated wastewater. • Increased risk of waterborne diseases among patients, healthcare workers, and visitors. • Increased fire and evacuation risk due to inadequate/uncertain fire-safety arrangements. • Weak monitoring and institutional capacity may delay corrective action.
7.	**DHQ Mardan**	• Inadequate healthcare waste segregation; no colour-coded bins; open dumping; incinerator available but non-functional; incomplete records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • Fire extinguishers, fire alarms and fire hose reel available, but routine inspection and operational status not evidenced; escape routes, assembly points and signage inadequately designated; no documented emergency procedures, training or drills. • No structured environmental monitoring program and limited institutional capacity.	• Increased risk of infectious/sharps exposure and improper disposal of healthcare waste. • Increased risk of waste accumulation and inappropriate treatment due to non-functional incinerator. • Potential pollution and pathogen exposure from untreated wastewater. • Increased occupational injury and biological/chemical exposure risks. • Residual fire and life-safety risks due to inadequate emergency preparedness and uncertain operational status of fire systems. • Weak monitoring may delay corrective action.
8.	**DHQ Shangla**	• No healthcare waste segregation; no colour-coded bins; open dumping; no on-site treatment; incomplete records. • No on-site wastewater treatment; direct discharge to municipal sewer.	• Increased risk of infectious/sharps exposure and improper healthcare waste disposal. • Potential pollution and pathogen exposure from untreated wastewater.

Sr. No.	Hospital	Existing Environmental Liability	Associated Environmental, Health and Safety Risks / Impacts
		• Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • Fire extinguishers available but no fire alarms; inadequate escape routes, assembly points and fire-safety signage; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	• Increased occupational injury and biological exposure risks. • Elevated fire and life-safety risk due to inadequate fire detection and evacuation arrangements. • Weak monitoring may limit timely identification and correction of deficiencies.
9.	**DHQ Tank**	• Inadequate healthcare waste segregation; colour-coded bins available; open dumping; incinerator available but non-functional; poor records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • Fire extinguishers available but no fire alarms; inadequate escape routes, assembly points and signage; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	• Residual risk of infectious/sharps exposure and uncontrolled waste disposal, particularly with the incinerator non-functional. • Potential pollution and pathogen exposure from untreated wastewater. • Increased occupational injury and exposure risks. • Elevated fire and evacuation risks due to lack of fire alarms and inadequate emergency preparedness. • Weak monitoring may delay corrective action.
10.	**DHQ Swat**	• No healthcare waste segregation; limited colour-coded bins; open dumping; incinerator available but non-functional; poor records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • Fire extinguishers, fire alarms and fire hose reel available, but routine inspection and operational status not evidenced; escape routes, assembly points and signage inadequately designated; no documented emergency procedures, training or drills.	• Increased risk of infectious/sharps exposure and inappropriate healthcare waste disposal. • Potential pollution and pathogen exposure from untreated wastewater. • Increased occupational injury and exposure risks. Residual fire and life-safety risks due to inadequate emergency preparedness and uncertain operational condition of fire-safety systems. • Weak environmental monitoring may delay corrective action.

Sr. No.	Hospital	Existing Environmental Liability	Associated Environmental, Health and Safety Risks / Impacts
		• No structured environmental monitoring program and limited institutional capacity.	
	DHQ Dassu	• No healthcare waste segregation; limited colour-coded bins; open dumping; no on-site treatment; poor records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • Fire extinguishers available but no fire alarms; inadequate escape routes, assembly points and fire-safety signage; no documented emergency procedures, training or drills. • No structured environmental monitoring program and limited institutional capacity.	• Increased risk of infectious/sharps exposure and inappropriate healthcare waste disposal. Potential pollution and pathogen exposure from untreated wastewater. • Increased occupational injury and biological/chemical exposure risks. Elevated fire and life-safety risks due to inadequate detection and evacuation arrangements. • Weak institutional monitoring may delay corrective action.

4.5 ECOLOGICAL ENVIRONMENT BATTAGRAM

4.5.1 Ecological Setting and Regional Context

244. The proposed DHQ Hospital Battagram project is located in District Battagram, which lies within the lower Himalayan mountainous belt of Khyber Pakhtunkhwa. The district is characterized by steep slopes, narrow valleys, and a generally humid temperate climate influenced by elevation and monsoon patterns. The surrounding region supports mixed coniferous and broadleaf forest ecosystems, contributing to relatively higher biodiversity compared to lowland areas.

245. Despite this broader ecological richness, the DHQ Battagram site is situated within the urbanized core of Battagram town, where natural habitats have been substantially modified due to settlement expansion, road infrastructure, and institutional development. As a result, the ecological character of the project site is largely anthropogenic.

4.5.2 Vegetation and Floral Resources

246. Vegetation within the project boundary is limited and primarily consists of planted ornamental and shade trees commonly maintained in institutional premises. Species likely present include *Populus* spp. (Poplar), *Morus alba* (Mulberry), *Robinia pseudoacacia*, and scattered shrubs and grasses. In surrounding hilly areas of Battagram, natural vegetation includes *Pinus roxburghii* (Chir Pine), *Quercus* spp. (Oak), and other temperate forest species; however, these are not part of the immediate project footprint.

247. The hospital site does not contain any natural forest patches or ecologically sensitive plant communities. No rare, endangered, or protected plant species have been recorded within the project area. The existing vegetation mainly provides aesthetic value, shade, and minor microclimatic regulation.

4.5.3 Faunal Composition

248. The fauna of the project area reflects urban and peri-urban ecological conditions, with limited species diversity. Avian fauna is dominated by common and disturbance-tolerant species such as house sparrow (*Passer domesticus*), common myna (*Acridotheres tristis*), crow (*Corvus splendens*), and pigeon (*Columba livia*).

249. Mammalian presence is generally restricted to small rodents, while bats may be found in nearby structures or trees. Reptiles such as garden lizards may occur in warmer seasons, particularly in undisturbed corners of the site.

250. Although Battagram district as a whole supports richer wildlife in forested and mountainous areas, such fauna are associated with remote, undisturbed habitats far from the project location. No endangered species, protected wildlife, or critical habitats are known to exist within the project influence area.

4.6 ECOLOGICAL ENVIRONMENT CHITRAL

4.6.1 Regional Ecological Setting

251. The proposed intervention at DHQ Hospital Chitral is situated in one of the ecologically unique regions of Khyber Pakhtunkhwa. Chitral lies within a mountainous landscape influenced by the Hindu Kush range, characterized by high altitudinal variation, cold winters, and relatively low precipitation compared to other northern Districts. This setting supports a distinct ecological profile, including dry temperate vegetation and specialized wildlife adapted to harsh climatic conditions.

252. Despite the ecological importance of the wider Chitral region, the project site itself is located within an urbanized institutional area, where natural ecological features have already been altered due to long-standing human use.

4.6.2 Vegetation Profile

253. The immediates setting of DHQ Hospital Chitral contains limited vegetation, primarily consisting of planted shade trees and managed greenery. Species commonly found in the area include Populus *nigra* (Poplar), *Salix* species (Willow), and *Robinia pseudoacacia*, along with scattered shrubs and grasses maintained for landscaping purposes.

254. In the surround area, natural vegetation typical of dry temperate zones can be observed, including species such as *Juniperus excelsa* and *Betula utilis* at higher elevations. However, such vegetation types are not present within the project boundary.

255. No plant species of conservation concern, including rare or endemic flora, have been identified within the site. The ecological role of existing vegetation is therefore limited to microclimate regulation, dust interception, and visual amenity.

4.6.3 Faunal Characteristics

256. Wildlife within the project vicinity is constrained by urban activity and habitat modification. The most commonly encountered fauna includes urban-tolerant bird species such as house sparrow (*Passer domesticus*), common myna (*Acridotheres tristis*), and crow species. In quieter surrounding areas, additional birds like wagtails and bulbuls may also be observed.

257. Mammalian presence is generally limited to small commensal species, including rodents and occasionally bats that utilize buildings or nearby trees. Reptiles and amphibians are sparse due to climatic conditions but may include lizards in warmer months.

258. Although Chitral district is known for significant wildlife such as markhor and snow leopard in remote areas, these species are confined to undisturbed mountainous habitats far from the project site. No threatened or protected fauna have been recorded within the area of influence of the proposed project.

4.7 ECOLOGICAL ENVIRONMENT HANGU

4.7.1 Environmental and Ecological Setting

259. The proposed DHQ Hospital Hangu is located in District Hangu, which lies in a transitional zone between the Kohat plateau and adjoining tribal mountainous regions. The area exhibits semi-arid to sub-tropical climatic conditions, with moderate seasonal rainfall and a mix of plains and low hills.

260. The project site is situated within Hangu town, where land use is predominantly urban and institutional. As a result, the natural ecological characteristics of the area have been considerably modified, and the site does not represent a natural habitat.

4.7.2 Flora (Vegetation)

261. Vegetation in the project area is generally sparse to moderately distributed, consisting of both naturally occurring and planted species. Common trees include *Phoenix dactylifera* Date Plam, *Acacia nilotica* (Kikar), *Dalbergia sissoo* (Shisham), *Olea ferruginea* (Wild Olive), and *Morus alba* (Mulberry).Shrubs such as *Dodonaea viscosa* and *Calotropis procera* are also found in surrounding areas, along with seasonal grasses. Within the hospital premises, vegetation is mainly limited to managed trees and ornamental plants.

262. No forested areas, protected vegetation, or species of conservation concern are present within the project footprint. The ecological significance of the vegetation is therefore limited to shade provision and minor habitat support.

4.7.3 Fauna (Wildlife)

263. The fauna of the project area is typical of small urban settlements and semi-arid area. Common bird species include sparrows (*Passer domesticus*), mynas (*Acridotheres tristis*), crows (*Corvus splendens*), and pigeons (*Columba livia*).

264. Mammals are limited to small commensal species, such as rodents, while bats may occasionally be present. Reptiles like common lizards and occasional snakes may be found in less disturbed areas.

265. No endangered or protected wildlife species, breeding habitats, or ecological corridors have been identified within the project area.

4.8 ECOLOGICAL ENVIRONMENT LAKKI MARWAT

4.8.1 Ecological Context of the Area

266. The proposed DHQ Hospital Lakki Marwat is situated in District Lakki Marwat, which falls within a predominantly arid to semi-arid ecological zone of southern Khyber Pakhtunkhwa. The landscape is characterized by flat plains, sandy soils, and sparse natural vegetation, influenced by high temperatures and low rainfall.

267. The project site lies within Lakki Marwat town, where the natural environment has been significantly altered due to urbanization, resulting in limited ecological features.

4.8.2 Vegetation Profile

268. Vegetation in the area is xerophytic in nature, adapted to dry climatic conditions. Common species include *Acacia nilotica* (Kikar), *Prosopis juliflora* (Mesquite), *Ziziphus mauritiana* (Ber), and *Azadirachta indica* (Neem).
269. Shrubs such as *Calotropis procera* and *Capparis decidua* are also present, along with seasonal grasses following rainfall. Within the hospital premises, vegetation is mostly planted for shade and landscaping purposes.

270. No natural forests or ecologically sensitive plant communities are present within the project area, and no rare or endangered plant species have been recorded.

4.8.3 Faunal Characteristics

271. Wildlife in the project area is limited and consists of species adapted to arid and human-influenced environments. Common birds include sparrows, mynas, crows, pigeons, and doves.

272. Mammalian fauna is restricted to small rodents and occasional bats, while reptiles such as lizards and snakes may occur in open areas. Amphibians are rare due to dry conditions.

273. No protected or endangered species, breeding grounds, or migratory routes are associated with the project site.

4.9 ECOLOGICAL ENVIRONMENT BATKHELA, MALAKAND

4.9.1 Project Setting and Ecological Context

274. The proposed project in Batkhela, District Malakand, is located in a semi-urban environment that serves as a commercial and administrative hub of the Malakand. The surrounding landscape consists of built-up areas, agricultural lands, and patches of natural vegetation on nearby hills. The broader Malakand region lies within a transitional ecological zone characterized by subtropical to temperate conditions, supporting moderate biodiversity.

275. However, the immediate project site is already disturbed due to human activities and infrastructure development. It does not represent a natural or pristine ecosystem, and ecological conditions are largely influenced by anthropogenic factors.

4.9.2 Flora (Vegetation)

276. Vegetation in and around the project area includes a mix of naturally occurring and planted species. Common trees and plants found in the project site include Populus

(spp) *Callistemon citrinus* (Bottle Brush), *Phoenix dactylifera* (Date Palm) *Dalbergia sissoo* (Shisham), Eucalyptus *camaldulensis*, *Morus alba* (Mulberry), and *Ficus* species. Agricultural crops and grasses are also present in adjacent areas, reflecting the agro-based landscape of Malakand.

277. The project site itself contains limited vegetation, mostly in the form of scattered trees and shrubs. No natural forests, protected areas, or ecologically sensitive plant communities exist within the project footprint. There are no reports of endangered, rare, or endemic plant species in the immediate vicinity.

4.9.3 Fauna (Wildlife)

278. Faunal diversity within the project area is typical of semi-urban and rural environments. Common bird species include house sparrow (*Passer domesticus*), common myna (*Acridotheres tristis*), crow (*Corvus splendens*), pigeon (*Columba livia*), and occasionally doves and bulbuls.

279. Mammalian fauna is limited to small species such as rodents, while bats may be present in trees or buildings. Reptiles such as the common garden lizard (*Calotes versicolor*) and occasional snakes may occur, particularly in less disturbed nearby areas. Amphibians may be present seasonally in moist habitats.

280. No endangered or protected wildlife species, critical habitats, or migratory routes have been identified within the project influence area.

4.10 ECOLOGICAL ENVIRONMENT MANSEHRA

4.10.1 Location and Ecological Context

281. The proposed development of DHQ Hospital Mansehra is situated within the urban limits of Mansehra city, which lies in a transitional ecological zone between the plains of Hazara and the lower Himalayan foothills. The broader area benefits from relatively favorable climatic conditions, moderate rainfall, and proximity to forested hills, which collectively support a more diverse ecological setting compared to arid area of the province.

282. However, the specific project site is located within an established institutional area that has been extensively modified over time. The natural ecological characteristics have largely been replaced by built infrastructure, leaving only fragmented and managed green spaces within and around the hospital premises.

4.10.2 Vegetation Cover and Floral Composition

283. The vegetation within the project boundary is primarily artificially established, consisting of shade trees, roadside plantations, and ornamental species. Commonly occurring trees in the area include *Cupressus sempervirens* (Cupresses) *Thuja orientialas* (Mor Phank), *Moria exotica(Murraya) Morus alba (Mulberry), Pinus roxburghii (Chir Pine) Eucalyptus species, and Populus species.* In adjacent areas,

especially towards the outskirts, natural vegetation may include species such as *Pinus roxburghii (Chir Pine),* reflecting the influence of nearby hill ecosystems.

284. Within the hospital site, vegetation is limited in density and diversity, mainly serving aesthetic and microclimatic functions. There are no indications of ecologically sensitive plant communities or protected flora within the project footprint. Additionally, no rare or endangered plant species have been identified during site observations.

4.10.3 Faunal Elements

285. The faunal composition of the project area is characteristic of an urban and peri-urban environment, where wildlife presence is influenced by human activity. Avifauna is the most prominent group, with commonly observed species including house sparrow (*Passer domesticus*), common myna (*Acridotheres tristis*), crow (*Corvus splendens*), pigeon (*Columba livia*), and occasionally bulbuls.

286. Mammalian species are limited to small, adaptable animals such as rodents, while bats may utilize buildings or nearby trees for roosting. Reptiles, particularly lizards, may be found in open and less disturbed patches, whereas amphibians appear seasonally in moist conditions.

287. Although the wider Mansehra district, particularly in forested and hilly area supports richer biodiversity, including wildlife of ecological importance, such species are not associated with the project site. No threatened or protected fauna, breeding habitats, or migratory pathways have been recorded within the area of influence.

4.11 ECOLOGICAL ENVIRONMENT MARDAN

4.11.1 Ecological Setting

288. The project site for the District Headquarter (DHQ) Hospital Mardan is located within a densely populated urban setting of Mardan. The surrounding environment is highly modified due to long-standing anthropogenic activities, including residential, commercial, and institutional land uses. As such, the natural ecological characteristics of the area have been substantially altered, resulting in limited biological diversity and the dominance of urban-adapted plant and animal species.

289. The project area does not fall within or in proximity to any legally protected areas such as parks, wildlife sanctuaries, game reserves, or critical habitats as defined under national legislation or international conservation frameworks. Furthermore, no ecologically sensitive zones, wetlands, or forested landscapes are present within the direct or indirect influence area of the proposed intervention.

4.11.2 Flora and Vegetation

290. The vegetation within and around the project site is sparse and primarily consists of planted trees and ornamental species typical of urban environments. The floral composition reflects human management rather than natural ecological processes.

Common tree species observed in the area include Malia azedarach (Baikan), *Azadirachta indica* (Neem), *Eucalyptus camaldulensis* (Sufaida), *Dalbergia sissoo* (Shisham), *Ficus religiosa* (Peepal), and *Morus alba* (Mulberry). In addition, ornamental shrubs, grasses, and seasonal plants are present within landscaped areas of the project site.

291. There is no evidence of natural forests or significant native vegetation communities within the project footprint. Importantly, no rare, endangered, or endemic plant species, as listed under the IUCN Red List or national conservation lists, have been recorded in the project area. The vegetation therefore holds low ecological conservation value but contributes modestly to urban microclimate regulation and aesthetic functions.

4.11.3 Faunal Resources

292. Due to the urban nature of the project area, faunal diversity is limited and largely restricted to species that are well adapted to human-dominated environments. Avifauna is the most visible component of local biodiversity, with commonly observed species including *Corvus splendens* (House Crow), *Acridotheres tristis* (Common Myna), *Passer domesticus* (House Sparrow), and *Columba livia* (Rock Pigeon). These species are ubiquitous in urban centers and are not considered of conservation concern.

293. Mammalian fauna is limited to small urban dwellers such as rodents (rats and mice) and occasionally bats, which may utilize buildings or nearby trees for roosting. Reptiles such as the common garden lizard (*Calotes versicolor*) and amphibians like frogs may be present in moist microhabitats, particularly during the monsoon season.

294. No endangered, threatened, or protected wildlife species have been reported within the project's area of influence. Additionally, there are no known wildlife corridors, migratory bird routes, or breeding habitats of ecological significance associated with the site.

4.12 ECOLOGICAL ENVIRONMENT ALPURI, SHANGLA

4.12.1 Environmental Setting of the Area

295. The proposed upgradation of DHQ Hospital Alpuri is located in District Shangla, a predominantly mountainous region characterized by steep slopes, valleys, and a relatively cool and moist climate. The area supports a mix of subtropical pine and temperate vegetation, contributing to moderate ecological diversity at the regional level.

296. However, the project site itself lies within the developed limits of Alpuri town, where land has already been converted for institutional and residential use. As a result, the immediate surroundings of the hospital reflect altered ecological conditions, with limited representation of natural habitats.

4.12.2 Vegetation and Plant Resources

297. Within the hospital premises and adjacent areas, vegetation is primarily composed of planted and secondary growth species. Commonly observed trees include *Pinus*

roxburghii (Chir Pine) in nearby slopes, along with *Morus alba* (Mulberry), *Robinia pseudoacacia*, and *Populus* species in settled areas. Shrubs and grasses occur sporadically, mainly as part of managed greenery or natural regrowth.

298. Although Shangla district hosts forest resources at higher elevations, no dense forest stands or ecologically significant plant communities exist within the project footprint. Field conditions indicate the absence of rare, endangered, or protected plant species within the site. The vegetation present plays a limited ecological role, mainly contributing to slope stability, shade, and local microclimate.

4.12.3 Faunal Composition

299. The fauna recorded in and around the project area is typical of small-town and rural mountain environments. Bird species commonly observed include sparrows (*Passer domesticus*), mynas (*Acridotheres tristis*), crows (*Corvus* spp.), and bulbuls. These species are well adapted to human presence and modified habitats.

300. Mammals in the immediate vicinity are generally limited to small-sized species, such as rodents, while bats may inhabit nearby trees or structures. Reptiles like the common lizard and occasional amphibians may be present depending on seasonal conditions.

301. The wider Shangla region may support more diverse wildlife; however, such species are associated with remote forested and less disturbed areas, far from the project site. No endangered or protected fauna, breeding grounds, or wildlife corridors have been identified within the project influence area.

4.13 ECOLOGICAL ENVIRONMENT TANK

4.13.1 Ecological Setting of the Area

302. The proposed project for DHQ Hospital Tank is located in District Tank, which lies in the southern part of Khyber Pakhtunkhwa, adjoining the semi-arid area of Dera Ismail Khan and tribal districts. The region is characterized by flat to gently undulating terrain, hot climatic conditions, and low to moderate rainfall, resulting in a predominantly arid to semi-arid ecosystem.

303. The natural ecology of the district is influenced by dry conditions, with vegetation largely consisting of drought-resistant species. However, the project site itself is situated within the urban limits of Tank city, where the environment has already been significantly altered due to human settlement and infrastructure development.

4.13.2 Flora (Vegetation)

304. Vegetation in the project area is sparse and mainly comprises planted and naturally occurring xerophytic species adapted to dry conditions. Common tree species found in and around Tank include Acacia *nilotica* (Kikar), *Prosopis juliflora* (Mesquite), *Dalbergia sissoo* (Shisham), *Azadirachta indica* (Neem), and *Ziziphus mauritiana* (Ber).

305. Shrubs such as *Calotropis procera* (Aak) and *Capparis decidua* are also common, along with scattered grasses that appear seasonally following rainfall. Within the hospital premises, vegetation is limited to planted trees and ornamental plants used for shade and landscaping.

306. No natural forests, protected vegetation, or rare/endangered plant species have been identified within the project footprint. The ecological role of existing vegetation is therefore limited to shade provision, dust control, and minor habitat support for urban fauna.

4.13.3 Fauna (Wildlife)

307. The faunal diversity of the project area is typical of arid and urban environments. Bird species commonly observed include house sparrow (*Passer domesticus*), common myna (*Acridotheres tristis*), crow (*Corvus splendens*), pigeon (*Columba livia*), and occasionally doves.

308. Mammalian fauna is limited to small species such as rodents, while bats may be present in buildings or trees. Reptiles such as the common lizard (*Calotes versicolor*) and occasional snakes may occur in less disturbed areas. Amphibians are rare due to dry conditions but may appear temporarily after rainfall.

309. No endangered, protected, or ecologically significant wildlife species, breeding habitats, or migratory routes have been recorded within the project area.

4.14 ECOLOGICAL ENVIRONMENT SAIDU SHARIF SWAT

4.14.1 Project Setting and Ecological Context

310. The proposed upgradation of DHQ Hospital Saidu Sharif is located in a semi-urban area of District Swat. The surrounding environment consists of institutional buildings, residential areas, and managed green spaces. While the Swat region is known for its relatively rich biodiversity and forested landscapes, the immediate project site is already developed and does not represent a natural or undisturbed ecosystem. The ecological conditions within the project boundary are therefore modified and of limited conservation significance.

4.14.2 Flora (Vegetation)

311. Vegetation within and around the hospital premises is mainly composed of planted and ornamental species typical of urban and peri-urban settings. Common tree species include *Platanus orientalis* (Chinar), *Morus alba* (Mulberry), and *Populus* species, along with scattered shrubs and grasses used for landscaping.

312. There are no natural forests, critical habitats, or ecologically important plant communities within the project footprint. Field observations and secondary information indicate that no rare, endangered, or protected plant species are present. The existing vegetation

provides shade, aesthetic value, and minor microclimatic benefits but has low ecological importance in terms of biodiversity conservation.

4.14.3 Fauna (Wildlife)

313. The faunal diversity in the project area is limited and consists mainly of species adapted to human presence. Commonly observed birds include house sparrow (*Passer domesticus*), common myna (*Acridotheres tristis*), crow (*Corvus splendens*), pigeon (*Columba livia*), and bulbul (*Pycnonotus leucogenys*).

314. Mammalian species are restricted to small rodents and occasional bats, while reptiles such as the common garden lizard (*Calotes versicolor*) and seasonal amphibians may occur in moist areas. No endangered or protected wildlife species, breeding habitats, or migratory routes have been identified within the project influence area.

4.15 ECOLOGICAL ENVIRONMENT DASSU UPPER KOHISTAN

4.15.1 Physical and Ecological Setting

315. The proposed project for DHQ Hospital Dasu is located in Upper Kohistan, a region characterized by rugged mountainous terrain, steep slopes, and the Indus River The area falls within a dry temperate to sub-alpine ecological zone, where natural vegetation and wildlife are influenced by altitude, slope conditions, and limited soil development.

316. Despite the ecological richness of the broader Kohistan landscape, the project site itself is situated within Dasu town, which has undergone significant modification due to human settlement, road infrastructure (including the Karakoram Highway), and associated development activities. Consequently, the immediate project area reflects disturbed ecological conditions with limited natural habitat.

4.15.2 Vegetation Characteristics

317. Vegetation within the project boundary is sparse and largely restricted to planted trees and scattered natural growth. Common species observed in and around Dasu include *Populus* species (Poplar), *Salix* species (Willow), and *Robinia pseudoacacia*. In nearby slopes and less disturbed areas, natural vegetation may include species such as *Pinus wallichiana* (Blue Pine) and *Quercus* species (Oak), although these are not present within the immediate project site.

318. Ground vegetation consists mainly of grasses and small shrubs adapted to dry and rocky conditions. There are no dense forests, protected vegetation types, or ecologically sensitive plant communities within the project footprint. No rare or endangered plant species have been identified during site assessment.

4.15.3 Faunal Diversity

319. The faunal assemblage within the project area is limited due to human disturbance and lack of suitable habitat. Common bird species include crow (*Corvus* spp.), house

sparrow (*Passer domesticus*), and pigeon (*Columba livia*), which are typical of small towns and roadside settlements.

320. Mammalian fauna is generally restricted to small commensal species such as rodents, while bats may be found in buildings or nearby trees. Reptiles such as lizards may occur in rocky and open areas, particularly during warmer months.

321. Although Upper Kohistan is known for wildlife in remote mountainous regions, including species of conservation importance, such fauna inhabits undisturbed high-altitude zones from the project location. No endangered, protected, or migratory species have been recorded within the project's area of influence.

4.15.4 Conservation Status

322. All the trees, common shrubs and herbs as well as faunal species have status of Least Concern as per IUCN list across all the districts

4.16 SOCIOECONOMIC ENVIRONMENT

323. The socioeconomic baseline encompasses the demographic profile, administrative and political context, religious and cultural characteristics, economic conditions, infrastructure and service facilities, and gender dimensions of the sub-projects areas. To document these conditions comprehensively, social surveys were conducted among a representative sample of respondents. The study population was carefully defined to include not only the residents of the project area but also patients visiting the respective health units and the employees working within these facilities, ensuring a holistic understanding of community dynamics and service delivery aspects.

324. A key initial step involved delineating the AOI and identifying respondents through a random sampling methodology during the baseline survey conducted in February 2026. The basic objectives of the social survey was to:

- Observe and document the existing socio-cultural and socioeconomic conditions of the study area, including community structure, livelihoods, and access to services;
- Identify and assess the potential social and economic impacts associated with the implementation of the proposed project;
- Collect and analyze community feedback regarding existing social and economic issues, perceived risks, and potential project-related concerns through inclusive and participatory engagement; and,
- Evaluate feasible mitigation measures and opportunities to address identified issues within the study and subsequent reporting framework.

4.17 METHODOLOGY

325. Primary and secondary data were collected and reviewed to develop the socioeconomic baseline of the study area. Primary data was obtained through field surveys and stakeholder consultations, while secondary data were sourced from provincial

departments and relevant documents, including census reports, district profiles, and project-related information. All data were cross-verified to ensure reliability and consistency.

326. A mixed-method approach was adopted, combining quantitative and qualitative techniques. Quantitative data were collected through structured questionnaires administered at selected DHQ hospitals under Phase-III to capture key demographic and socioeconomic indicators. Qualitative insights were gathered through interactions with community members and stakeholders to better understand social dynamics and perceptions.

327. The survey covered areas directly and indirectly affected by the project. A total of 185 respondents, including hospital staff, patients, attendants, and nearby commuters, were selected through random sampling. Data were collected through face-to-face interviews and subsequently digitized and analyzed to establish the baseline conditions.

328. In addition to the questionnaire-based survey, the study incorporated qualitative inquiry through public consultations. These included focus group discussions, key informant interviews, participatory observation, and the use of structured consultation proformas. This mixed-method approach facilitated triangulation of findings, enriched the analysis with contextual insights, and ensured a more comprehensive understanding of the social and institutional landscape of the project area.

4.17.1 Task Specific Approach

329. In conducting the social survey, full concentration was given to identify area of impacts and collection of necessary data/information on the existing social environment (economic, social, cultural etc.). This was done by holding discussions / meetings followed by in-depth survey and administering structured / semi-structured questionnaires.

4.17.2 Discussion with Officials

330. The Consultant had frequent discussions with the client and the concerned project officers to get a clear understanding about the project. This facilitated sharing of ideas, conceptual clarity and minimized constraints in carrying out the task.

4.17.3 Data Collection and Field Survey

331. The field survey was undertaken to generate primary data and validate the findings of the desk review, with a focus on key socioeconomic and socio-cultural aspects of the project area. The exercise emphasized direct engagement with communities and relevant stakeholders to capture ground level realities, service access conditions, and community perspectives.

332. The survey also facilitated the identification of potential social and economic impacts under both project and no-project scenarios. Feedback obtained during field interactions was used to understand community concerns, expectations, and priorities, which will

inform the development of appropriate mitigation and enhancement measures in subsequent stages of the assessment. Social Survey tools are attached as **Annexure-V.**

4.17.4 Community/Stakeholders' Participation

333. Community consultations were conducted with key stakeholders, beneficiaries, and surrounding communities within the project area to ensure inclusive participation in the planning of the proposed project. These consultations provided a platform for participants to express their concerns, expectations, and suggestions, which were duly considered in the project planning and design process. The engagement process helped in building broader stakeholder ownership by involving local communities, public representatives, government officials, and relevant professional groups in informed decision-making.

4.17.5 Battagram

334. Battagram District falls under the administrative jurisdiction of Khyber Pakhtunkhwa, Pakistan. According to the 2023 Population Census, the district has a total population of 335,984 living in 51,366 households, with 100% of the population residing in rural areas. The overall literacy rate is 39.09%, including 54.69% for males and 23.34% for females. Approximarely 30.89% (103,719 people) of the population is below the age of 10 years, and the sex ratio is 101.26 males per 100 females, Pashto (80%) is the predominant language, followed by Gujari (18%), while Hinko and Kohistani together account for about 2% of the population. The district's economy is primarlybased on agriculture, livestock rearing, daily wage labor, small scale businesses, and remittances from overseas emploument. There are 12 Union councils in Battagram.[65]

4.17.6 Chitral

335. Chitral is located in the Malakand Division of Khyber Pakhtunkhwa and is administratively divided into Upper Chitral and Lower Chitral districts, comprising 11 tehsils. The combined area is approximately 14,850 km². According to recent census data, the combined population is about 615,000, with the majority living in rural areas. The overall literacy rate is about 61%. Khowar is the dominant language, followed by Pashto, Kalasha, Dameli, and Gawar-Bati. The local economy is mainly based on agriculture, livestock, tourism, forestry, handicrafts, and remittances.

4.17.7 Hangu

336. Hangu is a district in Kohat Division, Khyber Pakhtunkhwa, covering 1,097 km². The district comprises 2 tehsils and has a population of approximately 519,000 (2017 Census) living in predominantly rural areas. The overall literacy rate is about 34%. Pashto is the principal language. The district's economy is mainly based on agriculture, livestock, trade, mining, and government services.

[65] https://www.pbs.gov.pk

4.17.8 Lakki Marwat

337. Lakki Marwat is a district in Bannu Division, Khyber Pakhtunkhwa, covering 3,164 km². The district comprises 3 tehsils and had a population of approximately 876,000 (2017 Census), with most residents living in rural areas. The overall literacy rate is about 57%. Pashto is the dominant language. The economy depends mainly on agriculture, livestock, trade, public services, and remittances.

4.17.9 Batkhela Malakand

338. Batkhela is the headquarters of Malakand District in the Malakand Division of Khyber Pakhtunkhwa. Malakand District covers 952 km² and comprises 3 tehsils. The district had a population of approximately 717,000 (2017 Census), with a predominantly rural population. The overall literacy rate is about 62%. Pashto is the major language. The economy is based on agriculture, trade, tourism, marble mining, and government employment.

4.17.10 Mansehra

339. Mansehra is a district in Hazara Division, Khyber Pakhtunkhwa, covering 4,579 km². The district comprises 4 tehsils and had a population of approximately 1.56 million (2017 Census), increasing to 1.80 million in 2023. The overall literacy rate is about 63%. Hindko, Pashto, and Gojri are the major languages. The district's economy is mainly based on agriculture, tourism, forestry, trade, and public services.

4.17.11 Mardan

340. Mardan is a district in Mardan Division, Khyber Pakhtunkhwa, covering 1,632 km². The district comprises 3 tehsils and had a population of approximately 2.37 million (2017 Census). The overall literacy rate is about 56%. Pashto is the predominant language. The economy is driven by agriculture, sugar and textile industries, commerce, education, and government employment.

4.17.12 Alpuri Shangla

341. Alpuri is the headquarters of Shangla District in the Malakand Division of Khyber Pakhtunkhwa. Shangla covers 1,586 km² and comprises 3 tehsils. The district had a population of approximately 576,000 (2017 Census), with nearly the entire population living in rural areas. The overall literacy rate is about 38%. Pashto is the primary language. The economy depends on agriculture, forestry, livestock, mining, and remittances.

4.17.13 Tank

342. Tank is a district in Dera Ismail Khan Division, Khyber Pakhtunkhwa, covering 1,679 km². The district comprises 3 tehsils and had a population of approximately 392,000 (2017 Census). The overall literacy rate is about 43%. Pashto and Saraiki are the major

languages. The district's economy is based on agriculture, livestock, trade, and public services.

4.17.14 Swat Saidu Sharif

343. Saidu Sharif is the administrative headquarters of Swat District in the Malakand Division of Khyber Pakhtunkhwa. Swat covers 5,337 km² and comprises 7 tehsils. The district had a population of approximately 2.31 million (2017 Census). The overall literacy rate is about 55%. Pashto is the dominant language. The economy mainly depends on tourism, agriculture, horticulture, trade, handicrafts, and public services.

4.17.15 Dassu Upper Kohistan

344. Dassu is the headquarters of Upper Kohistan District in the Hazara Division of Khyber Pakhtunkhwa. The district covers 5,749 km² and comprises 3 tehsils. It had a population of approximately 306,000 (2017 Census), with almost the entire population residing in rural areas. The major languages are Shina, Kohistani, and Pashto. The economy is mainly based on agriculture, livestock, forestry, hydropower-related employment, and remittances. The district has a relatively low literacy rate compared with the provincial average.

4.18 SOCIOECONOMIC PROFILE OF STUDIED HOUSEHOLDS

4.18.1 Gender Distribution of the Respondents

345. The gender distribution of respondents across the surveyed hospitals was predominantly male, with 93% male respondents and 7% female respondents. This imbalance is likely influenced by socio-cultural factors, including women's limited availability and willingness to participate during the survey, rather than actual healthcare utilisation patterns. Female respondents were recorded only in Battagram, Chitral, Lakki Marwat, Mansehra, Mardan, Tank, and Dassu Upper Kohistan, while no female respondents were interviewed in Batkhela Malakand, Shangla, Saidu Sharif and Hangu. Saidu Sharif recorded the highest proportion of male respondents (18%), followed by Tank and Chitral (10% each). **Table 4.9** presents the subproject-wise distribution of respondents by gender.

Table 4.9 Gender Distribution of Respondents

Sr. No.	Hospital	Male		Female	
		Number	%	Number	%
1	DHQ Hospital, Battagram	14	7	1	1
2	DHQ Hospital, Chitral	18	10	2	1
3	DHQ Hospital, Lakki Marwat	11	6	2	1
4	DHQ Hospital, Batkhela Malakand	15	8	0	0
5	King Abdullah Teaching Hospital, Mansehra	14	7	5	3
6	DHQ Hospital, Mardan	18	10	2	1
7	DHQ Hospital, Alpuri Shangla	15	8	0	0
8	DHQ Hospital, Tank	19	10	1	1
9	DHQ Hospital, Saidu Sharif	33	18	0	0

Sr. No.	Hospital	Male		Female	
		Number	%	Number	%
10	DHQ Hospital, Dassu Upper Kohistan	14	7	1	1
11	DHQ Hospital, Hangu	2	1	0	0
	Total	**173**	**93**	**14**	**7**

4.18.2 Population and Family Size

346. A socio-economic survey of 187 households was conducted, covering a total population of 1,752 individuals. Of the total household population, 51% were male and 49% were female, indicating a relatively balanced gender composition. At the hospital level, the male population exceeded the female population in Battagram, Chitral, Batkhela Malakand, Mardan, Tank, and Saidu Sharif, while the female population was higher in Lakki Marwat, Mansehra, Shangla, Dassu Upper Kohistan, and Hangu. Saidu Sharif accounted for the largest share of the surveyed household population (19%), followed by Chitral (11%), Tank (10%), Dassu Upper Kohistan (9%), Mansehra and Batkhela Malakand (9% each), Battagram (9%), Shangla (8%), Mardan (8%), Lakki Marwat (6%), and Hangu (1%).

347. **Table 4.10** presents the subproject-wise distribution of population and family size.

Table 4.10 Population and Family Size

Sr. No.	Hospital	Respondents	Male Population		Female Population		Total Population
			No.	%	No.	%	No.
1	DHQ Hospital, Battagram	15	82	5	68	4	150
2	DHQ Hospital, Chitral	20	103	6	87	5	190
3	DHQ Hospital, Lakki Marwat	13	53	3	56	3	109
4	DHQ Hospital, Batkhela Malakand	15	87	5	76	4	163
5	King Abdullah Teaching Hospital, Mansehra	19	73	4	91	5	164
6	DHQ Hospital, Mardan	20	69	4	67	4	136
7	DHQ Hospital, Alpuri Shangla	15	70	4	78	4	148
8	DHQ Hospital, Tank	20	86	5	84	5	170
9	DHQ Hospital, Saidu Sharif	33	197	11	143	8	340
10	DHQ Hospital, Dassu Upper Kohistan	15	67	4	89	5	156
11	DHQ Hospital, Hangu	2	11	1	15	1	26
	Total	**187**	**898**	**51**	**854**	**49**	**1752**

4.18.3 Age Composition of the Respondents

348. The age composition of respondents indicates that the survey primarily captured the economically active population. Of the 187 respondents, the largest proportion (49%) belonged to the 26–35 years age group, followed by the 36–45 years age group (28%). Respondents aged 19–25 years was 12% and 45 years and above each accounted for 11%, while only 1% were up to 18 years of age. The 26–35 years age group was the

most represented across the surveyed hospitals, particularly in Saidu Sharif, Tank, Mansehra, Battagram, Batkhela Malakand, and Dassu Upper Kohistan. Overall, the findings indicate that the survey predominantly reflects the perspectives of adults in the economically active age groups.

Table 4.11: Age Composition of the Respondents

Sr. No.	Hospital	Up to 18		19–25		26–35		36–45		45+	
		No.	%	No.	%	No.	%	No.	%	No.	%
1	DHQ Hospital, Battagram	0	0	1	1	9	5	5	3	0	0
2	DHQ Hospital, Chitral	0	0	1	1	7	4	9	5	3	2
3	DHQ Hospital, Lakki Marwat	0	0	3	2	3	2	5	3	2	1
4	DHQ Hospital, Batkhela Malakand	0	0	1	1	9	5	5	3	0	0
5	King Abdullah Teaching Hospital, Mansehra	0	0	3	2	10	5	4	2	2	1
6	DHQ Hospital, Mardan	0	0	2	1	6	3	10	5	2	1
7	DHQ Hospital, Alpuri Shangla	0	0	3	2	8	4	4	2	0	0
8	DHQ Hospital, Tank	0	0	1	1	13	7	2	1	4	2
9	DHQ Hospital, Saidu Sharif	1	1	6	3	17	9	2	1	7	4
10	DHQ Hospital, Dassu Upper Kohistan	0	0	0	0	9	5	5	3	1	1
11	DHQ Hospital, Hangu	0	0	1	1	0	0	1	1	0	0
	Total	**1**	**1**	**22**	**12**	**91**	**49**	**52**	**28**	**21**	**11**

4.18.4 Literacy

349. The educational profile of respondents indicates a relatively high level of educational attainment across the surveyed hospitals. Of the 187 respondents, 96% had received formal education, while 4% were illiterate. The largest proportion of respondents (44%) had attained graduation-level education, followed by postgraduate qualifications (19%), intermediate (13%), matriculation (10%), middle-level education (6%), and primary education (4%). Graduate-level education was the most common qualification across the surveyed hospitals, while illiteracy was mainly reported in Tank and Saidu Sharif. The educational profile of respondents is presented in **Table 4.12**.

Table 4.12: Educational Level of the Respondents

Sr. No.	Hospital	Illiterate		Primary		Middle		Matric		Intermediate		Graduation		Post-Graduation	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	DHQ Hospital, Battagram	0	0	2	1	0	0	1	1	1	1	11	6	0	0
2	DHQ Hospital, Chitral	0	0	1	1	0	0	5	3	2	1	8	4	4	2
3	DHQ Hospital, Lakki Marwat	0	0	1	1	1	1	0	0	0	0	7	4	4	2
4	DHQ Hospital, Batkhela Malakand	0	0	0	0	0	0	1	1	3	2	11	6	0	0

Sr. No.	Hospital	Illiterate		Primary		Middle		Matric		Intermediate		Graduation		Post-Graduation	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
5	King Abdullah Teaching Hospital, Mansehra	0	0	0	0	1	1	2	1	2	1	9	5	5	3
6	DHQ Hospital, Mardan	0	0	0	0	2	1	1	1	0	0	8	4	9	5
7	DHQ Hospital, Alpuri Shangla	0	0	1	1	2	1	2	1	4	2	6	3	0	0
8	DHQ Hospital, Tank	3	2	1	1	2	1	1	1	3	2	7	4	3	2
9	DHQ Hospital, Saidu Sharif	5	3	1	1	3	2	4	2	4	2	7	4	9	5
10	DHQ Hospital, Dassu Upper Kohistan	0	0	0	0	0	0	2	1	4	2	8	4	1	1
11	DHQ Hospital, Hangu	0	0	0	0	0	0	0	0	2	1	0	0	0	0
Total		**8**	**4**	**7**	**4**	**11**	**6**	**19**	**10**	**25**	**13**	**82**	**44**	**35**	**19**

4.19 ECONOMIC ASPECTS

4.19.1 Occupations

350. The occupational profile of respondents indicates that government employment was the primary source of livelihood, accounting for 38% of respondents, followed by private employment (20%) and business (15%). Labour and agriculture each represented 7%, while unemployment accounted for 6%. Livestock rearing and other occupations each comprised 3% of the sample.

351. Government employment was most common in Mansehra, Chitral, and Mardan, while private employment was more prevalent in Mardan, Saidu Sharif, and Chitral. Business activities were concentrated in Batkhela Malakand, Chitral, Saidu Sharif, Shangla, and Dassu Upper Kohistan, whereas agriculture was most common in Dassu Upper Kohistan. Overall, the findings indicate that respondents were predominantly engaged in formal employment, although livelihood patterns varied across the surveyed hospitals.

Table 4.13: Occupation of the Respondents

Sr. No.	Hospital	Govt. Job		Private Job		Business		Labour		Agriculture		Livestock		Unemployed		Others	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	DHQ Hospital, Battagram	5	3	3	2	3	2	1	1	2	1	0	0	1	1	0	0
2	DHQ Hospital, Chitral	10	5	5	3	4	2	1	1	0	0	0	0	0	0	0	0
3	DHQ Hospital, Lakki Marwat	6	3	2	1	1	1	3	2	0	0	0	0	1	1	0	0
4	DHQ Hospital, Batkhela Malakand	3	2	3	2	5	3	1	1	3	2	0	0	0	0	0	0
5	King Abdullah Teaching Hospital, Mansehra	12	6	3	2	0	0	1	1	1	1	0	0	0	0	2	1
6	DHQ Hospital, Mardan	10	5	7	4	0	0	1	1	0	0	0	0	0	0	2	1
7	DHQ Hospital, Alpuri Shangla	8	4	0	0	4	2	2	1	0	0	1	1	0	0	0	0
8	DHQ Hospital, Tank	8	4	3	2	3	2	2	1	0	0	1	1	2	1	1	1
9	DHQ Hospital, Saidu Sharif	8	4	7	4	4	2	2	1	3	2	3	2	6	3	0	0
10	DHQ Hospital, Dassu Upper Kohistan	1	1	4	2	4	2	0	0	5	3	0	0	1	1	0	0
11	DHQ Hospital, Hangu	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Total		**72**	**39**	**38**	**20**	**28**	**15**	**14**	**7**	**14**	**7**	**5**	**3**	**11**	**6**	**5**	**3**

4.19.2 Monthly Household Income

352. The monthly household income distribution indicates a diverse socioeconomic profile among the surveyed households. The largest proportion of respondents (26%) reported monthly household incomes of PKR 60,001–80,000, followed by PKR 40,001–60,000 and above PKR 100,000 (each 21%). Respondents with monthly incomes of PKR 80,001–100,000 accounted for 18%, while 14% reported household incomes of PKR 40,000 or below.

353. Overall, 65% of respondents reported monthly household incomes exceeding PKR 60,000, indicating relatively stable economic conditions among the surveyed households. Higher-income households (above PKR 100,000) were more common in Mardan, Tank, and Saidu Sharif, while lower-income households (up to PKR 40,000) were concentrated in Shangla, Saidu Sharif, Mardan, and Tank. **Table 4.14** presents the average monthly income distribution of the respondents.

Table 4.14: Average Monthly Income of the Respondents

Sr. No.	Hospital	≤40,000		40,001–60,000		60,001–80,000		80,001–100,000		>100,000	
		No.	%	No.	%	No.	%	No.	%	No.	%
1	DHQ Hospital, Battagram	2	1	6	3	6	3	1	1	0	0
2	DHQ Hospital, Chitral	0	0	6	3	3	2	5	3	6	3
3	DHQ Hospital, Lakki Marwat	2	1	1	1	7	4	2	1	1	1
4	DHQ Hospital, Batkhela Malakand	0	0	6	3	8	4	1	1	0	0
5	King Abdullah Teaching Hospital, Mansehra	2	1	2	1	3	2	8	4	4	2
6	DHQ Hospital, Mardan	4	2	3	2	1	1	0	0	12	6
7	DHQ Hospital, Alpuri Shangla	6	3	4	2	1	1	2	1	2	1
8	DHQ Hospital, Tank	4	2	3	2	2	1	4	2	7	4
9	DHQ Hospital, Saidu Sharif	6	3	3	2	11	6	6	3	7	4
10	DHQ Hospital, Dassu Upper Kohistan	0	0	6	3	6	3	2	1	1	1
11	DHQ Hospital, Hangu	0	0	0	0	0	0	2	1	0	0
	Total	**26**	**14**	**40**	**21**	**48**	**26**	**33**	**18**	**40**	**21**

4.19.3 Monthly Household Expenditures

354. The monthly household expenditure pattern indicates varying consumption levels among the surveyed households. The largest proportion of respondents (29%) reported monthly household expenditures of PKR 60,001–80,000, followed by PKR 40,001–60,000 (28%). Households with expenditures above PKR 100,000 accounted for 19%, while 12% reported expenditures of PKR 80,001–100,000 and 12% reported expenditures of PKR 40,000 or below.

355. Overall, 60% of respondents reported monthly household expenditures exceeding PKR 60,000, indicating moderate to relatively high household consumption levels. Higher expenditure households (above PKR 100,000) were more common in Mardan, Saidu Sharif, and Tank, while lower expenditure households (up to PKR 40,000) were concentrated in Mardan, Tank, and Saidu Sharif. **Table 4.15** presents the average monthly expenditure distribution of the respondents.

Table 4.15: Monthly Expenditures of the Respondents

Sr. No.	Hospital	≤40,000		40,001–60,000		60,001–80,000		80,001–100,000		>100,000	
		No.	%	No.	%	No.	%	No.	%	No.	%
1	DHQ Hospital, Battagram	2	1	6	3	5	3	1	1	0	0
2	DHQ Hospital, Chitral	1	1	8	4	3	2	3	2	5	3

Sr. No.	Hospital	≤40,000		40,001–60,000		60,001–80,000		80,001–100,000		>100,000	
		No.	%	No.	%	No.	%	No.	%	No.	%
3	DHQ Hospital, Lakki Marwat	0	0	8	4	3	2	2	1	2	1
4	DHQ Hospital, Batkhela Malakand	0	0	6	3	8	4		0	0	0
5	King Abdullah Teaching Hospital, Mansehra	2	1	4	2	2	1	7	4	4	2
6	DHQ Hospital, Mardan	7	4	1	1	0	0	1	1	11	6
7	DHQ Hospital, Alpuri Shangla	2	1	6	3	7	4		0	0	0
8	DHQ Hospital, Tank	4	2	3	2	6	3	1	1	6	3
9	DHQ Hospital, Saidu Sharif	4	2	8	4	10	5	3	2	8	4
10	DHQ Hospital, Dassu Upper Kohistan	0	0	2	1	10	5	3	2	0	0
11	DHQ Hospital, Hangu	0	0	0	0	1	1	1	1	0	0
Total		**22**	**12**	**52**	**28**	**55**	**29**	**22**	**12**	**36**	**19**

4.19.4 Family System

356. The family system of respondents indicates that the joint family structure predominates among the surveyed households, accounting for 77% of respondents, while 23% belonged to nuclear families. Joint families were most prevalent in Saidu Sharif, followed by Chitral, Shangla, and Mardan, whereas nuclear families were more common in Batkhela Malakand, Tank, and Mansehra.

357. Overall, the findings indicate that the joint family system remains the dominant household structure across the surveyed hospitals, although nuclear families also constitute a notable proportion of the sample. **Table 4.16** presents the family system statistics of the respondents.

Table 4.16: Family System Statistics

Sr. No.	Hospital	Joint		Nuclear	
		No.	%	No.	%
1	DHQ Hospital, Battagram	10	5	5	3
2	DHQ Hospital, Chitral	17	9	3	2
3	DHQ Hospital, Lakki Marwat	11	6	2	1
4	DHQ Hospital, Batkhela Malakand	7	4	8	4
5	King Abdullah Teaching Hospital, Mansehra	13	7	6	3
6	DHQ Hospital, Mardan	14	7	6	3
7	DHQ Hospital, Alpuri Shangla	15	8	0	0
8	DHQ Hospital, Tank	13	7	7	4
9	DHQ Hospital, Saidu Sharif	33	18	0	0
10	DHQ Hospital, Dassu Upper Kohistan	9	5	6	3
11	DHQ Hospital, Hangu	2	1	0	0
Total		**144**	**77**	**43**	**23**

4.19.5 Basic Amenities

358. Social infrastructure and amenities are crucial to creating sustainable communities. This assessment is done for nature of access to water, and mode of transport to the hospitals.

4.19.5.1 Sources of Drinking Water

359. Access to safe drinking water is a fundamental requirement for public health and well-being. The survey findings indicate that public water supply was the primary source of drinking water, used by 48% of respondents, followed by filtration plants (23%), other/bore water sources (20%), and hand pumps (9%). Public water supply was the dominant source in Chitral and Dassu Upper Kohistan, while filtration plants were more common in Saidu Sharif and Mansehra. Other/bore water sources were mainly reported in Shangla and Tank, whereas hand pumps were most commonly used in Mardan. **Table 4.17** presents the distribution of drinking water sources in the surveyed hospitals.

Table 4.17: Sources of drinking water

Sr. No.	Hospital	Public Water Supply		Filtration Plant		Hand Pump		Other/Bore	
		No.	%	No.	%	No.	%	No.	%
1	DHQ Hospital, Battagram	10	5	5	3	0	0	0	0
2	DHQ Hospital, Chitral	20	11	0	0	0	0	0	0
3	DHQ Hospital, Lakki Marwat	4	2	4	2	0	0	5	3
4	DHQ Hospital, Batkhela Malakand	12	6	3	2	0	0	0	0
5	King Abdullah Teaching Hospital, Mansehra	3	2	10	5	3	2	3	2
6	DHQ Hospital, Mardan	5	3	1	1	7	4	7	4
7	DHQ Hospital, Alpuri Shangla	5	3	1	1	0	0	9	5
8	DHQ Hospital, Tank	6	3	5	3	1	1	8	4
9	DHQ Hospital, Saidu Sharif	11	6	12	6	5	3	5	3
10	DHQ Hospital, Dassu Upper Kohistan	13	7	2	1	0	0	0	0
11	DHQ Hospital, Hangu	1	1	0	0	1	1	0	0
Total		**90**	**48**	**43**	**23**	**17**	**9**	**37**	**20**

4.19.5.2 Mode of Transportation

360. The survey findings indicate that public transport was the most commonly used mode of transportation (56%), followed by private transport (34%), while 10% of respondents used both modes. Public transport was most prevalent in Saidu Sharif, Chitral, Batkhela Malakand, and Tank, whereas private transport was more common in Mardan, Saidu Sharif, and Shangla. The use of both public and private transport was highest in Mansehra. **Table 4.18** presents the principal modes of transport used by the respondents.

Table 4.18: Principal Mode of Transport

Sr. No.	Hospital	Public		Private		Both	
		No.	%	No.	%	No.	%
1	DHQ Hospital, Battagram	11	6	4	2	0	0
2	DHQ Hospital, Chitral	15	8	4	2	1	1
3	DHQ Hospital, Lakki Marwat	3	2	7	4	3	2
4	DHQ Hospital, Batkhela Malakand	15	8	0	0	0	0
5	King Abdullah Teaching Hospital, Mansehra	5	3	7	4	7	4
6	DHQ Hospital, Mardan	8	4	11	6	1	1
7	DHQ Hospital, Alpuri Shangla	7	4	8	4	0	0
8	DHQ Hospital, Tank	13	7	6	3	1	1

Sr. No.	Hospital	Public		Private		Both	
		No.	%	No.	%	No.	%
9	DHQ Hospital, Saidu Sharif	16	9	11	6	6	3
10	DHQ Hospital, Dassu Upper Kohistan	11	6	4	2	0	0
11	DHQ Hospital, Hangu	0	0	2	1	0	0
	Total	**104**	**56**	**64**	**34**	**19**	**10**

4.20 AWARENESS & IMPLEMENTATION OF PROPOSED PROJECT

4.20.1 Awareness about the Project

361. The survey findings indicate a moderate level of awareness of the proposed project among respondents. Overall, 37% of respondents reported being aware of the project, while 63% indicated no prior knowledge. Awareness was highest in Chitral, followed by Saidu Sharif, Mardan, and Shangla, whereas no respondents in Tank reported prior knowledge of the project. These findings highlight the need for continued stakeholder engagement and dissemination of project information. **Table 4.19** presents respondents' knowledge of the proposed project.

Table 4.19: Knowledge about the project

Sr. No.	Hospital	Yes		No	
		No.	%	No.	%
1	DHQ Hospital, Battagram	2	1	13	7
2	DHQ Hospital, Chitral	20	11	0	0
3	DHQ Hospital, Lakki Marwat	4	2	9	5
4	DHQ Hospital, Batkhela Malakand	5	3	10	5
5	King Abdullah Teaching Hospital, Mansehra	1	1	18	10
6	DHQ Hospital, Mardan	11	6	9	5
7	DHQ Hospital, Alpuri Shangla	9	5	6	3
8	DHQ Hospital, Tank	0	0	20	11
9	DHQ Hospital, Saidu Sharif	14	7	19	10
10	DHQ Hospital, Dassu Upper Kohistan	2	1	13	7
11	DHQ Hospital, Hangu	1	1	1	1
	Total	**69**	**37**	**118**	**63**

362. Respondents generally perceived the proposed project positively and expected multiple benefits from its implementation. Improved healthcare services (77%) was the most frequently identified benefit, followed by reduced travel time (53%), improved drinking water and sanitation (53%), employment opportunities (41%), and improved accessibility for persons with disabilities (23%).

363. **Table 4.20** summarizes the respondents' perceptions of the project's expected benefits.

Table 4.20: Perceived Positive Impacts of the Project

Sr. No.	Hospital	Improved Healthcare		Improved Drinking Water & Sanitation		Improved Accessibility for persons with Disabilities		Employment Opportunities		Reduced Travel	
		No.	%	No.	%	No.	%	No.	%	No.	%
1	DHQ Hospital, Battagram	15	8	7	4	0	0	7	4	15	8
2	DHQ Hospital, Chitral	20	11	19	10	19	10	20	11	12	6
3	DHQ Hospital, Lakki Marwat	0	0	0	0	0	0	0	0	0	0
4	DHQ Hospital, Batkhela Malakand	14	7	0	0	2	1	0	0	15	8
5	King Abdullah Teaching Hospital, Mansehra	15	8	14	7	10	5	10	5	8	4
6	DHQ Hospital, Mardan	7	4	10	5	1	1	6	3	2	1
7	DHQ Hospital, Alpuri Shangla	15	8	8	4	1	1	3	2	14	7
8	DHQ Hospital, Tank	20	11	20	11	1	1	20	11	1	1
9	DHQ Hospital, Saidu Sharif	21	11	7	4	7	4	9	5	18	10
10	DHQ Hospital, Dassu Upper Kohistan	15	8	13	7	0	0	1	1	15	8
11	DHQ Hospital, Hangu	2	1	2	1	2	1	1	1	0	0
	Total	**144**	**77**	**100**	**53**	**43**	**23**	**77**	**41**	**100**	**53**

364. The survey findings indicate that respondents generally support the proposed hospital revamping project and perceive it as a beneficial initiative for improving healthcare services. However, they expressed concerns about temporary construction-related impacts, including dust and noise pollution, traffic congestion, overcrowding, and disturbances to patients, attendants, and hospital staff. To minimize these impacts, respondents recommended phased construction, restricting construction activities to appropriate hours, implementing patient shifting plans, maintaining adequate waiting areas, and cordoning off construction zones to ensure safety and uninterrupted healthcare services.

365. Respondents also highlighted existing deficiencies that should be addressed through the project, including the provision of safe drinking water, improved sanitation facilities, separate waiting areas for men and women, staff safety measures, cafeterias and staff rooms, day-care facilities, wheelchairs, solarization, improved public transport access, and additional wards. Overall, the findings demonstrate strong community support for the project while emphasizing the need to address existing service gaps and effectively manage construction-related impacts.

4.21 GENDER SURVEY

366. Under Phase III of the KP Health Systems Strengthening Program, a gender survey was conducted across all health facilities: Battagram, Chitral, Hangu, Lakki Marwat, Batkhela Malakand, Mansehra, Mardan, Shangla, Tank, Saidu Sharif and Dassu Upper Kohistan. A total of 37 women (patients, attendants, or female staff) were interviewed across these health facilities. The analysis synthesizes their responses to identify key gender-related issues, existing service gaps, and priorities for strengthening gender-responsive healthcare services under the proposed hospital revamping project.

4.21.1 Decision-Making Autonomy and Household Dynamics

367. Women's ability to make independent health-related decisions is a key determinant of timely access to healthcare. The survey reveals predominant male control over major household and health-related decisions, with some local variations across the surveyed hospitals.

368. The survey findings indicate that women's participation in household and health-related decision-making varies across the project area but remains predominantly influenced by male household members. The gender survey findings indicate that household decision-making remains predominantly male-led across most surveyed hospital locations. At DQ Saidu Sharif, DHQ Batkhela, DHQ Battagram, DHQ Chitral, DHQ Kohistan, and most respondents from Lakki Marwat, women's participation in decisions related to children's education, women's employment outside the home, the choice of healthcare facility, and major household purchases was generally limited, with men reported as the primary decision-makers. Greater joint participation of men and women was observed among some respondents at DQ Saidu Sharif, Lakki Marwat, Mansehra, Shangla, and Tank, indicating variations in household decision-making practices across locations. In particular, respondents from Mansehra and some respondents from DQ Saidu Sharif and Tank reported comparatively higher levels of joint decision-making across several household and health-related matters. However, major household purchases continued to be more frequently decided by men. Overall, the findings suggest that although the extent of women's participation varies across surveyed locations, male authority remains a prevailing pattern in household decision-making. This highlights the need for gender-responsive interventions that strengthen women's participation in decisions affecting their health, livelihoods, education, and overall well-being.

4.21.2 Healthcare Access and Physical Barriers

369. Across the surveyed Phase III hospital locations, including DQ Saidu Sharif, DHQ Batkhela, DHQ Battagram, DHQ Chitral, DHQ Kohistan, Lakki Marwat, Mansehra, Shangla, and Tank, most respondents reported that hospitals were easy to access. The survey indicates that healthcare accessibility is generally adequate in terms of physical connectivity, including distance and access routes. However, isolated concerns related to traffic, transport availability, financial constraints, and socioeconomic conditions were reported by some respondents.

370. Permission to visit a hospital was reported as either always required or sometimes required by a considerable proportion of respondents across several surveyed locations. This requirement appears to reflect prevailing household and social norms rather than any restriction imposed by the healthcare facilities themselves. Although some women may require household permission before seeking healthcare, the survey findings do not indicate that hospitals impose formal restrictions preventing women from accessing healthcare services when needed.

371. The survey findings indicate that physical access to healthcare facilities is generally satisfactory across the surveyed locations, with the majority of respondents reporting that hospitals are easy to access. Where difficulties were reported, these were primarily associated with transport availability, traffic, financial constraints, and socioeconomic conditions rather than the absence of roads or physical connectivity. Overall, the findings suggest that while physical access is broadly adequate, gender-responsive interventions should continue to consider household decision-making norms, transport limitations, and socioeconomic barriers that may affect women's timely access to healthcare services.

4.21.3 Infrastructure Facility: Water, Sanitation, Lighting, and Safety

4.21.3.1 Toilets and Cleanliness

372. Female toilet facilities were reported to be available across the surveyed hospitals; however, their adequacy varied. While respondents in some locations considered the facilities sufficient, concerns regarding inadequate facilities were reported in others, particularly at DHQ Battagram, DHQ Chitral, DHQ Kohistan, Lakki Marwat, Mansehra, Shangla, and Tank.

373. Similar variations were reported regarding toilet cleanliness and maintenance. Although many respondents considered the facilities clean, dissatisfaction with cleanliness was reported at several locations, particularly DHQ Chitral, DHQ Kohistan, Lakki Marwat, Mansehra, Shangla, and Tank.

374. Overall, the findings indicate that sanitation facilities are available but require improvements in adequacy, cleanliness, and maintenance. Addressing these issues is important to ensure the comfort, privacy, dignity, and safety of female patients, attendants, and staff.

375. The proposed hospital revamping provides an opportunity to improve female sanitation facilities and strengthen routine operation and maintenance, thereby supporting a safer, more hygienic, and gender-responsive healthcare environment.

4.21.3.2 Lighting

376. Respondents generally reported satisfactory lighting conditions within the surveyed hospitals. However, some concerns regarding inadequate lighting were reported at selected locations, indicating the need to ensure adequate illumination in patient areas, corridors, toilets, entrances, and other key hospital spaces to support safety and security.

4.21.3.3 Drinking water

377. The survey indicates that water supply infrastructure is available across the surveyed hospitals; however, the availability and adequacy of drinking water facilities vary. While many respondents reported access to drinking water, concerns regarding inadequate or unsatisfactory drinking water facilities were reported at several locations. Drinking water was also generally available for purchase from hospital canteens or nearby shops.

378. These findings highlight the need to ensure reliable access to safe drinking water within hospital premises, supported by adequate facilities, regular maintenance, and appropriate water quality monitoring.

Workplace Environment:

4.21.3.4 Clinical Service Quality and Staffing

379. The survey findings indicate that privacy during medical examinations is generally well maintained across the surveyed hospitals. Most respondents expressed satisfaction with the privacy provided, indicating generally respectful and confidential healthcare practices.

380. Most respondents reported receiving appropriate antenatal and postnatal care. The availability of female doctors and nurses was also generally reported as satisfactory, although some gaps were identified at selected locations.

381. Female sanitation facilities are available across the surveyed hospitals; however, concerns regarding their adequacy, cleanliness, and maintenance were reported in some locations. Addressing these gaps will support a safer, more hygienic, and gender-responsive healthcare environment.

382. Most respondents did not identify major health issues specifically affecting women in their communities. However, the findings may also reflect limited awareness or under-recognition of women's health concerns. Continued health awareness and community outreach are therefore important to promote early identification of health issues and timely healthcare-seeking.

4.21.3.5 Gender Equity and Facilities for Female Staff

383. The findings indicate generally positive perceptions regarding equal opportunities for male and female staff in most surveyed hospitals. However, some respondents, particularly in DQ Saidu Sharif, Lakki Marwat, Shangla, and Tank, reported unequal opportunities or were uncertain, indicating that perceptions of workplace equity are not uniform.

384. Overall, the findings suggest that gender equity is generally perceived positively, although some gaps may remain in ensuring consistent opportunities and equal treatment for female staff across all hospitals.

385. Basic facilities for female staff, including toilets, rest areas, and breastfeeding areas, were generally reported as available. However, some gaps were identified, particularly regarding rest areas and breastfeeding facilities at selected locations. Continued improvement of these facilities is important to support the dignity, wellbeing, and retention of female healthcare workers.

386. Most respondents reported feeling safe during night duty, although some concerns were identified, particularly at DQ Saidu Sharif, Lakki Marwat, and Mansehra. These concerns may be influenced by differences in security arrangements, lighting, transport availability, and the surrounding environment.

387. Awareness and availability of formal harassment reporting mechanisms varied across the surveyed hospitals. While some respondents confirmed their availability, many reported that such mechanisms were unavailable or were unaware of them. Strengthening and clearly communicating grievance and harassment reporting procedures, together with staff awareness and training, will help create a safer and more supportive workplace for female healthcare workers.

388. Following suggestions were proposed to overcome reduce the gap.

- Hospitals should consider introducing gender-responsive workplace reforms to better support female health workers.
- It would be beneficial to provide dedicated rest rooms for female staff in all healthcare facilities to improve comfort, wellbeing, and work efficiency.
- Hospitals are encouraged to clearly establish and visibly communicate confidential harassment reporting mechanisms, along with regular staff training on how to use them effectively.
- Regular reviews or audits of night-duty safety could be conducted, focusing on lighting conditions, security presence, and safe transport arrangements for female staff.
- Strengthening human resource practices may help ensure fair and equal access for female staff to training opportunities, career progression, and professional development.

389. These suggested measures would help ensure that female healthcare workers are not only part of the system but are also adequately supported, protected, and treated equitably within their workplaces.

4.21.3.6 Economic Empowerment and Income-Related Patterns among Women

390. The survey findings indicate that women's participation in income-generating activities remains limited across the surveyed hospitals. Most women reported not being engaged in paid employment or other income-generating activities, while those who were economically active were primarily involved in formal employment and a limited range of other livelihood activities. The findings indicate that household responsibilities, social norms, and limited opportunities continue to influence women's economic participation.

391. Among women who earn an income, their earnings are primarily used to support household needs and other family-related expenses, including children's education. This highlights the important contribution of women's income to household welfare, although their financial independence and control over earnings may vary.

392. Respondents identified employment opportunities, skills development and vocational training, support for small businesses, improved access to savings and financial resources, and family support as important measures for enhancing women's economic participation. Overall, the findings suggest that expanding livelihood opportunities and strengthening skills and financial support can contribute to greater economic empowerment and financial independence among women.

4.21.3.7 Violence Against Women

393. The survey findings indicate that financially disadvantaged households were the most commonly identified vulnerable group across the surveyed hospitals. Elderly persons, persons with disabilities, widows, and minority groups were also identified by some respondents. However, most respondents reported that formal support programmes for vulnerable groups were not available.

394. Only a limited number of respondents reported having witnessed violence against women, while the majority had not observed such incidents. Among those who had, physical violence was the most commonly reported, followed by psychological and economic violence.

395. Overall, the findings highlight financial vulnerability as the primary concern across the surveyed locations. The limited availability of formal support programmes and the reported occurrence of violence against women underscore the need to strengthen social protection measures, improve awareness of available support services, and enhance referral and support mechanisms for vulnerable groups and survivors of violence.

396. Summary of key findings is presented in **Table 4.21 and 4.22** whereas key needs and priority improvements identified by women are given in **Table 4.23**

Table 4.21 Summary of Key Findings of the Gender Analysis

Domain	Key Finding	Pattern Across Facilities
Decision-making autonomy	Male participation remains significant in household decision-making	Male-led decision-making remains common across surveyed locations, although joint decision-making and greater female participation were reported by some respondents, particularly in DQ Saidu Sharif, Lakki Marwat, Mansehra, Shangla, and Tank.
Healthcare access barriers	Healthcare facilities are generally physically accessible	Most respondents reported that hospitals are easy to access. Reported barriers mainly related to transport, traffic, financial constraints, and socioeconomic conditions. Permission requirements reflect household and social norms rather than restrictions imposed by health facilities.
Facility infrastructure	Sanitation facilities are available but	Female toilets are generally available, but concerns regarding adequacy, cleanliness, and maintenance were reported at selected hospitals.

Domain	Key Finding	Pattern Across Facilities
	require improvement in some locations	
Lighting and safety	Lighting is generally satisfactory, with some location-specific concerns	Most respondents reported adequate lighting, although some concerns were identified at selected facilities, indicating the need for continued attention to lighting and safety.
Drinking water	Water supply is available but drinking water facilities are not uniformly satisfactory	Drinking water was generally available, but concerns regarding adequacy and quality were reported at several locations.
Clinical services and staffing	Generally satisfactory privacy and maternal healthcare services	Privacy during examinations and antenatal/postnatal care were generally reported as satisfactory. Female doctors and nurses were generally available, although some gaps were reported at selected locations.
Women's health awareness	Limited identification of women's health concerns	Most respondents did not identify major women's health issues, which may indicate limited awareness or under-recognition of women's health concerns.
Female staff equity	Generally positive perceptions, but workplace support gaps remain	Equal opportunities were generally perceived positively, although some respondents reported unequal opportunities or were uncertain. Gaps in rest and breastfeeding facilities were identified at selected locations.
Safety and harassment mechanisms	Night-time safety concerns and limited awareness of reporting mechanisms	Most respondents generally felt safe during night duty, although some concerns were reported at selected locations. Awareness and availability of formal harassment reporting mechanisms varied across facilities.
Economic empowerment	Women's economic participation remains limited	Women engaged in income-generating activities were primarily involved in formal employment, with limited diversification of livelihood opportunities. Household needs and family-related expenses were the main uses of income.
Vulnerability and GBV	Financial vulnerability is the primary concern	Financially disadvantaged households were most commonly identified as vulnerable. Elderly persons, persons with disabilities, widows, and minorities were also identified. Formal support programmes were generally reported as limited, while physical violence was the most commonly reported form of violence against women.

Table 4.22: Findings and Proposed actions for Gender Analysis

Area	Top Needs Identified	Suggested Actions / Measures
Decision-making autonomy	Greater women's involvement in household and health decisions	Conduct community awareness sessions targeting both men and women; engage male household heads and community leaders to promote shared decision-making; integrate gender sensitization into outreach programs.
Healthcare access	Reduced dependency on permission for seeking care	Strengthen community mobilization and health education campaigns emphasizing women's right to access care; involve local influencers to shift norms; expand female outreach workers to support women's independent access.
Female-friendly infrastructure	Separate toilets, clean sanitation, proper lighting	Construct and maintain gender-segregated toilets; establish routine cleaning schedules with monitoring systems; install and maintain adequate lighting in all facility areas.
Water quality	Safe, clean, and reliable drinking water	Introduce regular water quality testing; install filtration or treatment systems where needed; assign responsibility for routine monitoring and maintenance.
Safety in hospitals	Improved environmental safety and security	Improve lighting in all areas; deploy trained security staff; establish complaint mechanisms for safety concerns; conduct periodic safety audits.
Staffing availability	Reliable presence of doctors and nurses	Recruit additional staff in understaffed facilities; optimize shift schedules; introduce attendance monitoring systems; consider incentive mechanisms for staff retention in underserved areas.
Female staff welfare	Rest rooms	Allocate dedicated rest areas for female staff; establish lactation rooms; include these facilities as mandatory standards in hospital infrastructure planning.
Harassment protection	Functional reporting and response systems	Develop confidential and accessible reporting mechanisms; display reporting procedures clearly; train staff on harassment policies and response protocols; ensure accountability and follow-up systems.
Economic empowerment	Access to skills training and livelihood programs	Link women with vocational training programs; collaborate with government and NGOs to introduce microfinance and income-generating initiatives; promote skill-building opportunities within communities.
Violence response	Health system support for survivors	Train healthcare providers in GBV first-line response; establish referral linkages with legal, psychosocial, and protection services; integrate GBV screening and support into routine healthcare services.

Table 4.23:Strategic Recommendations for KP Health Systems Strengthening Program

Strategic Area	Recommended Action	Implementation Focus
Gender-responsive governance	Integrate gender equity into hospital governance frameworks	Policy-level inclusion of gender indicators in performance monitoring.
Women's autonomy in health access	Reduce permission barriers for healthcare access	Community engagement with male household decision-makers.
WASH infrastructure	Upgrade sanitation facilities and ensure female-friendly toilets	Separate toilets, cleanliness audits, maintenance contracts.
Lighting and safety	Improve infrastructure safety standards	Install reliable lighting in wards, corridors, and outdoor areas.
Water safety systems	Introduce routine water quality testing and treatment	Monitoring protocols and accountability systems.
Staffing improvements	Address staff shortages in underperforming facilities	Targeted recruitment and shift optimization in all health centers.
Female staff welfare	Establish lactation and rest facilities	Mandatory infrastructure standards for all hospitals.
Harassment prevention	Create confidential reporting and response systems	Awareness campaigns, training, and visible complaint mechanisms
GBV response integration	Establish hospital-based GBV referral pathways	Link hospitals with legal, psychosocial, and protection services.
Strategic Area	Recommended Action	Implementation Focus
Economic empowerment linkage	Introduce health-linked livelihood programs	Skills training, microfinance, and vocational pathways for women.
Data and monitoring systems	Strengthen gender-disaggregated data collection	Routine gender audits across all facilities

5 ANTICIPATED IMPACTS AND MITIGATION MEASURES

397. This section presents the anticipated positive and adverse environmental and social impacts of the KPHSSP, Phase III. As the proposed interventions involve only rehabilitation and upgrading works within existing DHQ premises, the assessment of impacts is limited to the facility boundaries and their immediate surroundings (refer to **Section 4** for the Area of Influence).

398. The impacts have been evaluated for the design/pre-construction, construction, and operational phases of the project. The assessment covers physical, ecological, and socio-economic aspects within the AOI. For each identified impact, a qualitative description is provided along with corresponding mitigation and remedial measures.

399. An impact evaluation matrix has been established to evaluate the significance of identified environmental and social impacts, providing a basis for the identification of appropriate mitigation measures.

5.1 NOTION OF SIGNIFICANCE

400. The term “environmental impact” refers to both adverse and beneficial impacts of the project on the physical, biological, and socio-economic environment. Impact prediction has been undertaken based on available baseline data, project information, and reasonable professional assumptions. The evaluation of impact significance relies on established criteria and expert judgment. The identified impacts are categorized using following criteria:

Direction	-	Positive or Negative
Duration	-	Long or Short Term
Effect	-	Direct or Indirect
Extent	-	Localized or Widespread

401. Impact significance is determined by considering both the nature and magnitude of the impact and the sensitivity of the affected receptor. Receptors with higher sensitivity are likely to experience impacts of greater significance from the same activity.

402. For this IEE, the characteristics of project activities and the type of impacts are assessed in combination with receptor sensitivity to determine overall significance. Impact significance is categorized as negligible, low, moderate, or high.

403. Impacts assessed as moderate or high are addressed through appropriate mitigation and management measures in the EMP.

404. Following the assessment of impact magnitude, the sensitivity of the receiving environment and affected receptors was evaluated to determine the overall significance of each potential impact, using the impact significance matrix presented below. While most identified impacts can be effectively mitigated through appropriate management

measures, certain residual impacts may remain after mitigation. The classification of impact significance based on the combined evaluation of impact magnitude and receptor sensitivity is presented below using assigned scores and corresponding color codes.

Magnitude of Impact	Sensitivity of Receptors			
	High (4)	Medium (3)	Low (2)	Negligible (1)
Major (4)	16	12	8	4
Moderate (3)	12	9	6	3
Minor (2)	8	6	4	2
Negligible (1)	4	3	2	1

Score	Impact Significance
1	Negligible
2 – 4	Low
5 – 8	Medium
9 – 12	High
> 12	Very High

5.2 METHODOLOGY FOR IMPACT EVALUATION

405. The methodology adopted for the evaluation of the impacts included the following assessment tools, (i) project impact evaluation matrix and (ii) overlays. These tools were used to identify the significance and magnitude of the impact as well as the nature, duration, extent etc.

a) Project Impact Evaluation Matrix

406. The Impact Evaluation Matrix presents a structured analysis by mapping project activities against relevant environmental and social parameters. It categorizes potential interactions across various project phases design, construction, and operation allowing systematic identification and assessment of likely impacts on the physical, ecological, and socio-economic environment. The project Impact Evaluation Matrix is given in **Annexure-VI.**

b) Overlays

407. In order to identify spatial based impacts, overlays were used. An overlay is based on a set of transparent maps, each of which represents the spatial distribution of an environmental characteristic (for example; topography). Information for an array of variables such as land use, infrastructure, vegetation etc. was collected for the standard geographical units within the project's AOI, recorded on a series of maps, typically one for each variable. These maps were overlaid to produce a composite map. The resulting composite maps characterize the project area's land use, physical, social, ecological and other relevant parameters related to proposed intervention. The overlays maps used in this IEE study are given in **Section 4.**

408. The impact assessment has been conducted within the delineated AOI, as defined in **Section 4** in accordance with the project's scope and environmental baseline studies.

5.3 POTENTIAL POSITIVE IMPACTS

409. The proposed hospital revamp project is anticipated to result in significant positive environmental, social, and operational outcomes. As the interventions are confined within existing hospital premises, the project will enhance healthcare service delivery without requiring land acquisition or change in land use. The design incorporates functional layout optimization, segregation of clean and contaminated zones, and integration of infection prevention and control measures, which will improve patient safety, reduce hospital-acquired infection risks, and enhance overall quality of care. Improvements in building systems and materials will contribute to better indoor air quality, thermal comfort, and long-term durability of the facilities.

410. Upgradation of critical infrastructure, including fire-fighting, medical gas, electrical, ICT, and ELV systems, will strengthen operational reliability, emergency preparedness, and resilience of healthcare services. Environmental sustainability will be promoted through energy-efficient systems, solar energy integration, and reduced reliance on grid electricity, thereby lowering greenhouse gas emissions. Improved water management measures, such as rainwater harvesting, soakage pits, and enhanced drainage systems, will reduce leakages, minimize localized flooding, and improve site resilience. Strengthening of healthcare waste management systems will support safe segregation and disposal practices.

411. In addition, the project will improve accessibility and safe mobility for all users, including elderly and persons with disabilities, while enhancing patient comfort, dignity, and visitor convenience. The revamp will also reduce occupational health and safety risks, lower long-term operational and utility costs, and extend the functional lifespan of existing facilities. Short-term employment opportunities during implementation are expected to contribute to local economic activity. Overall, the project aligns with sustainable and resilient healthcare infrastructure development objectives.

5.4 POTENTIAL ADVERSE IMPACTS

412. In addition to the positive impacts, the project also poses potential significant adverse environmental and social impacts. The project is implemented in three key stages, i.e: Pre-Construction / Planning and Design Stage, Construction Stage and Operation and Maintenance (O&M) Stage.

413. Adverse impacts envisaged at these three (03) stages of the proposed project along with their proposed remedial or mitigation measures are detailed below:

5.5 ADVERSE IMPACTS DURING PLANNING AND DESIGN AND PRE-CONSTRUCTION PHASE

414. Potential adverse impacts during the planning and design stage of the project is given below:

5.5.1 Design-Stage Considerations: Hospital Layout, Utilities, and Infrastructure

Potential Impacts

415. Decisions made during the design and pre-construction phase regarding the hospital layout, internal circulation, wards, isolation units, utility systems, and external development can influence operational efficiency, infection control, safety, and environmental performance once construction begins. If not adequately considered, these design-stage decisions may lead to adjustments during construction or affect the long-term functionality of the hospital. Impacts are expected to be high, site-specific in scale, and long-term as design-stage decisions can significantly affect hospital operational efficiency, infection control, safety, and overall functional performance.

Mitigation Measures

- Coordinated design reviews will be conducted to integrate environmental, operational, and energy efficiency considerations in the design, including drainage, HVAC, and plumbing systems.
- All existing utilities, including water supply, sewerage, electrical, medical gas, natural gas, and fire-fighting systems, will be identified and mapped, and appropriate connection points (tie-ins) will be determined for integrating new systems with the existing infrastructure.
- Consultations with hospital staff, administration, and relevant authorities will be conducted during the design stage to ensure operational requirements are met and regulatory compliance is achieved.
- Structural and geotechnical assessments will be undertaken to guide safe retrofitting, foundation stability, and civil works planning.
- Energy-efficient systems, renewable energy options, and climate-resilient features will be integrated into the design.
- Safe access, circulation, and emergency exits for staff, patients, and visitors will be planned and incorporated into the design.
- A service continuity plan will be prepared to ensure uninterrupted hospital services, including electricity, water, medical gases, and emergency access, during renovation works.

5.5.2 Topography

Potential Impacts

416. The project mainly involves renovation of existing buildings and upgrading internal systems such as plumbing, fire-fighting, electrical, ICT, ELV, medical gas, HVAC, and rooftop solar installations, which will occur within the existing building footprint and are not expected to affect site topography. Minor and localized disturbances to ground levels

may occur during external works such as installation of underground tanks, rainwater harvesting systems, utility pipelines, storm drainage, natural gas piping, and construction of roads and paved areas, requiring limited excavation and trenching. The impacts are expected to be negligible, site-specific, and short-term in duration.

Mitigation Measures

- Excavation, trenching, and grading will be limited to designated work areas required for external development and utility installation.
- Disturbed ground surfaces will be restored and compacted after completion of underground works and paving activities.
- Proper drainage and surface slopes will be ensured in paved areas, roads, and walkways to prevent water accumulation or localized flooding.
- Existing landscaped and undisturbed areas within the hospital premises will be protected from unnecessary disturbance during construction activities.

5.5.3 Seismic Hazard

Potential Impact

417. As the project area may be exposed to seismic activity, existing buildings and newly installed systems could be vulnerable to earthquake forces if structural conditions are not properly assessed during the design stage. Aging structural components or inadequate retrofitting may increase the risk of damage, potentially affecting building safety and continuity of hospital services. However, since the project mainly involves renovation within the existing hospital premises with limited structural modifications, impacts are expected to be moderate to high, site-specific, and long-term.

Mitigation Measures

418. The revamp of infrastructure will be designed and constructed in accordance with the Seismic Building Code of Pakistan 2021 (SBC-2021) to ensure compliance with the minimum requirements for seismic safety of structures.

5.5.4 Resource Conservation

Potential Impact

419. The project will involve the use of water, fuel, and construction materials. Excessive water consumption for construction activities, workers or for equipment cleaning could place minor stress on local water supplies. Construction materials such as cement, aggregates, structural steel, pipes, and lining materials are mostly non-renewable; inefficient use could reduce the availability of these resources for future projects. Fuel consumption for machinery and equipment may also result in air emissions if not managed properly. The overall impact on natural resources is moderately negative but manageable due to the limited scope of hospital upgrades.

420. Impacts are expected to be moderate, site-specific, and short-term in nature.

Mitigation Measures

421. Following practices shall be adopted to conserve these natural resources:

- Non-potable water will be used for cleaning, curing, and dust control.
- Workers will be trained on simple water-saving practices.
- Leftover materials will be reused wherever feasible.
- Machinery will be maintained in good condition, and engines will be turned off when not in use.
- Locally available fuel of good quality (low-sulphur if available) will be used.
- Basic site layout planning and waste segregation will be implemented.

422. Resources Conservation Plan is attached as **Annexure-VII.**

5.5.5 Flora

Potential Impact

423. The project involves rehabilitation and revamping works within existing hospital premises, and no major tree cutting or vegetation removal is anticipated. Minor impacts on planted vegetation and landscaped areas may occur due to temporary site mobilization, movement of machinery, dust deposition, and material storage if activities are not properly managed. However, impacts on flora are expected to be negligible to low, site-specific, short-term, and reversible in nature.

Mitigation Measures

- Avoid unnecessary cutting or trimming of trees and vegetation within hospital premises;
- Restrict material storage, temporary facilities, and construction activities to already paved or disturbed areas;
- Implement dust suppression measures such as regular water sprinkling to minimize dust deposition on vegetation;
- Compensate any unavoidable vegetation removal through plantation using native species;
- Maintain and enhance landscaping and green areas within hospital premises.

5.5.6 Fauna

Potential Impact

424. The project area comprises an already developed urban or semi-urban hospital environment with limited habitat value, mainly supporting urban-adapted fauna such as birds and small mammals. Construction activities, noise, machinery operation, and increased human presence may temporarily disturb local fauna within and around the hospital premises. However, as works are confined within existing developed areas, impacts on fauna are expected to be negligible to low, site-specific, short-term, and reversible in nature.

Mitigation Measures:

- Restrict construction activities to daytime hours to minimize disturbance to urban fauna;
- Ensure that no natural habitats or existing green areas are unnecessarily disturbed;
- Control noise, dust, and waste generation through appropriate site management practices;
- Incorporate native vegetation and landscaping within hospital premises to support local urban biodiversity;
- Ensure proper collection and disposal of construction and healthcare waste to avoid nuisance to birds and small animals.

5.5.7 Land Acquisition and Resettlement

Potential Impact

425. No private land acquisition is required, and the project does not involve construction outside the existing hospital boundary. Thus, no impacts on private land, residential, or commercial structures are anticipated during the design or construction phases.

5.5.8 Temporary Acquisition of Land

Potential Impacts

426. The hospital revamp works will be confined within the existing hospital premises. Limited temporary space may be required for material storage, equipment placement, and vehicle parking. Any such use will be small-scale and short-term in nature and may be managed in hospital premises. The required land will be used within the hospital area. No temporary land acquisition is required. Hence there will be no impact.

Mitigation Measures

- Contractor facilities will, as far as possible, be established within the hospital boundary in coordination with hospital management.
- Temporary areas will be clearly demarcated to avoid disruption to hospital operations.
- If external land is required, it will be obtained through voluntary short-term lease agreements.
- All temporarily used areas will be restored to their original condition after completion of works.
- A Construction Camp/Layout Plan will be prepared in consultation with PMIU.

5.5.9 Existing Utilities

Potential Impacts

427. Excavation and trenching for activities such as water supply and sewerage pipelines, natural gas piping, storm drainage, electrical systems, and paved areas may pose a risk

of accidental disturbance or damage to existing underground utilities**.** These may include water supply lines, sewerage pipelines, electrical cables, communication lines, fire-fighting pipelines, and medical gas systems. Any damage could lead to temporary disruption of essential hospital services**.** However, the Impacts are expected to be moderate, site-specific, and short-term in nature.

Mitigation Measures

428. Mitigation measures will include:
- Utility surveys and mapping will be conducted prior to construction.
- Existing utility lines will be clearly marked and protected on site.
- Careful excavation methods will be adopted, particularly near identified utilities.
- Coordination with hospital management and relevant utility providers will be carried out prior to commencement of works.
- Temporary arrangements will be ensured, where required, to maintain continuity of essential services.

5.5.10 Physical and Cultural Resources

Mitigation Measures

429. The hospital revamp works will be confined within the existing hospital premises. No graveyards, shrines or other physical and cultural resources except mosques are located within the project boundary. Therefore, no direct impact on such resources is anticipated.

430. However, minor and temporary inconvenience may occur due to construction-related noise, dust, or traffic movement in surrounding areas, which could indirectly affect access or comfort due to construction activities. Impacts are expected to be negligible to low, site-specific, and short-term in nature.

Mitigation Measures

- All necessary arrangements including schedule of construction work and obstruction free and safe access will be made to avoid any disturbance to the mosques located in the hospital premises.

5.6 ADVERSE IMPACTS DURING CONSTRUCTION STAGE

5.6.1 Excavation

Potential Impact

431. Small scale excavation may be required for upgrading existing hospital utilities such as sewerage, drainage, water supply lines, and minor external works. As the project focuses on rehabilitation rather than new construction, excavation activities will be localized and short-term across all project sites.

432. Potential impacts include temporary soil disturbance, spoil generation, dust emissions, restricted internal access, interference with ambulance movement, utility disruption, and occupational health and safety risks. These impacts may be relatively more pronounced at DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat) due to their urban settings, high patient volumes, and traffic congestion around the hospital premises. Dust-related impacts may be more noticeable at DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank owing to the dry climatic conditions and greater potential for wind-blown dust. Localized soil erosion and sediment runoff may occur at DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan) due to the hilly terrain, steep slopes, and seasonal rainfall, particularly where minor utility excavations are undertaken in external areas. Across all project sites, there is also a possibility of encountering undocumented underground utilities and, in rare cases, physical cultural resources during excavation activities.

433. Impacts are expected to be moderate to high, site-specific, and temporary in nature.

Mitigation Measures

- Excavation will be carried out in small, phased sections, and works will be scheduled during off-peak hours to maintain uninterrupted hospital operations and emergency access.
- Dust will be controlled through regular water sprinkling and covering of spoil piles and transport vehicles, with enhanced attention at relatively dry sites such as DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank.
- Excavated material will be properly managed, and trenches will be backfilled promptly to minimize localized soil erosion and sediment runoff during rainfall especially at DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri , and DHQ Hospital Dassu.
- Excavated material will be reused where feasible, while surplus spoil will be transported and disposed of at approved disposal locations.
- Temporary barriers, fencing, warning tape, and signage will be installed around excavation areas to protect patients, staff, attendants, and visitors.
- Proper trench support, shoring, and safe excavation practices will be implemented to prevent collapse and ensure worker safety.
- Underground utilities and service lines will be identified and mapped prior to excavation to minimize accidental damage and service interruption.
- Controlled excavation methods will be adopted near older structures, and the Chance-Find Procedure will be implemented in case any archaeological or culturally significant materials are encountered.
- Close coordination with hospital administration will be maintained to ensure continuous access to emergency units, ambulances, and critical care areas.
- Regular air quality, noise, and safety inspections will be conducted, particularly near sensitive hospital units such as ICUs, operation theatres, laboratories, and isolation wards.

- Workers will receive training on occupational health and safety, hazard identification, infection prevention and control, emergency response, and safe waste handling procedures.

5.6.2 Construction campsites and Contractor Facilities

Potential Impact

434. The contractor's site office and temporary facilities will be established within the existing hospital premises at locations approved by the SC and PMIU in coordination with the respective Hospital Administration across all project sites Considering the limited scale of rehabilitation works, only small temporary areas will be utilized for site offices, material storage, equipment placement, and worker facilities.

435. However, if such temporary facilities are located within or close to functional hospital areas, localized and short-term impacts may occur. These impacts may be relatively more noticeable at DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat) congested and busy facilities such as due to higher patient influx, limited space availability, and continuous emergency movement. At DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank, dry climatic conditions may increase dust-related nuisance around temporary storage and movement areas, while at DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan) sloping terrain and drainage sensitivity may increase the risk of localized runoff and erosion around contractor facilities. Potential impacts include minor vegetation disturbance, obstruction of internal movement, noise and visual intrusion, generation of solid waste and wastewater, sanitation issues, temporary water contamination risks, vector breeding, and disruption of hospital access routes including ambulance and emergency pathways.

436. Considering the operational sensitivity of healthcare facilities and the continuous presence of patients, attendants, and critical medical services, these impacts are assessed as moderate to high, site-specific, and temporary in nature.

Mitigation Measures

- The contractor's site office and temporary facilities will be located only within designated areas approved by the SC and Hospital Administration, avoiding sensitive zones such as wards, emergency units, ICUs, laboratories, operation theatres, and ambulance routes.
- The footprint of temporary facilities will be minimized, and unnecessary clearing of vegetation, paved areas, or landscaped spaces will be minimised.
- Adequate sanitation arrangements including clean toilets, safe drinking water, handwashing facilities, and proper wastewater disposal systems will be provided and maintained at all temporary facilities. Direct discharge into drains, soil, or open areas will be strictly prohibited.
- Solid waste generated from contractor facilities will be properly segregated, collected, and disposed of through authorized municipal systems. Fuel, lubricants, and

maintenance activities will be managed in designated areas with spill prevention measures to avoid soil and water contamination.

- Dust, noise, and visual disturbance will be minimized through regular housekeeping, controlled material storage, water sprinkling, covered transport, and scheduling of noisy activities during less sensitive hours, particularly at DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank where dry conditions may intensify dust impacts.
- At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), temporary facilities and material stockpiles will be located on stable, level surfaces wherever practicable, and good housekeeping practices will be maintained to minimize localized runoff and ensure safe internal access during periods of rainfall.
- All internal access routes, emergency pathways, and ambulance movement corridors will remain open and unobstructed throughout the construction period.
- Vector control measures including proper waste management, drainage of stagnant water, and routine site cleaning will be implemented to prevent mosquito and pest breeding.
- Adequate worker welfare facilities including food, rest, hygiene, and first aid arrangements will be provided in accordance with national labour regulations and applicable occupational health and safety standards. Workers will be trained and bound by a Code of Conduct under an approved Construction Camp Management Plan and Labour Management Plan.
- A Community Liaison Officer will be designated to coordinate with hospital administration and address complaints or grievances related to contractor activities.
- All temporary facilities, stockpiles, and storage areas will be dismantled immediately after completion of works, and disturbed areas will be restored to their original condition.
- Regular environmental, health, and safety monitoring and supervision will be conducted to ensure compliance with the approved EMP.

5.6.3 Air Quality

Potential Impact

437. Air quality may be temporarily affected during rehabilitation works due to dust generation from demolition, excavation, material handling, transportation of construction materials, and movement of vehicles and machinery within hospital premises. Demolition and dismantling of existing structures and finishes may generate fine particulate matter, while diesel-powered generators, machinery, and transport vehicles may emit pollutants such as PM, NO_x, SO_2, CO, and VOCs.

438. The magnitude of air quality impacts is expected to vary across project sites depending on climatic conditions, traffic intensity, surrounding land use, and terrain. Higher impacts are anticipated at DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and busy hospital operations. DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank may also experience dust impacts due to dry conditions and exposed surfaces. In contrast, DHQ Hospital Battagram, DHQ

Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan) are expected to experience comparatively lower impacts due to hilly terrain, better natural dispersion conditions, and lower traffic density, although localized dust emissions may still occur near active work areas.

439. Given the sensitivity of hospital environments, particularly around OPDs, ICUs, operation theatres, laboratories, emergency units, and isolation wards, even short-term exposure to dust and air emissions may adversely affect patients, healthcare workers, attendants, and sensitive medical equipment.

440. The risk of exposure is expected to be relatively higher due to busy and high-patient-load facilities. DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat).

441. Impacts are expected to be moderate to high, site-specific, temporary, and reversible in nature.

Mitigation Measures

- Dust emissions from demolition, excavation, transportation, and material handling will be controlled through regular water sprinkling on exposed areas, covering of stockpiles, and covering of transport vehicles carrying fine materials, with enhanced dust suppression measures implemented at relatively dry and dust-prone sites such as DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank.
- Only well-maintained and low-emission machinery and vehicles will be used. Open burning of waste will be strictly prohibited, and equipment engines will be turned off when not in use to minimize exhaust emissions, particularly at congested urban sites.
- Temporary dust screens, barricades, or enclosures will be installed around demolition and other high dust-generating activities to limit dust dispersion into sensitive hospital areas.
- Dust-generating activities including demolition, concrete cutting, and excavation will be scheduled during off-peak hospital hours to minimize disturbance to patients, visitors, and medical staff.
- Demolition debris and excavated materials will be promptly collected, covered, and transported to approved disposal sites to reduce airborne dust.
- Construction materials prone to generating dust will be stored in covered areas or properly secured during transport and handling.
- Workers will be provided with appropriate PPE, including dust masks and respirators where necessary, and trained in their proper use.
- Regular air quality monitoring will be conducted near sensitive hospital units such as ICUs, operation theatres, laboratories, and isolation wards to ensure compliance with applicable NEQS.
- Warning signage will be installed around active work areas, and continuous coordination with hospital administration will be maintained regarding demolition schedules and high dust-generating activities.
- Good housekeeping practices including routine cleaning of access roads, pathways, and nearby hospital areas will be implemented to minimize dust accumulation.

- All monitoring records, complaints, corrective actions, and inspection findings will be properly documented and addressed in a timely manner.

5.6.4 Noise

Potential Impact

442. Activities including demolition, excavation, drilling, material handling, and vehicle movement may generate temporary noise and minor vibration across all project sites.

443. Noise generated during rehabilitation works may disturb patients, healthcare staff, attendants, and visitors, particularly within sensitive hospital areas such as ICUs, operation theatres, emergency units, laboratories, and inpatient wards. Noise impacts may be relatively more pronounced at high patient load facilities such as DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat) due to continuous patient flow, traffic movement. However, open surroundings may facilitate wider propagation of construction noise, while localized vibration impacts may occur near sloping or structurally sensitive areas during drilling and excavation activities. Vibration from demolition and heavy equipment may also pose limited risks to older hospital structures if activities are not properly controlled.

444. Impacts are expected to be high, site-specific, and short-term in nature.

Mitigation Measures

- Low-noise equipment, including machinery used for demolition, excavation, and compaction, will be selected and fitted with silencers or mufflers, and regularly maintained to prevent excessive noise and vibration on all sites.
- High-noise and vibration-generating activities, including demolition, drilling, excavation, and compaction, will be scheduled during off-peak hospital hours and conducted in small, phased sections with stricter controls across all sites.
- Vibration-intensive methods will be avoided near older or structurally sensitive hospital buildings and monitoring and visual inspections will be carried out to ensure no damage occurs.
- Temporary acoustic barriers or enclosures will be installed near sensitive units to reduce noise propagation where required.
- Work schedules will be planned to avoid simultaneous high-noise or high-vibration activities near sensitive areas, and worker rotation will be implemented to minimize prolonged exposure.
- Workers will be provided with appropriate PPE, including ear protection, and trained in its proper use.
- Noise and vibration monitoring will be conducted near sensitive hospital areas (ICUs, OTs, wards) to ensure compliance with NEQS standards, and corrective actions will be implemented if required.
- Demolition and construction debris will be promptly handled and removed to reduce the duration of noise- and vibration-generating activities.

- Advance coordination with hospital management will be maintained, and a grievance mechanism will be established to address complaints from patients, staff, or visitors.

5.6.5 Traffic Management

Potential Impact

445. Rehabilitation works within operational hospital premises including transportation of construction materials, movement of machinery and equipment, temporary closure of internal pathways, and partial occupation of parking or circulation areas may temporarily disrupt internal traffic circulation at all project sites. Such disruptions may lead to localized congestion and restricted movement for patients, visitors, ambulances, and service vehicles. These impacts may be relatively more pronounced at busy facilities such as DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat) due to higher patient inflow, limited parking space, and continuous emergency movement and constrained internal circulation. At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), narrower access roads and hilly terrain may create additional movement constraints during transportation of construction materials and equipment. Comparatively lower levels of disruption are anticipated at DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank**,**

446. Given the operational sensitivity of healthcare facilities and the critical need for uninterrupted emergency access, any obstruction or delay in internal circulation may result in moderate to high, site-specific, and short-term impacts.

Mitigation Measures

- Construction activities will be carried out in phased sections to ensure continuous access to emergency and critical care units.
- Coordination with hospital administration will be maintained to ensure uninterrupted ambulance access at all times with stricter control at all the facilities.
- Alternate entry and exit routes within the hospital premises will be clearly demarcated and communicated to staff, patients, and visitors.
- Advance notice will be provided to hospital staff, patients, and visitors regarding temporary route changes, parking restrictions, or access diversions.
- Material deliveries and heavy vehicle movements will be scheduled during off-peak hospital hours to minimize congestion.
- Dedicated pathways will be provided for pedestrians, and separate routes will be maintained for construction vehicles to avoid conflicts.
- Visible directional signage, safety barricades, and protective barriers will be installed along construction zones and temporary routes.
- Personnel will be stationed at key locations during peak construction activities to guide vehicles and pedestrians safely and ensure unobstructed access for ambulances and hospital staff.

- Construction materials, machinery, and debris will not be stored in a manner that obstructs emergency routes, hospital entrances, or fire access corridors.
- At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), special attention will be given to safe movement management along narrower or sloping access routes to avoid traffic conflicts and accidents.
- All temporary traffic arrangements will be reviewed regularly in coordination with hospital management to ensure effectiveness and minimize disruption.

447. A site-specific Traffic Management Plan will be prepared in coordination with hospital management at each facility to ensure safety, mobility, and minimal disruption during rehabilitation works. A framework Traffic Management Plan is attached as **Annexure-VIII.**

5.6.6 Impact on Soil

Potential Impact

448. Soil impacts from the proposed rehabilitation works are expected to be localized, minor to moderate, and short-term in nature, as project activities are confined to upgrading and rehabilitation within the existing premises of DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, DHQ Hospital Batkhela (Malakand), King Abdullah Teaching Hospital Mansehra, DHQ Hospital Mardan, DHQ Hospital Alpuri (Shangla), DHQ Hospital Tank, DHQ Hospital Saidu Sharif (Swat), and DHQ Hospital Dassu (Upper Kohistan). Temporary soil disturbance may occur during minor excavation for drainage systems, sewerage lines, water supply pipelines, underground utilities, equipment foundations, and external works such as paving, landscaping, parking improvements, boundary walls, and underground water or septic tanks.

449. Potential impacts may include localized erosion of exposed soil, temporary disruption of surface drainage, dust generation, and minor soil contamination from accidental spills of fuel, lubricants, wastewater, or construction waste. These impacts may be relatively more noticeable at DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank due to dry climatic conditions, loose soil surfaces, and wind-blown dust. At DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat), improper handling or storage of excavated material may obstruct drains and access routes, resulting in temporary accumulation of stagnant water and localized drainage issues within congested hospital surroundings. At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), hilly terrain and seasonal rainfall may result in localized soil erosion or sediment runoff from exposed excavated areas if not properly managed.

450. Given the urban, developed, and compact nature of hospital sites, these impacts are expected to be low to moderate, site-specific, and short-term in nature.

Mitigation measures

- Excavations for utilities or minor external works will be kept as small and short-term as possible to minimize soil disturbance.
- Excavated materials will be managed within the work area to avoid blocking access routes, drains, or patient pathways.
- Regular water sprinkling will be applied to exposed soil or loose material to control dust with increased frequency in drier areas such as DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank**.**
- Refuelling and maintenance of machinery will be carried out on impermeable surfaces or with drip trays to prevent soil contamination.
- Construction waste and debris will be collected promptly and disposed of at approved locations to prevent contamination and obstruction.
- At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), excavated material will be properly stockpiled, and exposed excavated areas will be backfilled promptly after completion of utility works to minimize localized soil erosion and sediment runoff during rainfall.
- Equipment movement will be restricted to the immediate work area to avoid damage to surrounding paved or landscaped surfaces.
- Disturbed areas, including small patches of soil along access routes, will be restored promptly with paving, landscaping, or other appropriate surface treatment.
- Workers will be trained in dust control, spill prevention, and basic soil protection measures, and compliance will be monitored regularly.

5.6.7 Community Health and Safety

Potential Impact

451. During the hospital rehabilitation works across all the locations, minor excavation, material handling, and movement of equipment within operational hospital premises may pose risks to patients, visitors, staff, and nearby pedestrians. Potential impacts include:

- Accidents from vehicle or equipment movement within hospital premises.
- Exposure to dust, noise, and minor vibrations, particularly affecting vulnerable patients (children, elderly, or those with pre-existing conditions).
- Localized contamination from accidental spills of fuel, lubricants, or construction materials.
- Increased risk of communicable diseases among hospital users/visitors if hygiene, sanitation, and infection prevention measures are not maintained.
- Slips, trips, falls, or collisions due to temporary obstacles or uneven surfaces.
- Additional movement and access constraints at DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan) due to hilly terrain and relatively narrow access roads.
- Enhanced dust exposure at relatively dry sites such as DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank because of dry climatic conditions and loose surface material.

- Increased potential for congestion and pedestrian–vehicle interaction at DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat) due to higher patient volumes and continuous hospital operations

452. Impacts are expected to be moderate, site-specific, and short-term in nature.

Mitigation Measures

- Construction activities will be confined to clearly demarcated work areas, with restricted access through barricades and signage.
- Safe and uninterrupted access for patients, staff, and emergency vehicles will be maintained at all times through phased works and designated routes.
- Construction vehicle and equipment movement within hospital premises will be strictly controlled, and low speed limits will be enforced to minimize accident risks, particularly at DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), where access roads may be relatively narrow or sloping.
- Dust, noise, and minor vibration will be minimized through water sprinkling, proper equipment maintenance, and scheduling of works during less sensitive hours with emphasis at DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank due to the higher potential for dust generation.
- Additional coordination with Hospital Administration will be maintained at DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat) to safely manage pedestrian movement, emergency access, and construction activities within busy hospital premises.
- All work areas near sensitive hospital units will be secured with barriers and warning signs to prevent accidental exposure across all sites
- Good housekeeping will be maintained, including timely removal of debris, proper waste management, and prevention of water stagnation.
- Refuelling and storage of fuels or lubricants will be carried out in controlled areas to prevent spills and contamination.
- Additional movement safety measures including Traffic control personnel, directional signage, and controlled material transport will be implemented where internal access routes may be narrower or sloped.
- Separate pedestrian pathways and construction access routes will be maintained to minimize interaction between hospital users and construction activities.
- Workers will be trained on site safety, infection prevention, hygiene practices, and appropriate conduct within hospital premises.
- A site-specific Health, Safety, and Environment (HSE) Plan, Infection Prevention and Control (IPC) protocol, and Grievance Redress Mechanism (GRM) will be implemented at each hospital site to address safety concerns, complaints, and emergency situations.
- A prior information will be provided to hospital staff and visitors regarding construction activities affecting access or movement.

- Regular monitoring and supervision will be conducted to ensure compliance with environmental, health, and safety requirements throughout the rehabilitation period.

5.6.8 Occupational Health and Safety

Potential Impact

453. OHS risks are associated with minor rehabilitation works within operational hospitals, including small-scale excavation, utility works, equipment installation, and material handling. As hospitals will remain operational during construction, workers may also interact with patients, healthcare staff, and visitors, increasing the need for effective safety and infection prevention measures.

454. Potential hazards include slips, trips, and falls; injuries from hand and power tools; exposure to dust, noise, and electrical hazards; manual handling injuries; and potential exposure to infectious agents while working in clinical areas. Improper handling of demolition debris, chemicals, or other hazardous materials may also pose health and safety risks. These risks will be managed through work area segregation, IPC measures, safe handling of hazardous materials, provision and use of appropriate PPE, emergency response arrangements, and prompt reporting and investigation of incidents, in accordance with the EMP and contractor's site-specific management plans.

455. Impacts are expected to be moderate to high, site-specific, and short-term in nature.

Mitigation Measures

- All works will be carried out in compliance with applicable occupational health and safety regulations and international good practices.
- PPE including helmets, gloves, safety footwear, masks, goggles, and high-visibility vests will be provided and its use will be strictly enforced.
- The Contractor shall prepare and implement OHS Plan, IPC Plan, and Emergency Response Plan (ERP) before commencement of works.
- Workers will be trained through regular toolbox talks on hazard identification, safe work practices, equipment handling, infection prevention, and emergency procedures.
- Active construction work areas will be secured with barricades, warning signage, and controlled access to prevent unauthorized entry and accidental exposure.
- Hazardous materials, chemicals, fuels, and demolition wastes shall be identified, handled, stored, and disposed of in accordance with approved procedures and applicable regulations.
- All machinery and equipment will be properly maintained, and safe operating procedures will be followed to minimize mechanical, electrical, and noise-related risks.
- First aid facilities will be made available on-site, and arrangements will be ensured for prompt medical assistance in coordination with hospital services.
- Good housekeeping will be maintained, including proper material storage, debris removal, and safe site layout to reduce risks of slips, trips, and falls.

- Workers' health and hygiene will be monitored, including pre-employment fitness checks, use of existing sanitation facilities, and adherence to infection prevention protocols. Sanitation Plan is attached as **Annexure-IX.**
- A designated safety supervisor will be assigned to monitor compliance, maintain records, and ensure implementation of all OHS measures.

5.6.9 Generation of Solid Waste

Potential Impact

456. Rehabilitation works within hospital premises will generate solid waste, including construction and demolition debris, excavated material, packaging waste, and domestic waste from contractor staff across all sites. The estimated quantities are discussed in **section 3.18.**

457. Additional small quantities of construction-related waste may also arise from repair and upgrading activities. If not properly managed, this waste may result in localized hygiene issues, visual nuisance, blockage of drainage systems, and vector breeding within hospital premises.

458. Impacts are expected to be moderate, site-specific, and short-term in nature.

Mitigation Measures

- Waste will be segregated at source into recyclable, reusable, and non-recyclable categories.
- Waste will be stored in designated, covered containers to prevent littering, odor, and pest attraction.
- Construction debris and excavated material will be reused on-site where feasible (e.g., backfilling or levelling).
- Non-hazardous waste will be disposed of through authorized municipal services, and open dumping or burning will be strictly prohibited.
- Adequate waste collection bins will be provided at work areas and designated staff zones.
- Hazardous waste (e.g., oils, lubricants, chemicals) will be stored separately and disposed of through licensed contractors.
- Good housekeeping practices will be maintained to prevent accumulation of waste and debris within hospital premises.
- Loose waste, spoil, and demolition debris will be covered during transport and storage, particularly at relatively dry and windy sites such as DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank**.**
- Special care will be taken at DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), to prevent disposal or stockpiling of debris near drainage paths or sloping areas where runoff or blockage may occur.

- Workers will be trained on proper waste handling, segregation, and site responsibilities.
- Waste management practices will be regularly monitored as part of the contractor's EMP.
- Roles and responsibilities for waste management will be clearly defined in the contractor's Code of Conduct and site procedures.

459. A comprehensive plan for construction waste management shall be prepared for construction stage (framework plan attached as **Annexure-X**).

5.6.10 Generation of Wastewater

Potential Impact

460. The project will generate small quantities of wastewater from activities such as minor excavation and utility works, limited concrete mixing or patching, equipment cleaning, and domestic use by contractor staff. The estimated quantities are discussed in **section 3.17.**

461. If not properly managed, wastewater generated during rehabilitation activities may lead to localized contamination of hospital grounds, drains, and surrounding surfaces; blockage of drainage systems; formation of stagnant water; odour generation; and increased risk of vector breeding, thereby affecting hygiene and sanitation conditions within hospital premises across all project sites. At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), hilly terrain and seasonal rainfall may increase the potential for localized runoff from work areas if wastewater and drainage are not properly managed. At DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank, improper wastewater handling may contribute to localized straining, soil contamination, and unsanitary conditions around work areas due to the relatively dry environmental conditions.

462. Impacts are expected to be moderate, site-specific, and short-term in nature.

Mitigation Measures

- Existing hospital sanitation facilities will be utilized by workers where feasible and approved by hospital administration to avoid the need for temporary sanitation arrangements.
- Construction-related wastewater (e.g., concrete wash, equipment cleaning, oils, and lubricants) will be collected and managed in designated areas and will not be discharged into hospital drains or surrounding areas.
- Designated equipment and vehicle cleaning areas will be established with appropriate containment measures such as sediment traps or oil-water separators.
- Fuels, oils, and chemicals will be stored on impermeable surfaces with secondary containment to prevent leakage and contamination.
- Stormwater will be prevented from entering work areas to prevent waterlogging, mixing with wastewater, and potential contamination.

- Special drainage and runoff management measures will be implemented at DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), to control wastewater movement on sloping terrain and minimize erosion or sediment transport.
- Non-potable water will be reused where feasible for dust suppression and minor construction activities.
- Good housekeeping practices will be maintained to prevent wastewater accumulation, blockages, or stagnant water within hospital premises.
- Workers will be trained on water conservation, hygiene, and proper wastewater handling practices.
- Drainage systems and wastewater handling practices will be regularly inspected to identify and address leaks, blockages, or contamination risks.
- A site-specific wastewater management approach will be implemented in coordination with hospital administration, and records of wastewater generation and disposal will be maintained.
- All wastewater management practices will comply with applicable environmental regulations and hospital sanitation standards.

5.6.11 Impact on Water Resources

Potential Impact

463. The activities within existing hospital premises such as minor excavation, utility upgrades, and equipment installation may result in limited and localized impacts on water resources across all project sites. Key considerations include:

- Localized runoff from disturbed surfaces, cement works, or equipment cleaning, which may enter internal drainage systems if not properly controlled.
- Risk of minor contamination from accidental spills of fuel, oil, or chemicals, potentially affecting soil or stormwater drains.
- Slight increase in water demand for construction-related activities; however, this remains minimal due to the small workforce and short duration of works.
- Continued reliance on existing hospital water supply and sewerage systems, with wastewater routed through established plumbing to municipal systems and no direct discharge to natural water bodies.
- At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), hilly terrain and rainfall runoff may increase the risk of sediment transport and localized drainage disturbance if exposed areas are not adequately controlled.
- At relatively dry sites such as DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank, water demand for dust suppression may be comparatively higher during peak construction activities.

464. Impacts are expected to be low to moderate, site-specific, and short-term in nature.

Mitigation Measures

- Workers will utilize existing hospital sanitation facilities, eliminating the need for temporary arrangements and preventing uncontrolled wastewater discharge.
- Construction-related wastewater (e.g., from concrete works, equipment cleaning, or minor activities) will be collected and managed in designated areas and will not be allowed to mix with hospital sewage or enter storm drains.
- Equipment and vehicles will be cleaned only in designated service areas equipped with appropriate containment measures such as sediment traps and oil-water separators.
- Fuels, oils, and chemicals will be stored on impermeable, bunded surfaces and kept away from drainage lines.
- Spill prevention and response procedures will be implemented, and workers will be trained in spill containment, cleanup, and reporting.
- Runoff from minor excavation or disturbed areas will be controlled through proper housekeeping, prompt backfilling of excavations, and protection of nearby drainage inlets to prevent sediment or contaminants from entering drainage systems.
- At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), excavated material will be properly stockpiled and managed to minimize localized runoff and sediment movement during rainfall.
- Construction materials, debris, and excavated spoil will not be stored near drainage channels or water pathways to avoid blockage and contamination.
- Water consumption for construction activities will be minimized, monitored, and managed efficiently, and workers will be encouraged to follow water conservation practices, particularly at relatively dry sites such as DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank.
- Existing hospital sewerage connections will be maintained, and no direct discharge into natural water bodies or open drains will occur.
- Regular inspections will be carried out to ensure proper functioning of drainage systems and compliance with environmental regulations and hospital sanitation protocols.

5.6.12 Hazardous Waste Management

Potential Impact

465. Generation of hazardous waste is expected to be limited in scale, primarily associated with equipment maintenance, minor rehabilitation activities, and the controlled use of small quantities of chemical products within hospital premises. Presence of Asbestos Containing Materials (ACM) may also pose hazardous impacts if disturbed or removed during rehabilitation works.

466. Key potential impacts include:

- Localized contamination of soil and drainage systems due to accidental spills, leaks, or improper disposal of hazardous substances.

- Deterioration of environmental quality within hospital premises, including risks of odor, staining, or unsafe conditions if hazardous waste is not properly contained.
- Potential health and safety risks to workers and hospital users from exposure to toxic, flammable, or irritant substances, particularly in confined or sensitive areas.
- Asbestos exposure may release asbestos fibres, posing potential occupational and public health risks to workers, patients, hospital staff, and visitors.
- Blockage or damage to drainage infrastructure if hazardous residues (e.g., cement slurry or chemicals) enter the drainage system.

467. Impacts are expected to be moderate, site-specific, and short-term in nature.

Mitigation Measures

- Fuels, oils, and chemicals will be stored in designated, bunded areas on impermeable surfaces, away from drains and sensitive hospital utilities.
- Cement wash water and chemical residues will be collected in sealed containers and will not be discharged into hospital drainage systems; disposal will be carried out through approved waste management channels.
- Spill prevention and response measures will be implemented, including availability of spill kits and training of personnel in containment, clean-up, and reporting procedures.
- Hazardous materials and wastes will be clearly labelled, segregated, and handled using appropriate PPE.
- Regular inspections will be conducted to identify leaks, damaged containers, or unsafe storage and handling practices.
- Hazardous waste generated in small quantities will be removed from site promptly through licensed contractors for safe treatment and disposal.
- All hazardous waste management practices will comply with applicable provincial environmental standards (NEQS) and hospital safety protocols.
- Where ACMs are identified, an Asbestos Management Plan (AMP) will be implemented before commencement of work.
- ACMs will be removed, handled, and disposed of by licensed/authorized contractors and trained personnel, with appropriate PPE, fibre-control measures, and access controls in place.
- ACMs will not be broken, reused, or incorporated into the works. Asbestos waste will be securely packaged, transported, and disposed of at an authorized facility, with disposal records maintained.

5.6.13 Disturbance to Hospital Services and Shifting of Units

Potential Impact

468. The proposed revamp works within an operational hospital setting may result in temporary disruption to routine healthcare services and necessitate the relocation of certain functional units during construction activities. Such disruptions may affect patient flow, internal circulation, waiting areas, access to healthcare services, and operational efficiency within hospital premises. Disruptions may be relatively more pronounced at DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital

Batkhela, and DHQ Hospital Saidu Sharif (Swat) due to patient influx, continuous emergency movement, and limited availability of space for temporary arrangements for relocation of services. Comparatively lower levels of disruption are anticipated at DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank, where relatively lower patient volumes and less congested hospital layouts are expected to facilitate phased rehabilitation works.

469. Impacts are expected to be high, site-specific, and short-term in nature.

Mitigation Measures

- A comprehensive service continuity plan will be prepared in coordination with hospital administration, identifying relocation strategies for affected units;
- Temporary functional arrangements will be established within available spaces to maintain uninterrupted delivery of critical healthcare services;
- Construction activities will be scheduled to avoid peak operational hours, where feasible;
- Clear wayfinding signage and information dissemination will be implemented to ensure safe and efficient movement of patients, staff, and visitors;
- Continuous coordination with hospital management will be maintained to ensure uninterrupted operation of emergency and essential services at all locations.
- Service continuity plan is attached as **Annexure-XI.**

5.6.14 Disturbance to Utilities

Potential Impact

470. The activities may involve tie-ins, minor excavation, and replacement or upgrading of existing utility connections, which could lead to temporary disruption of essential services including electricity, water supply, sewerage, medical gases, communication systems, and drainage. Such interruptions may affect critical hospital functions such as operation theaters, wards, laboratories, and emergency services if not properly managed.

471. There is also a risk of accidental damage to underground or concealed utilities (e.g., pipelines, cables, or drainage lines), which could result in service outages, safety hazards, or localized flooding/contamination within hospital premises.
472. Impacts are expected to be moderate to high, site-specific, and short-term in nature.

Mitigation Measures

- Hospital administration staff and patients will be informed in advance of any planned utility interruptions, and regular updates will be provided during works to ensure awareness, maintain safety, and minimize disruption to hospital operations.
- Tie-ins, repairs, or service interruptions will be scheduled during off-peak hours or planned maintenance windows to minimize impact on hospital operations.

- All utility works will be performed by qualified and authorized personnel following safety and technical standards.
- Exposed or nearby utility lines will be protected with physical barriers, clear markings, and warning signage during construction activities.
- Backup systems, including generators, water storage, and alternative communication lines, will be maintained to ensure continuity of critical hospital services during planned outages.
- Hospital administration will be immediately notified in case of accidental utility damage to enable rapid restoration.
  All utility works, temporary disruptions, and restoration timelines will be documented for monitoring, reporting, and accountability.

5.6.15 Disposal of Mucking Material

Potential Impact

473. Mucking material will be generated from minor excavation works within existing hospital premises for utility repairs, drainage improvement, foundation adjustments, or small-scale civil rehabilitation.

474. The excavated material will primarily consist of soil, broken concrete, masonry debris, and small quantities of dismantled pipes or pavement. If not properly managed, temporary impacts may include:

- Obstruction of internal hospital access roads or walkways
- Dust generation affecting patients, staff, and visitors
- Visual nuisance within hospital premises
- Potential hygiene concerns if mixed with wastewater or old drainage lines

475. Impacts are expected to be low to moderate, site-specific, and short-term in nature.

Mitigation Measures

- Excavated soil suitable for reuse will be used for backfilling or leveling within hospital premises where feasible.
- Excess or unsuitable material will be promptly removed to approved municipal or licensed disposal sites.
- Temporary stockpiles, if unavoidable, will be placed away from access routes, covered, and regularly watered to control dust and runoff.
- All excavation and waste material will be stored in designated areas within the hospital premises to prevent obstruction and safety hazards.
- Trucks transporting debris will be covered to avoid spillage during transit.
- Records of quantities, storage locations, and disposal will be maintained for monitoring and compliance.
- Hospital staff and administration will be informed of storage locations and disposal schedules to ensure safety and minimal disruption.

- Construction personnel will be trained on safe handling of muck, debris, and minor hazardous materials to prevent contamination or accidents.

5.6.16 Emergency Preparedness and Response

Potential Impact

476. Rehabilitation works under project are small to medium scale but occur within operational hospital facilities. Key potential risks include:

A. Workplace and Fire Emergencies

- Injuries to workers from excavation, working at heights, electrical works, or equipment handling.
- Fire hazards from welding, electrical short circuits, or improper storage of fuels and chemicals.
- Temporary obstruction of hospital access routes affecting ambulances and emergency response.
- Accidental damage to internal utilities (electricity, water, medical gases).
- Exposure of patients, staff, or visitors to unsafe work zones.

B. Natural and Man-Made Disasters

- Earthquakes, floods, or extreme weather events causing injuries, damage to hospital infrastructure, and disruption of healthcare services.
- Accidental incidents (e.g., chemical spills, structural failures) posing health and safety risks to staff, patients, visitors, and workers.

477. Impacts are expected to be high, site-specific, and short-term in nature.

Mitigation Measures

A. Workplace and Fire Emergencies

- A site-specific Health, Safety, and Emergency Response Plan (ERP) will be developed and implemented.
- Risk assessments and job safety analyses will be conducted prior to commencement of works.
- Adequate PPE will be provided and its use will be strictly enforced.
- Workers will be trained on emergency procedures, fire safety, and evacuation protocols.
- Flammable materials will be stored securely in ventilated areas away from patient care zones.
- Fire extinguishers, first aid kits, and clear ambulance and emergency access will be maintained at all times.
- Active work zones will be barricaded and clearly signposted to prevent unauthorized access.

- Utility mapping will be completed prior to excavation to avoid accidental damage.
- Coordination with hospital administration will be maintained for planned outages and emergency drills.
- Backup power and water systems will be utilized to ensure continuity of hospital services.
- Work schedules will be adjusted during extreme weather conditions to ensure safety.
- All incidents, near-misses, and corrective actions will be documented and reported.

B. Natural and Man-Made Disasters

- The ERP will be aligned with local emergency services, fire, and medical authorities to ensure rapid response.
- Periodic simulation drills will be conducted for hospital staff, patients, and contractors to prepare for evacuation and emergency situations.
- Key emergency contact numbers and procedures will be prominently displayed throughout hospital premises and construction zones.
- Hospital staff, contractors, and workers will be trained on disaster response and emergency procedures.
- Incident reporting procedures will be implemented for near-misses and hazards, with prompt corrective actions taken.

478. This comprehensive approach ensures the safety of patients, staff, visitors, and workers, while maintaining uninterrupted healthcare services during hospital rehabilitation works. Detailed ERP procedures are provided in **Annexure-XII.**

5.6.17 Flora and Fauna

479. No significant impacts on flora or fauna are anticipated, as the project is confined to existing hospital premises within an already developed urban or semi-urban environment. Minor temporary impacts on planted vegetation and urban-adapted fauna may occur due to construction activities, dust, noise. Any unavoidable vegetation removal will be compensated through plantation and landscaping using native species to enhance green cover and the overall site environment.

480. Care will be taken to minimize disturbance to urban-adapted fauna, particularly birds and small animals, through controlled construction activities, proper waste management, and restriction of major construction works to daytime hours.

5.6.18 Discovery of Heritage Sites/ Structures during Excavation

Potential Impact

481. Given that the project site is an already developed hospital facility, the likelihood of encountering archaeological resources is very low. However, in the unlikely event of any chance archaeological discovery during limited excavation works, construction activities will be temporarily halted and relevant authorities will be informed in accordance with applicable regulations.

Mitigation Measures

- The Chance-Find Procedure (**Annexure-XIII**) will be followed in case of any discovery of artifacts or culturally sensitive remains.
- Work in the immediate area will be halted, and the site will be secured.
- The contractor will notify the SC, who will coordinate with the relevant archaeology authority for assessment.
- Works will resume only after clearance from the concerned authority.
- Workers will be briefed to identify and report any potential heritage finds.

482. These measures will ensure appropriate handling of rare discoveries with minimal disruption to hospital operations.

5.6.19 Social/ Cultural Conflicts

Potential Impact

483. A limited number of skilled and unskilled workers (approximately 25 per site) will be engaged for the project, with the majority sourced locally or from existing contractor personnel, thereby minimizing labor influx. However, the temporary presence of workers within operational hospital premises may lead to minor social and institutional risks.

484. These include potential disruption due to differences in behavior or cultural practices, minor community safety concerns related to worker movement, and public health risks such as transmission of communicable diseases if hygiene and infection prevention measures are not maintained.

485. Impacts are expected to be low to moderate, site-specific, and short-term in nature.

Mitigation Measures

- Prioritize recruitment of local workers and existing contractor staff to minimize labor influx and reduce potential social tensions.
- Provide induction and training for all workers on local customs, hospital rules, hygiene, infection prevention, and respectful behavior.
- Limit worker movement to designated work areas and restrict entry into sensitive hospital zones to prevent disruption to staff, patients, and visitors.
- Plan and phase construction activities to minimize prolonged presence of workers in high-traffic or sensitive hospital areas.
- Implement hygiene measures, use of hospital sanitation facilities, and regular health screening to reduce risks of communicable disease transmission.
- Maintain accessible channels for hospital staff and visitors to report issues or concerns related to worker behavior or social conflicts.
- Conduct regular oversight to ensure compliance with behavioral standards, site rules, and health protocols, with corrective actions applied as needed.

5.6.20 GBV, Child Labour and Forced Labour

Potential Impact

486. Although labor influx is limited, there remains a risk of inappropriate worker conduct, including harassment or gender-based violence (GBV), which may affect hospital staff, patients, or visitors, particularly women and vulnerable groups. There is also a likelihood of child labor engagement, forced labour or other non-compliance with labor regulations, which could result in reputational and legal implications.

487. Impacts are expected to be moderate to high, site-specific, and short-term in nature.

Mitigation Measures

- Contractors will comply with national labor laws, including prohibition of child labor (<15 years) and restrictions on hazardous work for adolescents, and all bidding documents will reflect these requirements.
- Workers will sign an individual Code of Conduct (CoC) prior to deployment, and contractors will enforce CoCs addressing gender-based violence (GBV), sexual exploitation and abuse (SEA), and sexual harassment (SH).
- Mandatory induction and periodic training will be provided on professional behavior, gender sensitivity, GBV prevention, and consequences of violations.
- Access to sensitive hospital areas will be controlled to prevent unauthorized entry by workers.
- A confidential GRM will be established, including female-friendly reporting channels within hospital settings, for staff, patients, and community members.
- Contractors will prioritize hiring local adult labor to minimize labor influx risks.
- Non-compliance with CoC or labor provisions will result in penalties, suspension, or contract termination.
- Regular supervision and monitoring will be conducted to ensure adherence to CoCs and corrective actions applied as needed.

5.7 ANTICIPATED IMPACTS DURING OPERATIONAL PHASE

488. During the operational phase of the KPHSSP hospital revamp, improvements in management, and service delivery are expected. However, certain environmental and social impacts may arise during operation. The anticipated negative impacts and their corresponding mitigation measures are presented in the following sections to ensure regulatory compliance and effective environmental management.

5.7.1 Water Supply & Usage

Potential Impact

489. Hospital operations require substantial water for patient care, sanitation, HVAC systems, cleaning, and other daily activities. Overuse or inefficient water management can strain local water resources, reduce availability for surrounding communities, and increase operational costs. Improper storage or handling may also risk contamination of potable water supplies. Impacts are expected to be moderate, site-specific, and long-term in nature.

Mitigation Measures:

- Water-efficient fixtures, taps, and appliances will be installed.
- Regular maintenance of plumbing systems will be conducted to prevent leaks and wastage.
- Potable and non-potable water systems will be kept separate and secure to prevent contamination.
- Periodic monitoring of water consumption, supply pressures, and water quality will be carried out to ensure adequacy and early detection of contamination.
- Awareness measures, including signage and staff orientation, will be implemented to promote water conservation among hospital staff and visitors.

5.7.2 Wastewater and Sewage

Potential Impact

490. Hospitals operations will generate municipal and biomedical effluent that, if improperly treated or discharged, may contaminate soil, groundwater, or receiving water bodies. Chemical, biological, and pharmaceutical constituents in effluents may harm aquatic ecosystems and public health. Impacts are expected to be high, site-specific, and long-term in nature.

Mitigation Measures:

- On-site pretreatment systems for medical and laboratory wastewater will be installed and operated prior to discharge.
- Wastewater streams will be segregated at source into domestic (sanitary) and medical/laboratory effluents. Domestic sewage will be discharged into municipal sewers, while medical and laboratory effluents will be pretreated prior to safe disposal.
- Wastewater quality will be regularly monitored to ensure compliance with NEQS and IFC standards.
- Staff will be trained on proper handling, segregation, and disposal of wastewater to maintain hygiene and safety.
- Plumbing and treatment systems will be periodically maintained to prevent leaks, blockages, and contamination.

5.7.3 Solid Waste Generation

Potential Impact

491. Hospital operations generate various categories of solid waste, including infectious and pathological waste, sharps, pharmaceutical waste, chemical waste, general domestic refuse, and packaging materials. Inadequate segregation, handling, storage, or disposal may result in environmental contamination, occupational health risks, vector breeding, and potential public health impacts on surrounding communities. Impacts are expected to be high, site-specific, and long-term in nature.

Mitigation Measures:

- Waste will be segregated at source into infectious, hazardous, and general waste streams in accordance with Hospital Waste Management Rules, 2005.
- Color-coded, labeled, and covered containers will be provided for safe temporary storage in designated areas.
- Waste will be collected regularly and disposed of through licensed medical and municipal waste contractors, with separate handling for hazardous and general waste.
- Hospital staff will be trained periodically on proper waste segregation, handling, and emergency response procedures.
- A Hospital Waste Management Plan will be implemented and maintained in line with Hospital Waste Management Rules, 2005 and WHO guidelines, including record-keeping and monitoring.
- Existing deficiencies in healthcare waste management will be addressed through implementation of the CAP (Section 9.13)

5.7.4 Energy Consumption and Air Quality

Potential Impact

492. Hospital operations including lighting, HVAC systems, diagnostic and life-support equipment create high electricity demand. Power outages or unreliable supply can disrupt critical services, especially in ICUs, operating theaters, and laboratories. Backup generators may be needed during outages, which can emit pollutants affecting indoor and outdoor air quality. Energy use also contributes to the hospital's overall environmental footprint. Impacts are expected to be moderate to high, site-specific, and long-term in nature.

Mitigation Measures:

- Energy-efficient lighting, HVAC systems, and medical equipment will be implemented to optimize electricity consumption.
- Backup generators will be installed in properly ventilated enclosures with automatic switchover, and will be regularly maintained to ensure operational readiness.
- Solar photovoltaic panels and other renewable energy sources will be integrated, where feasible, to support critical units and reduce reliance on fossil fuels.
- Energy consumption will be monitored, and HVAC and lighting operations will be optimized to minimize energy use.
- Air quality near generator exhausts and ventilation intakes will be periodically monitored to ensure compliance with environmental and occupational standards.
- Records of generator operation, maintenance, and emissions will be maintained as part of the EMP.

5.7.5 Noise Pollution

Potential Impact

493. Hospital operations may generate noise from medical equipment, backup generators, ambulance movements, and general operational activities. Elevated noise levels may

adversely affect patient recovery, staff performance, and nearby residential receptors if not properly managed. Impacts are expected to be moderate, site-specific, and long-term in nature.

Mitigation Measures:

- Regular maintenance and proper operation of medical equipment and generators will be ensured to minimize noise emissions.
- Soundproofing materials and acoustic enclosures will be installed in sensitive areas such as ICUs, operating theaters, and generator rooms.
- Generators will be located in designated areas with appropriate noise attenuation measures.
- Non-essential high-noise activities will be scheduled during daytime hours where feasible.
- Hospital staff will be trained and encouraged to implement noise minimization practices throughout the premises.

5.7.6 Traffic and Accessibility

Potential Impact

494. Increased movement of patients, visitors, ambulances, and service vehicles may result in traffic congestion near hospital entrances, delays in emergency response, and elevated road safety risks for pedestrians and motorists. Impacts are expected to be moderate to high, site-specific, and long-term in nature.

Mitigation Measures:

- Clearly designated entry and exit points will be established, with organized parking to streamline vehicle movement.
- Coordination with local traffic authorities will ensure smooth traffic flow and unobstructed emergency access.
- Adequate signage, road markings, and designated pedestrian pathways will be provided to enhance safety.
- Separate routes and loading areas will be maintained for service and supply vehicles to prevent interference with patient and visitor traffic.
- Clear access corridors for ambulances and emergency vehicles will be maintained at all times.

5.7.7 Patient and Staff Safety

Potential Impact

495. Hospital operations present occupational and public safety risks, including exposure to infectious and biohazardous materials; electrical hazards; fire risks; slips, trips, and falls; and equipment-related accidents. Vulnerable groups such as children, elderly patients, pregnant women, and individuals with limited mobility may be particularly susceptible to injury. Impacts are expected to be moderate to high, site-specific, and long-term in nature.

Mitigation Measures:

- Conduct regular safety inspections, risk assessments, and hazard audits across all hospital facilities.
- Install and maintain clear safety signage, handrails, non-slip flooring, adequate lighting, and emergency illumination systems.
- Implement fire safety systems, including alarms, extinguishers, and evacuation procedures, and test them periodically.
- Provide ongoing training to staff on OHS, IPC, and emergency response protocols.
- Ensure PPE is available and correctly used by staff handling biohazardous or hazardous materials.
- Maintain robust incident reporting and corrective action procedures.
- Existing gaps in fire safety preparedness will be addressed through CAP actions related to emergency response planning, training, and periodic drills.

5.7.8 Infection Control and Public Health

Potential Impact

496. Hospital environments are inherently susceptible to communicable disease transmission. Inadequate hygiene practices, overcrowding, poor ventilation, or improper handling of infectious materials may increase the risk of healthcare-associated infections (HAIs) among patients, staff, and visitors. Impacts are expected to be high, site-specific, and long-term in nature.

Mitigation Measures:

- Comprehensive IPC protocols will be implemented and enforced in accordance with WHO and national health guidelines.
- Routine cleaning, disinfection, and sterilization of medical instruments, high-touch surfaces, and patient care areas will be carried out.
- Ventilation systems, including upgraded HVAC units, will be maintained fully functional, particularly in wards, operating theaters, ICUs, and isolation rooms.
- Dedicated isolation facilities for infectious patients will be provided to prevent cross-contamination.
- Regular staff training on IPC practices, hand hygiene, and proper use of PPE will be conducted, with continuous compliance monitoring.
- Public health awareness among patients and visitors will be promoted through clear signage and informational materials.

5.7.9 Environmental and Community Impacts

Potential Impact

497. Improper operational practices, such as uncontrolled waste disposal, excessive energy or water use, and traffic congestion, can indirectly affect the surrounding community's environment and quality of life.

498. Hospital operation may attract informal services (food vendors, parking attendants), which could increase local congestion, littering, or minor social conflicts. Impacts are expected to be moderate, site-specific, and long-term in nature.

Mitigation Measures:

- Continuous monitoring of water, waste, air, and noise parameters will be carried out.
- Community engagement and a GRM will be maintained for timely resolution of complaints.
- Sustainable hospital management practices will be adopted to minimize negative impacts.
- Informal vendor activities around the hospital will be regulated and monitored.
- Designated service areas for vendors will be provided.
- Local communities will be engaged in awareness programs about hospital operation norms.

5.7.10 Noise and Odor from pretreatment of Medical Waste

Potential Impact

499. Operation of on-site medical waste management activities, including autoclaving, laundry, and sterilization units, may generate localized noise and occasional odors. If not adequately controlled, these may affect hospital staff, patients, and nearby sensitive receptors. Impacts are expected to be low to moderate, site-specific, and long-term in nature.

Mitigation Measures:

- Enclosed and properly ventilated treatment and sterilization units will be installed to minimize noise and odor emissions.
- Adequate spatial separation shall be maintained between noise-generating facilities and sensitive areas such as wards and ICUs will be appropriately sited away from patient wards, where feasible.
- Regular inspection and preventive maintenance of equipment will be conducted to reduce operational noise and fugitive emissions.
- Non-essential high-noise activities will be scheduled during daytime hours, where practicable.
- Operational performance will be monitored to ensure compliance with applicable environmental standards and hospital waste management procedures.

5.7.11 Staff and Visitor Traffic Management

Potential Impact

500. Congestion at parking areas, ambulance bays, and main entrances can lead to delays, stress, and increased risk of accidents, especially during emergencies. Impacts are expected to be moderate to high, site-specific, and long-term in nature.

Mitigation Measures:

- Clear drop-off and pick-up zones will be defined.
- Signage will be provided, and traffic management personnel will be deployed to regulate flow.
- Separate access routes for emergency vehicles, staff, and visitors will be established to reduce conflicts.

5.7.12 Emergency Preparedness and Disaster Management

A. Natural Disasters

Potential Impact

501. Natural disasters such as earthquakes or floods may cause structural damage, injuries, and operational disruptions. Impacts are expected to be high, site-specific, and long-term in nature.

Mitigation Measures:

- Compliance with the Seismic Building Code of Pakistan (SBC-2021) will be ensured.
- An Emergency Response Plan (ERP) will be implemented, with staff training and periodic drills conducted.
- Emergency equipment and contact numbers will be clearly displayed.
- Minor incidents and near-misses will be logged to inform preventive measures.

B. Fire Safety

Potential Impact

502. Fires due to electrical faults, flammable chemicals, or oxygen cylinders may threaten patients, staff, and nearby communities. Impacts are expected to be high, site-specific, and long-term in nature.

Mitigation Measures:

- Comprehensive fire detection and suppression systems will be installed and maintained.
- Fire drills and emergency evacuation plans for staff and patients will be conducted regularly.
- Flammable materials will be stored and handled safely.
- Clear signage for fire exits and emergency routes will be provided.

5.7.13 Climate Change Impacts

503. The hospitals are located across districts with diverse topographic and climatic conditions and are exposed to varying climate change and disaster-related hazards. The hospitals in Battagram, Mansehra, Shangla, and Dassu (Upper Kohistan) are particularly

vulnerable to intense rainfall, flash floods, landslides, slope instability, and disruption of road access, while Chitral is exposed to extreme temperatures, heavy precipitation, flash floods, landslides, and, in higher-altitude areas, glacial lake outburst flood (GLOF) and snow-related hazards. The hospital in Batkhela, Malakand may be affected by extreme heat, intense rainfall, flash flooding, landslides, and windstorms, whereas Mardan and Saidu Sharif are vulnerable to extreme heat, intense rainfall, localized and riverine flooding, and associated water and vector-borne disease risks. The hospitals in Lakki Marwat and Tank are comparatively more exposed to extreme heat, prolonged dry periods, drought, water scarcity, and dust storms, with intense rainfall and flash flooding also posing episodic risks. These climate-related hazards may damage hospital buildings and critical infrastructure, disrupt access and essential utilities including electricity, water supply, sanitation, drainage, and communications, and affect the reliability and operation of medical equipment. Flooding, landslides, and extreme weather may restrict the movement of patients, staff, emergency vehicles, and medical supplies, while heatwaves, water shortages, and deteriorating environmental conditions may increase pressure on healthcare services and contribute to heat-related illnesses, infectious and vector-borne diseases, and other climate-sensitive health conditions. Such hazards may also disrupt the supply of medicines and medical consumables and compromise the continuity of essential healthcare services, particularly emergency and critical care. The overall climate change impacts are expected to be moderate to high, site-specific, and potentially long-term, with the level of exposure varying according to the location, elevation, terrain, drainage conditions, and resilience of individual hospital facilities.

Mitigation Measures:

504. The proposed design incorporates climate-resilient measures, including improved drainage and flood protection, energy-efficient HVAC and lighting, rooftop solar PV with backup power, adequate water storage and filtration, and strengthened emergency preparedness. In landslide-prone areas, appropriate site protection and slope stabilization measures will be provided where required to enhance hospital resilience and continuity of essential healthcare services.

6 ANALYSIS OF THE ALTERNATIVES

505. This section presents an analysis of project alternatives considered during planning and design of the KPHSSP, including the 'no-project' option. The comparison covers environmental and social considerations to identify the most environmentally feasible and socially acceptable option. The analysis ensures that the selected alternative minimizes adverse impacts while maximizing project benefits in terms of improved healthcare delivery and infrastructure.

506. The alternatives considered during the study are as follows:'

- No Project Option;
- Revamp of Existing Healthcare Infrastructure (Parallel multi sites vs. Phased Implementation); and
- Energy Alternative (Grid vs. Solar Integration)

6.1 NO PROJECT OPTION (NPO)

507. Under the "no project" scenario, the proposed interventions under KPHSSP, including revamping and upgrading of healthcare facilities, would not be implemented. Consequently, the existing conditions of public health facilities across Khyber Pakhtunkhwa would persist and are likely to deteriorate further over time. The healthcare system currently faces several infrastructural and environmental challenges, including:

- Aging and poorly maintained hospital buildings with inadequate ventilation, space constraints, and structural deficiencies.
- Inefficient water supply and lack of proper wastewater management systems, leading to sanitation issues.
- Inadequate healthcare waste management practices, posing risks to public health and the environment.
- Overcrowded facilities and limited service capacity affecting quality of care.
- Poor indoor air quality and outdated ventilation systems increasing infection risks.
- High energy consumption due to inefficient electrical systems and reliance on conventional energy sources.
- Lack of climate-resilient infrastructure, making facilities vulnerable to extreme weather events.

508. While this option avoids short-term construction-related impacts such as dust, noise, and temporary disruptions, it fails to address critical deficiencies. Environmental conditions and healthcare service delivery are expected to worsen over time, making the "no project" option unappealing.

6.2 WITH PROJECT OPTION

509. Implementation of KPHSSP through revamping of existing healthcare facilities will result in short term environmental and social impacts however will significantly improve environmental and social conditions of the health facilities.

- Temporary impacts such as dust, noise, and emissions during construction will occur but can be effectively mitigated.
- Improved water supply, sanitation, and wastewater systems will enhance hygiene conditions.
- Proper healthcare waste management systems will reduce environmental contamination and health risks.
- Upgraded ventilation and facility design will improve indoor air quality and infection control.
- Energy-efficient systems will reduce energy consumption and operational costs.
- Improved infrastructure will enhance patient care, accessibility, and service delivery.
- Climate-resilient features will strengthen the ability of facilities to withstand extreme weather conditions.

510. Hence, despite short-term impacts, the project will lead to long-term environmental sustainability and improved healthcare outcomes.

6.2.1 Alternative I- Full Implementation (Simultaneous Construction at 30 Sites)

511. Alternative revamp and construction activities will be carried out simultaneously across all 30 healthcare facilities under KPHSSP.

- Construction-related impacts such as dust, noise, waste generation, and emissions will occur simultaneously at multiple locations, increasing cumulative environmental pressure.
- Resource consumption (materials, water and energy) will be high and concentrated over a shorter duration.
- However, simultaneous construction may lead to significant disruption in healthcare services, affecting patient care and hospital operations across KP.
- Environmental management and monitoring may become challenging due to the scale and concurrency of activities. While this option provides fast-track improvements across KP, it involves higher environmental intensity and operational risks.

512. While this option provides fast-track improvements across KP, it involves higher operational risks.

6.2.2 Alternative II- Phased Implementation Option

513. Under the phased implementation scenario, revamping works will be executed in stages across the 30 healthcare facilities.

- Construction impacts such as dust, noise, and emissions will be localized and spread over time, making them easier to manage.
- Resource utilization will be distributed, reducing peak environmental stress.

- Environmental improvements such as better sanitation, waste management, and air quality will be achieved progressively.
- Healthcare services will remain operational with minimal disruption, as only selected facilities or sections are upgraded at a time.
- Lessons learned in earlier phases can be applied to improve environmental performance in later stages.
- Overall system resilience and environmental benefits will increase gradually.

514. This option provides a balanced approach, reducing environmental and operational risks while ensuring steady improvements.

6.3 ENERGY ALTERNATIVES

6.3.1 Alternative I-Conventional Grid-Based System backed up by Generators

515. The conventional approach relies primarily on grid electricity, supported by diesel generators during outages. While widely used, this system has several limitations:

- Continued reliance on grid electricity and diesel generators, which are subject to supply interruptions.
- Higher greenhouse gas emissions and air pollutants, contributing to environmental degradation.
- Increased noise generated from generators
- Increased operational costs due to energy inefficiency and fuel consumption.
- Vulnerability to power outages, which can disrupt critical healthcare services.

516. Overall, this option provides a familiar energy supply but is less sustainable and less reliable, especially for critical hospital operations.

6.3.2 Alternative II- Solar Energy Integration (Preferred Option)

517. Integrating solar energy with the existing grid enhances both environmental sustainability and energy resilience of healthcare facilities. Key benefits include:

- Installation of rooftop solar photovoltaic (PV) systems integrated with grid supply, allowing hospitals to generate clean energy onsite.
- Reduction in greenhouse gas emissions and dependence on fossil fuels, improving environmental performance.
- Improved energy efficiency and long-term cost savings, as solar power reduces fuel and electricity expenses.
- Enhanced reliability of power supply, particularly for critical hospital operations during outages.
- Minimal environmental impact after installation, as solar systems operate silently and without emissions.

518. By combining solar energy with the grid, hospitals can maintain uninterrupted operations while significantly reducing their carbon footprint and operational costs.

Table 6.1: Comparison of Alternatives

Aspect	No Project	Option 1		Option 2	
		Full Implementation (30 Sites Simultaneously)	**Phased Implementation**	**Conventional Grid + Generators**	**Solar Energy Integration**
Air & Noise	Continued deterioration	High, cumulative impacts at all sites	Localized, manageable impacts	High localized impacts	Slightly lower due to reduced generator runtime
Water & Sanitation	Poor conditions persist	Rapid improvement across all sites	Gradual improvement	No direct change	No direct change
Healthcare Waste	Unsafe practices continue	Immediate system-wide improvement	Progressive improvement	Not affected directly	Not affected directly
Energy Use & Emissions	High and inefficient	High initial demand	Gradual efficiency improvement	High demand; reliance on fossil fuels	Lower emissions; renewable contribution reduces fossil fuel use
Resource Consumption	No change but current use is inefficient	High, concentrated demand	Distributed demand	High fuel and electricity use	Reduced fossil fuel use; improved efficiency
Public Health	Poor outcomes persist	Rapid improvement	Gradual improvement	Not affected directly	Not affected directly
Operational Impact	No disruption but compromised service	Simultaneous disruption across all facilities	Minimal disruption	Vulnerable to outages	Improved reliability for critical loads
Environmental Management	Not applicable	Difficult due to scale	Easier and more effective	Challenging due to generator use	Slightly easier with reduced emissions
Cost & Feasibility	No cost, worsening conditions	High upfront cost	Distributed, manageable cost	Lower initial cost but higher operational cost	Higher upfront cost but long-term savings
Overall Outcome	Deterioration	Fast but disruptive	Balanced and sustainable	Energy supply less sustainable	Energy supply reliable and environmentally sustainable

6.3.3 Selected Option: Phased Implementation

519. The phased implementation approach combined with solar energy integration has been selected as the most feasible and sustainable option for KPHSSP.

520. While simultaneous implementation across all 30 sites offers rapid benefits, it poses significant environmental management challenges, high resource demand, and disruption to healthcare services. The no project option is not viable due to continued deterioration of infrastructure and environmental conditions.

521. The selected approach ensures that:

- Environmental impacts are minimized and effectively managed
- Healthcare services remain operational during implementation
- Costs are distributed over time, improving financial feasibility
- Energy efficiency and sustainability are enhanced through solar integration
- Environmental and social benefits are progressively realized
- Implementation is adaptive and responsive to lessons learned

522. Thus, this approach represents a balanced, practical, and environmentally sustainable solution, aligned with the objectives of KPHSSP.

7 INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

7.1 CONSULTATION, PARTICIPATION AND INFORMATION DISCLOSURE STRATEGY (CPID)

523. Consultations, participation, and information disclosure (CPID) are an integral part of project planning and implementation strategy for the hospital revamp project. CPID is an ongoing process that: (i) begins at the project preparation stage and continues throughout the project cycle; (ii) ensures timely disclosure of relevant and adequate information in a manner that is easily accessible and understandable to all stakeholders, including hospital staff, patients, attendants, workers, and nearby communities; (iii) enables the documentation and addressing of stakeholder concerns; (iv) is conducted in an inclusive, transparent, and gender-responsive manner, free of intimidation or coercion, and tailored to the needs of vulnerable groups; and (v) facilitates the incorporation of stakeholder feedback into decision-making, including construction planning, mitigation of disruptions, health and safety measures, and overall project implementation. Consultations are carried out in a manner appropriate to the hospital environment and the nature of project activities.

524. As part of CPID, meaningful consultations were carried out with hospital administration, healthcare staff, patients and attendants, workers, and other key stakeholders during preliminary assessments and project planning. Project-specific stakeholders were identified through initial social and environmental assessments, stakeholder consultations, and interactions conducted through meetings, focused discussions, and key informant interviews to capture their views, concerns, and recommendations. These consultations focused on minimizing disruption to hospital services, ensuring patient and worker safety, and improving overall implementation arrangements. The feedback and recommended actions have been incorporated into the project design and implementation planning.

7.2 STAKEHOLDER CONSULTATIONS DURING PROJECT PROCESSING PHASE

525. The main project stakeholders identified include hospital administration, healthcare staff (doctors, nurses, and support staff), patients and their attendants, project workers, and nearby communities. Other stakeholders include relevant government departments involved in health services and project oversight. These stakeholders have varying levels of interest and involvement in the project, particularly in relation to continuity of healthcare services, safety, access, and overall facility operations during the rehabilitation works. The consultant engaged with these stakeholders to understand their views, concerns, and suggestions regarding project implementation and incorporated their feedback into planning and execution arrangements.

7.3 APPROACH FOR THE CONSULTATION AND INFORMATION DISSEMINATED

526. Public information dissemination and consultations were carried out during the project preparation stage through meetings, focused discussions, key informant interviews, and individual consultations. The consultation process was aimed at engaging all relevant stakeholders and ensuring that hospital administration, medical staff, patients and attendants, workers, and nearby communities were informed in advance, consulted, and given the opportunity to participate during project planning and implementation. This process helped explain the project objectives and scope, address concerns related to service continuity, access, safety, and construction-related disturbances, and reduce uncertainties among stakeholders. The following approaches were used to carry out the consultation process:

- Consultative meetings with hospital administration and relevant stakeholders
- Discussions with hospital staff.
- Focus group discussions with patients, attendants, and workers
- Key informant interviews with hospital management and project personnel

527. The public consultation and information disclosure sessions were carried out to inform hospital stakeholders including administration, staff, patients, attendants, workers, and nearby communities about the project objectives, planned construction/rehabilitation activities, potential impacts, health and safety measures, service disruptions, and available grievance redress mechanisms, and to record their concerns and views. The following issues were discussed and disclosed during the consultation meetings:

- Introduction of the hospital revamp project, its components, activities, and expected outcomes
- Schedule and sequencing of construction and renovation works
- Potential impacts on hospital operations, patients, staff, and visitors
- Measures to ensure continuity of healthcare services during construction
- Occupational health, safety, and environmental management provisions
- Access and mobility arrangements for patients, staff, and visitors
- Communication and coordination mechanisms during project implementation
- Grievance redress procedures and contact points for raising concerns
- Feedback and suggestions from stakeholders regarding mitigation of disruptions and improvement of project implementation

7.4 DEPARTMENTAL CONSULTATIONS

528. The consultation were held at departmental level, the details of officials contacted are given in **Table 7.1** below:

Table 7.1: List of Government Officials Consulted

Sr. No.	Date	Name of Department/ Office	Name of Person	Designation
Department Consultations				
1.	16-02-26	Environmental Protection Agency Khyber Pakhtunkhwa	Ramzan Ali	Inspector Headquarter
			Muhammad Fawad Ghauri	Monitoring Inspector

Sr. No.	Date	Name of Department/ Office	Name of Person	Designation
			Bilawal Bilal	Monitoring Inspector
2.	16-02-26	Culture, Tourism, Archaeology & Museums Department Khyber Pakhtunkhwa	Syed Shoaib Gillani	Chief Planning Officer
3.	16-02-26	Khyber Pakhtunkhwa Wildlife Department	Akhal Ali Sehad Badsha	Super Intended Wildlife
			Mohsin Farooque	Chief Consevator Wildlife
			Nafeez Zafar	Assistant Technical
4.	16-02-26	Khyber Pakhtunkhwa Forest Department	Ahmad Jalil	Chief Conservator of Forest
			Fawad Khalil	Director Headquarter
			Zubair Ali	Senior Director
			Muhammad Ilias	Director
5.	17-02-26	Water and Sanitation Services Peshawar	Muhammad Ijaz	Manager Water Supply and Waste Water Management
			Zalmeer Ul Hussan	GM Planning
6.	18-02-26	Local Government, Elections and Rural Government Department	Siraj Muneer	Senior Chief Planning Officer
7.	18-02-26	Irrigation Department Khyber Pakhtunkhwa	Mustajab Khan	Subdivisional Officer of Peshawar
			Shireen Khan	Executive Engineer
8.	19-02-26	Khyber Pakhtunkhwa Health Care Commission	Dr. Shafaq Haider	Director Registration

7.4.1 Consultations with Departments

529. Meetings and consultations were held with officials of relevant government departments, hospital management authorities, and other key institutions. The following points were discussed to provide information about the hospital revamp project:

- Location and scope of the hospital project
- Objectives and expected outcomes of the revamp
- Potential impacts on hospital operations, patient care, and staff work and access
- Measures to ensure continuity of healthcare services during construction
- Roles and responsibilities of different departments, hospital units, and external service providers
- Existing services provided at the hospital and surrounding areas, and any anticipated disruptions
- Coordination mechanisms for smooth project implementation

530. During the meetings, the officials expressed their full cooperation for the hospital revamp project and provided valuable feedback to support effective planning and implementation.

7.4.2 Views & Suggestions of the Officials of Departments

531. The responses of the participants during departmental consultations on the hospital revamp project were recorded. Overall, the officials from relevant government departments expressed that the project is expected to have a positive impact on hospital operations, patient care, and service delivery. They also provided suggestions to improve coordination between departments, ensure continuity of essential services during construction, and address safety, access, and operational issues. The key feedback and recommendations from these departmental consultations are summarized in **Table 7.2**

Table 7.2: Detail of Issues/Points Raised/Discussed during Departmental Consultations

Sr. No.	Department/ Organization	Stakeholder Views/Concerns
1.	Environmental Protection Agency Khyber Pakhtunkhwa	• Emphasis was put on implementation of proper waste disposal methods. • It was suggested to incorporate: • Killer tanks for pathological waste and; • OT Tanks-carsolex for chemical sterilization of floors and equipment. • Peshawar Institute of Cardiology was cited as a standard for international hospital qualifications • Audits will be required for hospitals made before 1997, which contain over 100 beds. However, this will be considered a separate case and will follow a separate report structure.
2.	Culture, Tourism, Archaeology & Museums Department Khyber Pakhtunkhwa	• The hospitals have a positive correlation with tourist rates and surrounding hotel occupancy. • Better hospitals will provide better and higher quality services to tourists who fall ill. • No archeological sites are known to be located any of the listed hospital premises.
3.	Khyber Pakhtunkhwa Wildlife Department	• No protected areas or species are currently known to be present on the listed hospital premises.
4.	Khyber Pakhtunkhwa Forest Department	• No protected areas or species are currently known to be present on the listed hospital premises.
5.	Khyber Pakhtunkhwa Fisheries Department	• No protected areas or species are currently known to be present on the listed hospital premises.
6.	Water and Sanitation Services Peshawar	• Concerns were expressed over hazardous solid and water waste being mixed in municipal waste without being segregated. • It is recommended that water providers sign a MOU with the relevant hospitals. • Hazardous and municipal waste must be segregated before dumping. Lack of separation will result in direct infection of scavengers at the dumping sites. • Incinerators are recommended to be installed on the hospital premises. • Liquid waste must be catered to with preliminary treatment on the hospital premises before being mixed with municipal liquid waste. • The hospitals are required to sign MOU's with relevant private or government bodies to assist in segregation and hazardous waste disposal.

Sr. No.	Department/ Organization	Stakeholder Views/Concerns
		• KPEPA and KPHCC was cited as suggested bodies to ensure compliance and implementation. • KP Water Authority is also recommended to look into proper disposal of liquid waste however reservations are stated as the relevant body is only existent on paper and has no current office.
7.	Local Government, Elections and Rural Government Department	• Meetings will be held to see if mitigation levels are possible and at what capacity.
8.	Irrigation Department Khyber Pakhtunkhwa	• Concerns were expressed over hazardous solid and water waste being infiltrated into irrigation water without being treated. • Sewage treatment of such waste is not available resulting in a big sanitation issue. • This will affect over 25 million people. • Due to lack of sanitation plants sewage will be dumped from one drain to another. • Installation of septic tanks is emphasised.
9.	Khyber Pakhtunkhwa Health Care Commission	• Follow international indicators and adhere to corridors. • As the facilities are horizontally laid out on the building site, the ICU,CCU and OR should be located near each other, preferably a separate section for each with a maximum of four beds per room. • Double glasses windows should be installed to ensure proper cooling of rooms and to aid in conservation of energy.

532. **Plate 7-1** shows the pictorial view of departmental consultation meetings held in the project area.

Photo Log of Department Consultations



Irrigation Department Khyber Pakhtunkhwa



Local Government, Elections and Rural Development Department



Water and Sanitation Services Peshawar



Khyber Pakhtunkhwa Wildlife Department



Environmental Protection Agency Khyber Pakhtunkhwa



Culture, Tourism, Archaeology & Museums Department Khyber Pakhtunkhwa



Khyber Pakhtunkhwa Fisheries Department

7.5 PUBLIC CONSULTATION AND PARTICIPATION PROCESS

533. For ascertaining the perceptions of different stakeholders about the project (during/ after construction) meetings were held within the project area of influence. These meetings were held in an open atmosphere, in which participants expressed their views freely. Informal group discussions were also held as an additional tool for the assessment of the perceptions of the stakeholders about the project and potential impacts both positive and adverse likely to occur due to its implementation.

7.5.1 Methods of Public Consultation

534. The following methods were used for public consultation with project stakeholders in order to ascertain their stakes regarding project implementation. Consultations were conducted at appropriate locations within and around the project hospitals to ensure effective stakeholder participation. The views of the beneficiaries were formally recorded through;

- Formal Group Meetings
- Informal Group Meetings
- Individual meetings

7.5.2 Consultations with Hospital Staff, Patients, Attendants and Nearby Community

535. Stakeholder consultations were conducted across the project area to understand the views, concerns, and expectations of the communities and hospital users, and to incorporate their feedback into the project planning process. A total of eleven (11) consultative meetings were held in the study area, with the participation of 101 respondents representing different groups. The consultations were conducted at the hospitals given in **Table 7.3**. The consultations included representatives from different stakeholder groups including patients, attendants, community members and Hospital staff to ensure that a broad range of perspectives was captured.

536. Lists of consultation participants are attached as **Annex- XIV**

Table 7.3: **Consultation Participants at each location**

Sr. No.	Hospital Name	Consultation Dates	Consultation Participants
1	DHQ Saidu Sharif	16-04-26	16
2	DHQ Batkhela	17-04-26	12
3	DHQ Battagram	05-05-26	9
4	DHQ Chitral	25-04-26	7
5	DHQ Kohistan	07-05-26	7
6	DHQ Lakki Marwat	22-04-26	8
7	DHQ Mansehra	18-04-26	9
8	DHQ Shangla	27-04-26	7
9	DHQ Tank	20-04-26	9
10	DHQ Mardan	16-04-26	12
11	DHQ Hangu	12-08-26	5
		Total	**101**

7.5.3 Stakeholders and their apprehensions

537. During the consultations, participants shared their concerns, expectations, and suggestions regarding the proposed project. These discussions provided valuable insights into the anticipated project impacts and informed the identification of appropriate mitigation and enhancement measures. **Plate 7-2** presents photographs of the consultation meetings conducted at the project hospitals, while **Table 7.4** summarizes the major concerns and apprehensions raised by the stakeholders.

538. Overall, the majority of respondents expressed a positive perception of the proposed project and considered it beneficial for the health sector. They anticipated that the project would enhance healthcare facilities, improve hygiene and sanitation conditions, and strengthen the overall quality of healthcare services. Respondents also expected the project to generate indirect socioeconomic benefits, including employment opportunities for local communities during construction and operation, leading to increased household incomes and contributing to poverty reduction.

Table 7.4: Major Concerns and suggestions of the respondents in the Project Area

Concerns	Response
• Hospital services and patient care will be disturbed to during construction. • Noise, dust, and vibration will adversely affect patients, attendants, and hospital staff and hospital machinery. • Health and safety risks to patients, visitors, and hospital staff. • Employment opportunity for local community shall be preference • Timely completion of construction works shall be carried out. • Disruption to hospital access, including delays in ambulance movement and emergency response due to construction activities may be observed.	• Appropriate measures will be taken in coordination with the hospital administration to ensure continuity of healthcare services to ensure continuity of hospital services. • Appropriate mitigation measures, including dust suppression, noise and vibration control, and scheduling of high-impact activities during off-peak hours, will be implemented. • Sensitive hospital areas and equipment will be protected throughout the construction period. • Construction areas will be barricaded, warning signage installed, and all activities carried out in accordance with good management practices. • The contractor will be encouraged to give preference to qualified local workers, where feasible, in accordance with project requirements and applicable labor laws.

Concerns	Response
• Improper handling and disposal of construction and demolition waste may affect hospital hygiene, safety, and the surrounding environment. • Inadequate water supply, safe drinking water, sanitation, and hygiene (WASH) facilities within the hospital. • Inadequate safety, security, privacy, lighting, and wayfinding within the hospital, particularly for female staff, patients, attendants, and visitors • Inadequate gender-responsive facilities, including separate washrooms, rest areas, waiting spaces, and lactation rooms for female staff, patients, and attendants. Limited accessibility and convenience of hospital facilities for women and other vulnerable groups, including pregnant women, the elderly, and persons with disabilities.	• A detailed construction schedule will be followed to ensure timely completion of works while minimizing disruption to hospital operations. • Uninterrupted access for patients, visitors, ambulances, and emergency vehicles will be maintained throughout the construction period. • Proper collection, storage, transportation, and disposal of waste at approved disposal sites will be ensured to ensure • Water supply and sanitation services will be maintained throughout the construction period. Any temporary disruption will be minimized, and damaged utilities will be restored promptly by the contractor. • The project will provide or upgrade gender-responsive facilities, including separate washrooms, waiting and rest areas, and lactation rooms, wherever included within the approved project scope and design. • The project will improve water supply and WASH infrastructure, including the provision of safe drinking water and adequate sanitation facilities, in accordance with the approved design and hospital requirements. The project will incorporate appropriate lighting, safety and security measures, privacy provisions, and clear signage to improve the safety and comfort of hospital users, particularly women and other vulnerable groups. • Universal accessibility principles will be incorporated into the hospital design, including barrier-free access and user-friendly facilities for women, older persons, pregnant women, and persons with disabilities, wherever feasible and within the project scope.

539. In general, the consulted respondents considered the project beneficial for the health sector, particularly in terms of improved healthcare facilities and hygienic conditions. Indirect benefits identified by respondents include increased local employment opportunities, improved household incomes, and potential poverty reduction. However, awareness of the proposed project among surveyed respondents was generally low. Accordingly, additional information disclosure and stakeholder engagement will be undertaken during project implementation with female staff, patients and attendants to ensure that affected and interested stakeholders are adequately informed about project activities, implementation schedules, potential impacts, mitigation measures, and the grievance redress mechanism.

540. Concerns raised during consultations regarding healthcare waste management, wastewater disposal, drinking water quality, occupational health and safety, and emergency preparedness have been incorporated into the CAP. Relevant corrective actions have been included to address these issues during project implementation and operation.

Plate 7-2: Photo log for consultations and socioeconomic survey




DHQ Lakki Marwat




King Abdullah Teaching Hospital, Mansehra




DHQ Mardan





DHQ Tank



DHQ Batkhela, Malakand



DHQ Swat

8 GRIEVANCE REDRESS MECHANISM

8.1 INTRODUCTION

541. The grievance redress mechanism[66] (GRM) will address grievances arising from environmental and social impacts of the project. This section shows the structure, roles, and functions of the GRM, to address the grievances arising due to construction activities and the execution of the project works. The purpose of the GRM is to receive, review and resolve grievances or concerns raised during the execution of the project works from the community.

542. In the first instance, efforts will be made to avoid grievances through strong consultations participation and information disclosure strategy, and the project activities will be conducted in accordance with best international practices and approved EMP. Nevertheless, it may be expected that some problems cannot be resolved through CPID actions and, therefore, an accessible and effective GRM may be required. Thus, the project will put in place its GRM structures from the beginning of its implementation, i.e., as soon as activities for project design and preparation or implementation commence. The GRM will remain intact throughout the project implementation period to address the community concerns and issues arising during the execution of project works.

543. Problems or complaints to be addressed by the GRM during the planning and implementation of the project are expected to primarily arise from contractor activities. These may include: (i) construction-related disturbances such as noise, dust, vibration, and restricted access within or around health facilities; (ii) disruption to hospital operations, patient services, and utilities (water, electricity, waste management); (iii) occupational health and safety concerns affecting workers, patients, and visitors; (iv) community health and safety risks, including improper site management, traffic issues, and unsafe material storage; (v) labor-related grievances such as working conditions, wage delays, or worker misconduct; (vi) inadequate communication or lack of prior notice regarding construction schedules; (vii) improper waste disposal, sanitation, and environmental management practices; and (viii) concerns regarding timely resolution of complaints and responsiveness of the contractor or project management.

544. The GRM will operate in compliance with applicable national laws, including occupational health and safety regulations, environmental protection laws, and hospital policies, as well as ADB, SPS 2009 where relevant. It will ensure that all complaints are properly documented, investigated, and addressed with appropriate remedial actions.

[66] As per SPS 2009, a mechanism to receive and facilitate the resolution of displaced persons' concerns and grievances about physical and economic displacement and other project impacts, paying particular attention to the impacts on vulnerable groups. It addresses displaced persons' concerns and complaints promptly, using an understandable and transparent process that is gender-responsive, culturally appropriate, and readily accessible to displaced persons at no cost and without retribution. The mechanism will not impede access to the country's judicial or administrative remedies. However, the DP (s) are free to go to the Court of Law as and when desired.

8.2 STRUCTURE OF GRIEVANCE REDRESS MECHANISM

545. The formal GRM provided for this project has a three-tiered structure including: (i) Health center level grievance redress set-up at each subproject site; (ii) Project-level GRM at PMIU/C&W in Peshawar; and (iii) Department of Health level GRM at the provincial office. Grievances will initially be recorded and addressed at the health center/subproject site. Complaints that remain unresolved will be escalated to the PMIU/C&W level for review and resolution. Any grievances not resolved at this stage will be referred to the Department of Health (DoH) level for final consideration and resolution. Thus, the GRM will enable resolution of grievances at the local/project level by mobilizing local recourse and providing successive levels of review at the PMIU and Department of Health levels for difficult and complex issues that are not resolved at the preceding tier.

546. To ensure that all geographic reaches and relevant administrative units involved in the project are covered under the GRM, it will set up: (i) a local-level mechanism with grievance redress focal points and Grievance Redress Committee-I (GRC-I) at each affected hospital site; (ii) Grievance Redress Committee-II (GRC-II) at the PMIU/C&W level, as applicable; and (iii) Grievance Redress Committee-III (GRC-III) at the Department of Health level to review and resolve grievances that remain unresolved at the PMIU level. The functions and responsibilities for each level of the GRM are explained below.

8.2.1 Health Center Level GRC-I

547. The Tier I GRC will be established at the health center level and headed by the Medical Superintendent (MS) of the respective hospital. It will serve as the first-level grievance redress body for complaints received directly from the community. The Tier I GRC for the project will be constituted with the following representatives:

- EHS Specialist, SC
- Social and Gender specialist, SC
- Resident Engineer/Assistant Resident Engineer, C&W
- Representative from local community,
- Other relevant staff as required.

548. Meeting at least fortnightly, the health center Level GRC reviews and resolves a wide range of grievances including environmental and social concerns, and other project-related complaints within 07 working days. Any complaints that cannot be resolved at this level will be formally escalated to the Tier II GRM at PMIU/C&W with documented reasons and recommendations. The Site Grievance Focal Points (SGFP) or at Site Grievance Committee (SGC) will be established to receive the complaints.

549. The Tier-I GRC will maintain a Complaint Register to document all grievances, including:

- Complainant's name and contact details
- Date of complaint
- Summary of the issue
- Findings and recommendations

- GRC decision and communication date
- Status of implementation or escalation if unresolved

550. Multiple channels will be made available for aggrieved persons to submit their concerns and grievances which include:

- **In-person submissions** at the field office/contractor's site office, and through meetings.
- **Telephone/helpline** numbers dedicated for receiving complaints.
- **Written complaints** submitted to PMIU staff, social mobilizers, or directly to the SGFP SGC.
- **Email submissions** through official project email addresses.
- **Complaint/suggestion boxes** placed at accessible locations in field or nearby at project site.

8.2.2 PMIU/C&W Level GRC-II

551. If the complainant is not satisfied with the decision of the Tier-I GRC, they may escalate the grievance to the second tier of the GRM, i.e., the PMIU C&W senior management, within Fourteen (14) days of receiving the GRC decision. Complaints submitted at this level, along with the records of the GRC proceedings, will be registered, and the complainant will be acknowledged.

552. The PMIU C&W staff will review the GRC records and may request any additional supporting documents or evidence from the complainant. If needed, the PMIU C&W team may visit the hospital site to meet the complainant, observe the issue, and collect further information to verify the grievance. The Tier-II GRC will be headed by the Project Director, PMIU, as Head/Convener.

553. After completing the review and investigation, the PMIU C&W will finalize recommendations, obtain approval from the appropriate authority and communicate the decision to both the concerned site authority and the complainant within 15 days of receipt of the complaint.

554. The GRC will be headed by the Project Director as convener and includes the following members:

- Environmental Safeguard Specialist, PMIU
- Social & Gender Safeguard Specialist, PMIU
- Hospital administration representative
- C&W representative
- Other relevant staff or department representatives as required

555. This GRC will be formally notified and operationalized to ensure prompt resolution of grievances arising from hospital site works.

- Recording grievances from hospital staff, patients, attendants, and workers; acknowledging receipt; investigating issues; and summoning complainants, if required, to provide information or evidence. The GRC will aim to resolve complaints within 15 days of receipt.

- Communicating decisions and recommendations to the hospital administration, contractor, and complainants, and following up on implementation.
- Establishing an information dissemination system to keep complainants informed of progress and decisions at both field and PMIU C&W levels.
- Maintaining a Complaint Register accessible to stakeholders, containing brief information about complaints, GRC decisions, and current status.
- Keeping a complete record of all complaints received, including actions taken, to ensure transparency and accountability.

8.2.3 Department of Health Level GRC-III

556. If the complainant is not satisfied with the decision of the Tier-II GRC, the grievance may be escalated to the third tier of the GRM, i.e., the Department of Health (DoH), within fourteen (14) days of receiving the Tier-II decision. Complaints submitted at this level, together with the records of the previous proceedings, will be registered and acknowledged.

557. The Tier-III GRC will comprise a four-member committee established at the Department of Health level. The Department of Health shall nominate all four members of the committee and designate one of the nominated members as its Head/Convener.

558. The DoH Level GRC will review the records of the grievance and may seek additional information or supporting evidence from the complainant, the PMIU, the concerned hospital, or other relevant project authorities, as required.

559. Following review and investigation, the Tier-III GRC will finalize its recommendations and communicate the decision to the complainant and the concerned authorities within fourteen (14) days of receipt of the complaint.

560. The Tier-III GRC will be formally notified and operationalized by the Department of Health to ensure final review and prompt resolution of grievances that remain unresolved at the PMIU level.

- Recording and acknowledging escalated grievances; reviewing the proceedings and decisions of Tier I and Tier II; undertaking additional investigation where required; and summoning the complainant or relevant officials to provide information or evidence.
- Communicating its decisions and recommendations to the PMIU, hospital administration, contractor, relevant authorities, and the complainant, and following up on implementation.
- Maintaining complete records of all grievances received, deliberations held, decisions made, and actions taken to ensure transparency and accountability.

561. At any stage, the complainant retains the right to seek remedies through the court of law if they are not satisfied with the outcome of the GRM. The GRM does not restrict access to legal recourse.

8.3 GENDER BASED VIOLENCE COMMITTEE (GBV)

562. The Gender-Based Violence (GBV) Committee will be established to safeguard the rights and well-being of women, particularly those with overlapping vulnerabilities, during the planning and implementation of the project. Headed by the Project Director and other members, the committee will be addressing GBV issues.

563. The committee will play a central role in promoting gender inclusivity during community consultations and will ensure that all voices are heard. It will conduct awareness sessions, distribute informational materials, and provide gender-sensitivity training to construction staff. In addition, the committee will implement outreach programs to inform women and vulnerable groups about available reporting mechanisms. Through these efforts, the GBV Committee will work to prevent and mitigate gender-based risks while fostering a safe, respectful, and inclusive project environment. the formation of the GBV committee is depicted in **Table 8.1** while Its key functions and responsibilities are outlined below.

Table 8.1: Formation of Gender Based Violence Committee

Project Director	**Head/Convener**
Representative from E&S Staff	Member
Gender Expert, PMIU	Secretary
Representative of SC	Member
Representative of Contractor	Member
Service providers and NGOs working on these issues will be engaged (if required)	

- To ensure that the women of the area, including those with overlapping vulnerabilities, are not negatively affected by the project.
- To ensure easy access for reporting all type of incidents or any related activity having any gender related aspects.
- To establish anonymous reporting mechanisms to ensure the confidentiality requirements of the complainant(s).
- Grievances, GBV component may in context to the restrictions in their movement during construction, impact of the privacy or any other project related or issues in the vicinity.
- To facilitate the aggrieved / complainant (if any) to lodge their complaints and get their concerns resolved through this GBV Committee.
- Conduct awareness sessions and distribute informational materials.
- Ensure community consultations include women to promote inclusivity.
- To aware construction staff on gender sensitivity and GBV prevention.
- Conduct outreach programs to inform women/complainants about reporting mechanisms.

8.4 INFORMATION DISSEMINATION AND COMMUNITY OUTREACH

564. The GRM will establish an information dissemination system to inform hospital staff, patients, attendants, workers, and nearby communities about their rights under applicable national regulations, occupational health and safety standards, and project safeguards. Stakeholders will be made aware of the three-tier GRM, its functioning, the complaint process at the site-level focal points, the project-level GRC at PMIU/C&W,

and the escalation process to the Department of Health Level GRC, along with the contact details of focal members at each level.

565. The site-level focal points will send acknowledgements upon receipt of complaints and inform complainants about planned site visits or meetings to ensure their participation. They will also provide regular updates on the progress of complaint resolution. Besides formal communication, the SGFPs will maintain close liaison with complainants at the hospital site, providing guidance on the GRM and updates on the status of complaints at the site, PMIU/C&W, and Department of Health levels, as applicable.

566. Complainants will be kept informed throughout the grievance resolution process and will be facilitated to attend and participate in proceedings at the site, project, and Department of Health levels. The steps of the hospital GRM are summarized in Table 8.2.

Table 8.2: Steps in the Grievance Resolution Process

Sr. No.	Description
1.	Each hospital site will have a Site Grievance Focal Point (SGFP) or a small Site Grievance Committee (SGC) to serve as the first point of contact for all complaints related to construction, service disruptions, occupational health and safety, and environmental concerns. The site focal point will coordinate with hospital administration, project staff, and contractor representatives (Tier-I GRC).
2.	Any complaints received at the site will be recorded and investigated by the SGFP/SGC, with assistance from hospital administration, PMIU technical staff, SC, and contractor representatives' i.e Tier-I GRC. Resolution at the site level will be attempted within 7 days wherever possible.
3.	Complaints not resolved at the site level will be forwarded to the Project-level GRC at PMIU by the complainant or through the site-level Tier-I GRC. The Tier-II GRC will register the complaint, send acknowledgement, and initiate investigation, including site visits if needed. The Tier-II GRC will communicate its decision to the complainant and concerned site authority within 15 days of receipt of the complaint.
4.	Complaints not resolved at the PMIU level, or where the complainant is dissatisfied with the Tier-II decision, may be escalated to the Department of Health Level GRC (Tier-III). The Tier-III GRC, comprising four members nominated by the Department of Health, including a designated Head/Convener, will review the case and communicate its decision to the complainant within 14 days of receipt.
5.	At any stage, complainants retain the right to seek remedies through the court of law if they are not satisfied with the outcome of the GRM. The GRM does not restrict access to legal recourse.

Complaint intake → Hospital / Site (Tier I) → PMIU / C&W (Tier II) → Department of Health (Tier III)

COMPLAINT INTAKE	**In person | Telephone / Helpline | Written complaint | Email | Complaint / Suggestion Box** SGFP / SGC serves as the first point of contact at the hospital site.	**EDITABLE CONTACTS** Helpline: [_____] Email: [_____] Focal person: [_____]
↓ **Proceed to Tier I**		
TIER I **Hospital / Health Center Level GRC-I** HEAD **Medical Superintendent (MS)**	**PROCESS & CONTACT** • SGFP / SGC receives, registers and coordinates investigation of site-level complaints. • Tier-I GRC addresses environmental, social, OHS and other project-related grievances. • Complaint Register captures issue, findings, decision, communication date and implementation / escalation status. • GRC meets at least fortnightly. **Contact / route:** Use the intake channels above. If unresolved, escalate with records, documented reasons and recommendations.	**TIMELINE** **Resolve within 7 working days**
↓ **If unresolved / dissatisfied: escalate within 14 days of the Tier-I decision**		
TIER II **Project Level - PMIU / C&W GRC-II** HEAD / CONVENER **Project Director, PMIU**	**PROCESS & CONTACT** • Registers and acknowledges the escalated complaint together with Tier-I proceedings. • Reviews evidence; may request supporting documents and conduct a hospital site visit where needed. • Finalizes recommendations and communicates the decision to the complainant and concerned site authority. • Maintains records and follows up implementation. **Contact / route:** Escalation may be made by the complainant or through Tier-I GRC. PMIU phone: [_____] Email: [_____].	**TIMELINE** **Decision within 15 days of receipt**
↓ **If unresolved / dissatisfied: escalate within 14 days of the Tier-II decision**		
TIER III **Department of Health Level GRC-III** COMMITTEE **4 DoH-nominated members; one designated Head / Convener**	**PROCESS & CONTACT** • Registers and acknowledges the escalated grievance with the records of previous proceedings. • Reviews Tier-I and Tier-II records; may seek additional information or evidence from relevant parties. • Undertakes additional investigation where required and communicates the Tier-III decision. • Maintains complete records and follows up implementation. **Contact / route:** Submit the escalated grievance and prior records to the notified DoH GRC. DoH phone: [_____] Email: [_____].	**TIMELINE** **Decision within 14 days of receipt**
LEGAL RECOURSE: At any stage, the complainant may seek remedies through the court of law. The GRM does not restrict access to legal recourse.		

Figure 8.1: Three-Tier Grievance Redress Mechanism (GRM)

9 ENVIRONMENTAL MANAGEMENT PLAN

567. The EMP sets out the measures necessary to prevent, mitigate, and manage potential environmental and social impacts associated with the proposed project. It provides a systematic framework for the implementation of mitigation measures, monitoring of key environmental parameters, and ensuring compliance with applicable regulatory and safeguard requirements throughout the construction and operational phases.

568. The EMP further defines institutional roles and responsibilities, identifies capacity-building requirements, and outlines budgetary allocations to facilitate effective implementation, monitoring, and sustainable project performance.

9.1 OBJECTIVES

569. The main objectives of this section are to:

- Identify and assess the project's potential environmental and social impacts and define appropriate mitigation and management measures in accordance with the requirements of ADB SPS, 2009.
- Clearly delineate the roles and responsibilities of the Executing Agency, Implementing Agency, Contractor, Supervision Consultant (SC), and other relevant stakeholders to ensure effective implementation, supervision, and compliance monitoring.
- Integrate environmental and social safeguards into project design, construction, and operational phases to ensure compliance with national regulatory requirements and ADB safeguard provisions.
- Establish a structured monitoring and reporting framework, including measurable indicators, monitoring frequency, documentation requirements, and corrective action mechanisms.
- Promote meaningful stakeholder engagement, information disclosure, and grievance redress in line with ADB's consultation and participation principles.
- Identify institutional capacity needs, training requirements, and budgetary allocations necessary to ensure effective implementation and long-term sustainability of safeguard measures.

9.2 INSTITUTIONAL SETUP FOR IMPLEMENTATION AND MANAGEMENT OF EMP

570. The key institutions involved during the construction phase include the Project Management Implementation Unit (PMIU) led by the Project Director (PD), ADB Safeguards team the Supervision Consultant (SC), and the Contractor(s). The implementation of the EMP will be carried out through coordinated efforts among these institutions.

571. The following staff will be involved in the implementation of EMP:
- PD, PMIU;
- Environmental and Social (E&S) Safeguard Specialist, PMIU;
- E&S Specialist, SC;

- Environmental & Social Health and Safety (ESHS) specialist, Construction Contractor(s); and
- ADB Safeguards Team.

572. The PMIU will ensure that the EMP is fully integrated into bidding and contract documents, making compliance a contractual obligation for contractors. Contractors shall be required to prepare and implement a Site Specific EMP (SSEMP) consistent with ADB SPS (2009), national regulatory requirements, and approved safeguard documents prior to commencement of works.
573. No construction activities, including establishment of camps or mobilization of equipment, shall commence without prior approval of the SSEMP and necessary statutory clearances.

574. The organizational structure for EMP implementation for KPHSSP is given in **Figure 9.1.**

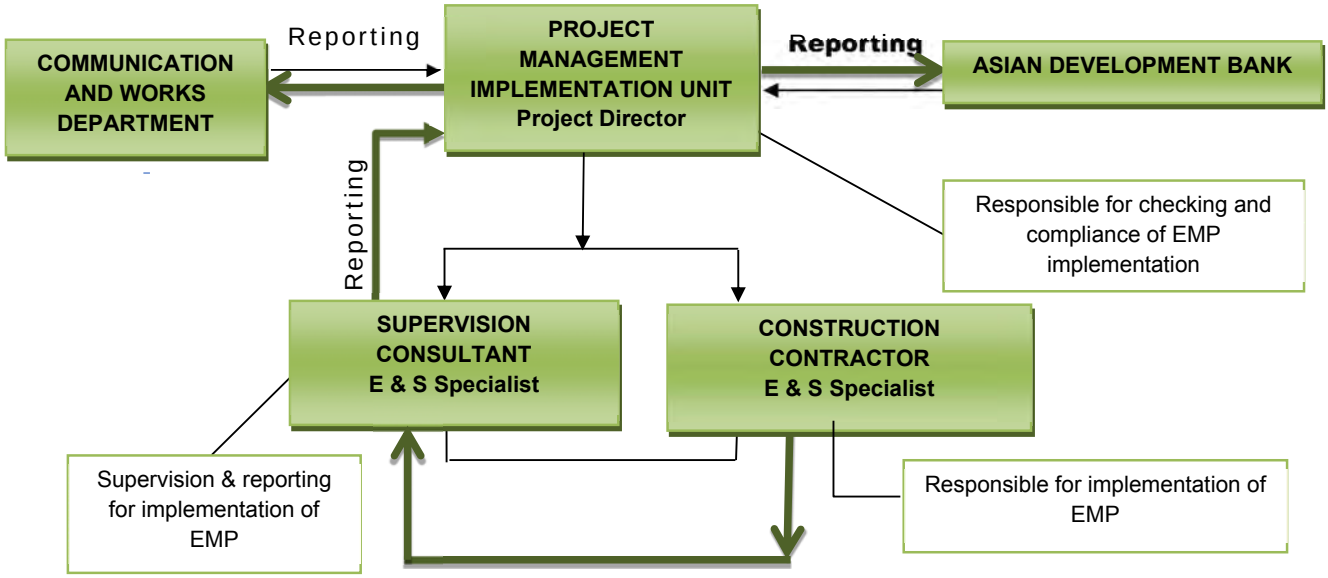


Figure 9.1: Organizational Setup for Implementation of EMP at Construction Phase

9.3 ROLES AND RESPONSIBILITIES

a) Asian Development Bank

575. The ADB serves as the financing institution and the oversight authority for environmental and social safeguards under its SPS. In accordance with ADB requirements, this IEE report, including the EMP, is subject to ADB review and approval prior to project implementation. Throughout the project lifecycle, the executing agency is responsible for submitting regular monitoring reports to ADB. Furthermore, ADB reserves the right to conduct periodic supervision missions and audits to verify implementation of the EMP and to confirm ongoing compliance with ADB's environmental and social standards.

b) Project Management Implementation Unit (PMIU)

i. Project Director

576. The PD of the PMIU will be primarily responsible for overall project execution and coordination, ensuring timely delivery in accordance with approved frameworks. The PD is accountable for ensuring compliance with relevant national regulations, the requirements of the EMP and the safeguard policies of the ADB.

577. The core responsibilities of the PD encompass the following:

- Providing strategic direction and supervision to ensure the effective implementation of all measures outlined in the EMP;
- Serving as the principal focal point for all safeguard-related communications with ADB, including the submission of monitoring reports and facilitation of supervision missions; and
- Directing and overseeing contractors, consultants, and service providers responsible for executing the project and implementation of EMP to ensure alignment with project objectives and compliance requirements.

ii. Environmental Safeguard Specialist (ESS)

578. The ESS will serve as the technical focal person within the PMIU for all matters pertaining to environmental safeguards. Functioning under the direct supervision of the PD, the ESS will be responsible for the day-to-day oversight, coordination, and monitoring of environmental safeguard compliance throughout the project lifecycle.

579. The primary responsibilities of the ESS include:

- Providing expert advice to the PD, contractors, and other project personnel on the implementation of the EMP and adherence to ADB safeguard policy requirements;
- Conducting regular site inspections to verify the effective implementation of mitigation measures, documenting findings, and preparing monthly or quarterly environmental monitoring reports for submission to the PD and ADB;
- Monitoring contractor performance to ensure compliance with approved EMP provisions, contract conditions, and relevant national environmental laws;
- Facilitating meaningful stakeholder engagement, including assisting with the organization of public consultations, managing grievance redress mechanisms, and ensuring timely disclosure of project information; and
- Coordinating training sessions and awareness programs for contractors and project staff on environmental requirements.

iii. Gender & Social Safeguard Specialist (G&SSS)

580. The G&SSS will serve as the technical focal person within the PMIU for all matters pertaining to gender & social safeguards. Functioning under the direct supervision of the

PD, the G&SSS will be responsible for the day-to-day oversight, coordination, and monitoring of gender and social safeguard compliance throughout the project lifecycle.

581. The primary responsibilities of the G&SSS include:

- Providing expert advice to the PD, contractors, and other project personnel on the implementation of the EMP and adherence to ADB safeguard policy requirements;
- Conducting regular site inspections to verify the effective implementation of mitigation measures, documenting findings, and preparing monthly or quarterly gender and social monitoring reports for submission to the PD and ADB;
- Monitoring contractor performance to ensure compliance with approved EMP provisions, contract conditions, and relevant national environmental laws;
- Facilitating meaningful stakeholder engagement, including assisting with the organization of public consultations, managing grievance redress mechanisms, and ensuring timely disclosure of project information; and
- Coordinating training sessions and awareness programs for contractors and project staff on gender and social management requirements.

c) Supervision Consultant (SC)

582. Independent E&S personnel will be engaged by SC to oversee the implementation of the EMP and to ensure contractor compliance with environmental, social, health, and safety requirements. The SC will function under the overall guidance of the PMIU E&S Experts and will be responsible for day-to-day safeguards monitoring throughout the construction phase.

583. The primary responsibilities of the E&S SC include:

- Reviewing and endorsing the contractor's site-specific environmental and social management plans to ensure alignment with the approved EMP and ADB requirements;
- Conducting regular site inspections to verify that day-to-day construction activities adhere to EMP provisions and contractual EHS obligations;
- Maintaining close coordination with contractors and PMIU E&S Experts to facilitate timely implementation of mitigation measures and address any emerging issues;
- Preparing and delivering environmental, health, and safety training programs for contractor staff and site personnel;
- Undertaking systematic monitoring of environmental and social parameters on-site, documenting observations, and identifying any deviations from approved plans;
- Preparing and submitting periodic monitoring and evaluation reports to the PMIU E&S Experts for review, in accordance with the reporting schedule defined in the EMP; and
- Identifying the need for and recommending additional mitigation measures when unanticipated impacts arise or when existing measures prove insufficient.

584. The E&S team of SC shall comprise the following key personnel:

a) Environment Health and Safety Specialist

585. A qualified professional holding a Bachelor of Science (BSc) degree in Environmental Engineering/Science (or equivalent), with a minimum of ten (10) years of relevant professional experience in environmental management and health and safety for infrastructure projects.

b) Social and Gender Specialist

586. A qualified professional with a Bachelor's degree in Sociology, Development Studies, or a related field, and at least ten (10) years of experience in implementing social safeguards, stakeholder engagement, labor management, gender equality, child protection, and inclusion of vulnerable groups in infrastructure or development projects.

d) Construction Contractor

587. The Construction Contractor will be responsible for the execution of civil works in accordance with the approved project design, technical specifications, and contractual agreements. In relation to environmental and social safeguards, the Contractor acts as the primary implementing party for on-site mitigation measures and is accountable for compliance with the EMP and applicable ADB safeguard requirements.

588. The environmental and social responsibilities of the Construction Contractor include the following:

- Execution of all environmental and social mitigation measures as specified in the EMP and approved site-specific management plans;
- Ensuring that all construction activities comply with EMP provisions, relevant contractual clauses, and applicable national EHS regulations;
- Assignment of appropriately qualified EHS and social staff to oversee day-to-day safeguard implementation and compliance monitoring at the work site;
- Preparation and submission of regular environmental and social monitoring reports to the SC and PMIU, documenting compliance status, incidents, and corrective actions undertaken;
- Timely implementation of corrective measures in response to non-compliances or unforeseen impacts identified by the SC or PMIU;
- Provision of EHS induction and ongoing training programs for all construction personnel to ensure awareness of environmental and social obligations;
- Cooperation with project authorities during public consultations, community interactions, and operation of the grievance redress mechanism; and
- Maintenance and operationalization of site-specific emergency preparedness and response plans to address potential environmental or safety incidents.

589. The E&S team of contractor shall comprise the following key personnel:

a) Environment, Health and Safety Specialist

590. A qualified professional holding a Bachelor of Science (BSc) degree in Environmental Engineering/Science (or equivalent), with a minimum of Eight (08) years of relevant professional experience in environmental and health and safety implementation of infrastructure projects.

b) Social and Gender Specialist

591. A qualified professional with a Bachelor's degree in Sociology, Development Studies, or a related field, and at least Eight (08) years of experience in implementing social safeguards, stakeholder engagement, labor management, gender equality, child protection, and inclusion of vulnerable groups in infrastructure or development projects.

e) Hospital Administration

592. The Hospital Administration shall facilitate implementation of the EMP while ensuring continuity of healthcare services during construction. Its responsibilities shall include:

- Coordinate with the PMIU, Supervision Consultant (SC), and Contractor to facilitate project implementation within the operational hospital.
- Designate an Environmental and Social (E&S) Focal Person to coordinate environmental, social, health, and safety matters.
- Facilitate site access and scheduling of works to minimize disruption to hospital operations and emergency services.
- Support implementation of IPC measures and ensure segregation of construction activities from patient care areas.
- Continue management of healthcare waste generated by hospital operations in accordance with applicable procedures.
- Implement and monitor CAP actions assigned to the Hospital Administration. Coordinate resolution of construction-related environmental, health, and safety issues and complaints through the GRM.
- Participate in environmental inspections, monitoring, audits, and emergency response coordination, as required.
- Review contractor work schedules and site-specific management plans to ensure compatibility with hospital operations and patient safety.
- The Hospital Administration will be responsible for day-to-day implementation of CAP measures. PMIU will oversee CAP implementation and allocate necessary resources. The Supervision Consultant and Environmental Specialist will monitor progress and verify completion of corrective actions. CAP implementation status will be reviewed regularly and reported to ADB through environmental monitoring reports.

9.4 BIDDING AND CONTRACT DOCUMENTS

593. The EMP will be fully integrated into the bidding and contract documents to ensure that all prospective contractors are aware of their environmental and social obligations prior to submitting bids.

594. The PMIU will ensure that the contract documents include specific provisions requiring the successful contractor to prepare and submit a SSEMP for approval by the PMIU and the SC before the commencement of any civil works. The SSEMP will detail how the contractor intends to implement the mitigation measures outlined in the EMP, considering site-specific conditions and construction methodologies.

595. Throughout the construction phase, the contractor will be subject to regular monitoring and compliance audits conducted by the SC and PMIU to verify adherence to the environmental and social provisions set forth in the EMP. These audits will assess the effectiveness of mitigation measures, identify any deviations, and ensure timely corrective actions.

596. A copy of the approved EMP will be maintained at the project site at all times during construction and made readily accessible to all relevant personnel, including contractor staff, SC, and visiting ADB missions.

597. Any instance of non-compliance or deviation from the conditions specified in the EMP will constitute a non-compliance with environmental and social requirements. In such cases, the contractor will be required to undertake immediate corrective actions as directed by the PMIU or the SC. Failure to address non-compliance promptly may result in further contractual remedies as stipulated in the bidding documents.

9.5 TRAINING AND CAPACITY BUILDING

598. To strengthen the capacity of the PMIU, contractors, and SC under the KPHSSP, training will be provided on environmental and social safeguards, implementation of mitigation measures, and monitoring and reporting requirements outlined in the EMP.

599. The project will ensure in-house training for PMIU staff, contractors, and SC through one-day basic training and one-day advanced training sessions. These sessions will cover environmental and social safeguards applicable to healthcare facility revamp works, with particular emphasis on the roles and responsibilities of PMIU, contractors, and consultants in implementing the EMP and environmental monitoring requirements during construction.

- Key environmental and social issues related to hospital revamp and healthcare facility operations
- Objectives and importance of E&S compliance under ADB safeguard requirements
- Applicable regulatory and institutional requirements and roles of implementing agencies
- Mitigation measures and responsibilities for effective EMP implementation
- Environmental and social monitoring parameters, data collection, documentation, and reporting procedures
- Occupational health and safety measures, including proper use of personal protective equipment (PPE) and emergency preparedness
- Communication and coordination mechanisms among PMIU, contractors, consultants, and hospital management

- Grievance redress mechanisms and complaint handling procedures
- Code of conduct (CoC), gender sensitivity, and labor rights awareness.

9.6 COMMUNICATION & DOCUMENTATION

9.6.1 Meetings and Reports

Monthly meetings will be held at site during the construction phase. The purpose of these meetings will be to discuss the routine activities, non-compliances as pointed out by SC and their remedial measures. CAP implementation progress shall be included in quarterly internal reports and semiannual environmental monitoring reports submitted to ADB. The reports shall identify the status of each CAP action as completed, ongoing, delayed, or pending, together with supporting evidence and planned follow-up actions. Various reports will also be produced at periodic time intervals, as provided in **Table 9.1** Indicates reporting mechanism along with information regarding persons responsible for report preparation and review process.

Table 9.1: Periodic Reporting Mechanism

Report	Requirements	Prepared by	Reviewed by	Submitted to
Monthly	Labor/site working conditions, EMP compliance; air, water, noise monitoring	Contractors' E&S Experts	SC E&S Experts	PMIU
Quarterly	Workplace conditions; environmental & social compliance; contractor performance	SC E&S Experts	PMIU	ADB
Semiannual	EMP compliance; corrective actions; risk management	SC E&S Experts	PMIU	ADB
Annual	Consolidated project performance; safeguards & operational summary	PMIU/SC E&S Experts	PMIU/PD	ADB
Project Completion	Overall project implementation; safeguards compliance; lessons learned	SC E&S Experts	PMIU	ADB

9.6.2 Photographic Record and Data Base

600. Contractor and SC will maintain photographic records of all activities during the implementation of the proposed project. Data base of persons involved in monitoring, compliance and effects, HSE database, compliance and non-compliance record according to HSE Plan will also be maintained.

9.6.3 Non-compliance of EMP

601. Failure to comply with the provisions of the EMP by the Contractor will lead to appropriate corrective actions, including financial penalties. Major or persistent non-compliances may also result in the suspension of works or other contractual actions as per the contract terms.

9.7 ENVIRONMENTAL MANAGEMENT MATRIX

602. Environmental Management Matrix is considered as one of the main elements of EMP. It will be used as the management tool for the implementation of mitigation measures. The plan includes following:

- The envisaged impacts as identified in IEE and their recommended mitigation measures; and
- The person/organization directly responsible for adhering to or executing the required mitigation measures.

603. **Table 9.2** provides information about all impacts to be raised due to project activities during different phases of the project i.e. pre-construction, construction and operation phases.

Table 9.2: Environmental Mitigation and Management Matrix

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
Design Phase				
1.	**Design-Stage Considerations: Hospital Layout, Utilities, and Infrastructure** Decisions made during the design and pre-construction phase regarding the hospital layout, internal circulation, wards, isolation units, utility systems, and external development can influence operational efficiency, infection control, safety, and environmental performance once construction begins. If not adequately considered, these design-stage decisions may lead to adjustments during construction or affect the long-term functionality of the hospital. Impacts are expected to be high, site-specific in scale, and long-term as design-stage decisions can significantly affect hospital operational efficiency, infection control, safety, and overall functional performance.	• Coordinated design reviews will be conducted to integrate environmental, operational, and energy efficiency considerations in the design, including drainage, HVAC, and plumbing systems. • All existing utilities, including water supply, sewerage, electrical, medical gas, natural gas, and fire-fighting systems, will be identified and mapped, and appropriate connection points (tie-ins) will be determined for integrating new systems with the existing infrastructure. • Consultations with hospital staff, administration, and relevant authorities will be conducted during the design stage to ensure operational requirements are met and regulatory compliance is achieved. • Structural and geotechnical assessments will be undertaken to guide safe retrofitting, foundation stability, and civil works planning. • Energy-efficient systems, renewable energy options, and climate-resilient features will be integrated into the design. • Safe access, circulation, and emergency exits for staff, patients, and visitors will be planned and incorporated into the design. • A service continuity plan will be prepared to ensure uninterrupted hospital services, including electricity, water, medical gases, and emergency access, during renovation works.	Design Consultant	PMIU
2.	**Topography** The project mainly involves renovation of existing buildings and upgrading internal systems such as plumbing, fire-fighting, electrical, ICT, ELV, medical	• Excavation, trenching, and grading will be limited to designated work areas required for external development and utility installation.	Design Consultant	PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	**Monitoring**
	gas, HVAC, and rooftop solar installations, which will occur within the existing building footprint and are not expected to affect site topography. Minor and localized disturbances to ground levels may occur during external works such as installation of underground tanks, rainwater harvesting systems, utility pipelines, storm drainage, natural gas piping, and construction of roads and paved areas, requiring limited excavation and trenching. The impacts are expected to be negligible, site-specific, and short-term in duration.	• Disturbed ground surfaces will be restored and compacted after completion of underground works and paving activities. • Proper drainage and surface slopes will be ensured in paved areas, roads, and walkways to prevent water accumulation or localized flooding. • Existing landscaped and undisturbed areas within the hospital premises will be protected from unnecessary disturbance during construction activities.		
3.	**Seismic Hazard** As the project area may be exposed to seismic activity, existing buildings and newly installed systems could be vulnerable to earthquake forces if structural conditions are not properly assessed during the design stage. Aging structural components or inadequate retrofitting may increase the risk of damage, potentially affecting building safety and continuity of hospital services. However, since the project mainly involves renovation within the existing hospital premises with limited structural modifications, impacts are expected to be moderate to high, site-specific, and long-term.	• The revamp of infrastructure will be designed and constructed in accordance with the Seismic Building Code of Pakistan 2021 (SBC-2021) to ensure compliance with the minimum requirements for seismic safety of structures.	Design Consultant	PMIU
4.	**Resource Conservation** The project will involve the use of water, fuel, and construction materials. Excessive water consumption for construction activities, workers or for equipment cleaning could place minor stress on local water supplies. Construction materials such as cement, aggregates, structural steel, pipes, and lining materials are mostly non-renewable; inefficient use could reduce the availability of these resources for future projects. Fuel consumption for machinery and	Following practices shall be adopted to conserve these natural resources: • Non-potable water will be used for cleaning, curing, and dust control. • Workers will be trained on simple water-saving practices. • Leftover materials will be reused wherever feasible. • Machinery will be maintained in good condition, and engines will be turned off when not in use.	Design Consultant	PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	**Monitoring**
	equipment may also result in air emissions if not managed properly. The overall impact on natural resources is moderately negative but manageable due to the limited scope of hospital upgrades. 24. Impacts are expected to be moderate, site-specific, and short-term in nature	• Locally available fuel of good quality (low-sulphur if available) will be used. • Basic site layout planning and waste segregation will be implemented. Resources Conservation Plan is attached as **Annexure-VII.**		
5.	**Flora** The project involves rehabilitation and revamping works within existing hospital premises, and no major tree cutting or vegetation removal is anticipated. Minor impacts on planted vegetation and landscaped areas may occur due to temporary site mobilization, movement of machinery, dust deposition, and material storage if activities are not properly managed. However, impacts on flora are expected to be negligible to low, site-specific, short-term, and reversible in nature.	• Avoid unnecessary cutting or trimming of trees and vegetation within hospital premises; • Restrict material storage, temporary facilities, and construction activities to already paved or disturbed areas; • Implement dust suppression measures such as regular water sprinkling to minimize dust deposition on vegetation; • Compensate any unavoidable vegetation removal through plantation using native species; • Maintain and enhance landscaping and green areas within hospital premises.	Design Consultant	PMIU
6.	**Fauna** The project area comprises an already developed urban or semi-urban hospital environment with limited habitat value, mainly supporting urban-adapted fauna such as birds and small mammals. Construction activities, noise, machinery operation, and increased human presence may temporarily disturb local fauna within and around the hospital premises. However, as works are confined within existing developed areas, impacts on fauna are expected to be negligible to low, site-specific, short-term, and reversible in nature.	• Restrict construction activities to daytime hours to minimize disturbance to urban fauna; • Ensure that no natural habitats or existing green areas are unnecessarily disturbed; • Control noise, dust, and waste generation through appropriate site management practices; • Incorporate native vegetation and landscaping within hospital premises to support local urban biodiversity; • Ensure proper collection and disposal of construction and healthcare waste to avoid nuisance to birds and small animals.	Design Consultant	PMIU
7.	**Temporary Acquisition of Land**	• Contractor facilities will, as far as possible, be established within the hospital boundary in coordination with hospital management.	Design Consultant	PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	**Monitoring**
	The hospital revamp works will be confined within the existing hospital premises. Limited temporary space may be required for material storage, equipment placement, and vehicle parking. Any such use will be small-scale and short-term in nature and may be managed in hospital premises. The required land will be used within the hospital area. No temporary land acquisition is required. Hence there will be no impact.	• Temporary areas will be clearly demarcated to avoid disruption to hospital operations. • If external land is required, it will be obtained through voluntary short-term lease agreements. • All temporarily used areas will be restored to their original condition after completion of works. • A Construction Camp/Layout Plan will be prepared in consultation with PMIU.		
8.	**Existing Utilities** Excavation and trenching for activities such as water supply and sewerage pipelines, natural gas piping, storm drainage, electrical systems, and paved areas may pose a risk of accidental disturbance or damage to existing underground utilities. These may include water supply lines, sewerage pipelines, electrical cables, communication lines, fire-fighting pipelines, and medical gas systems. Any damage could lead to temporary disruption of essential hospital services. However, the Impacts are expected to be moderate, site-specific, and short-term in nature.	Mitigation measures will include: • Utility surveys and mapping will be conducted prior to construction. • Existing utility lines will be clearly marked and protected on site. • Careful excavation methods will be adopted, particularly near identified utilities. • Coordination with hospital management and relevant utility providers will be carried out prior to commencement of works. • Temporary arrangements will be ensured, where required, to maintain continuity of essential services.	Design Consultant	PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	**Monitoring**
9.	**Physical and Cultural Resources** The hospital revamp works will be confined within the existing hospital premises. No graveyards, shrines or other physical and cultural resources except mosques are located within the project boundary. Therefore, no direct impact on such resources is anticipated. However, minor and temporary inconvenience may occur due to construction-related noise, dust, or traffic movement in surrounding areas, which could indirectly affect access or comfort due to construction activities. Impacts are expected to be negligible to low, site-specific, and short-term in nature.	• All necessary arrangements including schedule of construction work and obstruction free and safe access will be made to avoid any disturbance to the mosques located in the hospital premises.	Design Consultant	PMIU
Construction Phase				
10.	**Excavation** Small scale excavation may be required for upgrading existing hospital utilities such as sewerage, drainage, water supply lines, and minor external works. As the project focuses on rehabilitation rather than new construction, excavation activities will be localized and short-term across all project sites. Potential impacts include temporary soil disturbance, spoil generation, dust emissions, restricted internal access, interference with ambulance movement, utility disruption, and occupational health and safety risks. These impacts may be relatively more pronounced at DHQ Hospital Mardan, King Abdullah Teaching	• Excavation will be carried out in small, phased sections, and works will be scheduled during off-peak hours to maintain uninterrupted hospital operations and emergency access. • Dust will be controlled through regular water sprinkling and covering of spoil piles and transport vehicles, with enhanced attention at relatively dry sites such as DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank. • Excavated material will be properly managed, and trenches will be backfilled promptly to minimize localized soil erosion and sediment runoff during rainfall especially at DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan).	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat) due to their urban settings, high patient volumes, and traffic congestion around the hospital premises. Dust-related impacts may be more noticeable at DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank owing to the dry climatic conditions and greater potential for wind-blown dust. Localized soil erosion and sediment runoff may occur at DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan) due to the hilly terrain, steep slopes, and seasonal rainfall, particularly where minor utility excavations are undertaken in external areas. Across all project sites, there is also a possibility of encountering undocumented underground utilities and, in rare cases, physical cultural resources during excavation activities. Impacts are expected to be moderate to high, site-specific, and temporary in nature.	• Excavated material will be reused where feasible, while surplus spoil will be transported and disposed of at approved disposal locations. • Temporary barriers, fencing, warning tape, and signage will be installed around excavation areas to protect patients, staff, attendants, and visitors. • Proper trench support, shoring, and safe excavation practices will be implemented to prevent collapse and ensure worker safety. • Underground utilities and service lines will be identified and mapped prior to excavation to minimize accidental damage and service interruption. • Controlled excavation methods will be adopted near older structures, and the Chance-Find Procedure will be implemented in case any archaeological or culturally significant materials are encountered. • Close coordination with hospital administration will be maintained to ensure continuous access to emergency units, ambulances, and critical care areas. • Regular air quality, noise, and safety inspections will be conducted, particularly near sensitive hospital units such as ICUs, operation theatres, laboratories, and isolation wards. • Workers will receive training on occupational health and safety, hazard identification, infection prevention and control, emergency response, and safe waste handling procedures.		
11.	**Construction campsites and Contractor Facilities** The contractor's site office and temporary facilities will be established within the existing hospital premises at locations approved by the SC and PMIU in	• The contractor's site office and temporary facilities will be located only within designated areas approved by the SC and Hospital Administration, avoiding sensitive zones such as wards, emergency units, ICUs, laboratories, operation theatres, and ambulance routes.	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	coordination with the respective Hospital Administration across all project sites Considering the limited scale of rehabilitation works, only small temporary areas will be utilized for site offices, material storage, equipment placement, and worker facilities. However, if such temporary facilities are located within or close to functional hospital areas, localized and short-term impacts may occur. These impacts may be relatively more noticeable at DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat) congested and busy facilities such as due to higher patient influx, limited space availability, and continuous emergency movement. At DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank, dry climatic conditions may increase dust-related nuisance around temporary storage and movement areas, while at DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan) sloping terrain and drainage sensitivity may increase the risk of localized runoff and erosion around contractor facilities. Potential impacts include minor vegetation disturbance, obstruction of internal movement, noise and visual intrusion, generation of solid waste and wastewater, sanitation issues, temporary water contamination risks, vector breeding, and disruption of hospital access routes including ambulance and emergency pathways.	• The footprint of temporary facilities will be minimized, and unnecessary clearing of vegetation, paved areas, or landscaped spaces will be minimised. • Adequate sanitation arrangements including clean toilets, safe drinking water, handwashing facilities, and proper wastewater disposal systems will be provided and maintained at all temporary facilities. Direct discharge into drains, soil, or open areas will be strictly prohibited. • Solid waste generated from contractor facilities will be properly segregated, collected, and disposed of through authorized municipal systems. Fuel, lubricants, and maintenance activities will be managed in designated areas with spill prevention measures to avoid soil and water contamination. • Dust, noise, and visual disturbance will be minimized through regular housekeeping, controlled material storage, water sprinkling, covered transport, and scheduling of noisy activities during less sensitive hours, particularly at DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank where dry conditions may intensify dust impacts. • At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), temporary facilities and material stockpiles will be located on stable, level surfaces wherever practicable, and good housekeeping practices will be maintained to minimize localized runoff and ensure safe internal access during periods of rainfall. • All internal access routes, emergency pathways, and ambulance movement corridors will remain open and unobstructed throughout the construction period.		

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	Considering the operational sensitivity of healthcare facilities and the continuous presence of patients, attendants, and critical medical services, these impacts are assessed as moderate to high, site-specific, and temporary in nature.	• Vector control measures including proper waste management, drainage of stagnant water, and routine site cleaning will be implemented to prevent mosquito and pest breeding. • Adequate worker welfare facilities including food, rest, hygiene, and first aid arrangements will be provided in accordance with national labour regulations and applicable occupational health and safety standards. Workers will be trained and bound by a Code of Conduct under an approved Construction Camp Management Plan and Labour Management Plan. • A Community Liaison Officer will be designated to coordinate with hospital administration and address complaints or grievances related to contractor activities. • All temporary facilities, stockpiles, and storage areas will be dismantled immediately after completion of works, and disturbed areas will be restored to their original condition. • Regular environmental, health, and safety monitoring and supervision will be conducted to ensure compliance with the approved EMP.		
12.	**Air Quality** Air quality may be temporarily affected during rehabilitation works due to dust generation from demolition, excavation, material handling, transportation of construction materials, and movement of vehicles and machinery within hospital premises. Demolition and dismantling of existing structures and finishes may generate fine particulate matter, while diesel-powered generators, machinery,	• Dust emissions from demolition, excavation, transportation, and material handling will be controlled through regular water sprinkling on exposed areas, covering of stockpiles, and covering of transport vehicles carrying fine materials, with enhanced dust suppression measures implemented at relatively dry and dust-prone sites such as DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank. • Only well-maintained and low-emission machinery and vehicles will be used. Open burning of waste will be strictly prohibited, and equipment engines will be turned off when not in use to minimize	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	and transport vehicles may emit pollutants such as PM, NO_x, SO_2, CO, and VOCs. The magnitude of air quality impacts is expected to vary across project sites depending on climatic conditions, traffic intensity, surrounding land use, and terrain. Higher impacts are anticipated at DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and busy hospital operations. DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank may also experience dust impacts due to dry conditions and exposed surfaces. In contrast, DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan) are expected to experience comparatively lower impacts due to hilly terrain, better natural dispersion conditions, and lower traffic density, although localized dust emissions may still occur near active work areas. Given the sensitivity of hospital environments, particularly around OPDs, ICUs, operation theatres, laboratories, emergency units, and isolation wards, even short-term exposure to dust and air emissions may adversely affect patients, healthcare workers, attendants, and sensitive medical equipment. The risk of exposure is expected to be relatively higher due to busy and high-patient-load facilities. DHQ Hospital Mardan, King Abdullah Teaching Hospital	exhaust emissions, particularly at congested urban sites. • Temporary dust screens, barricades, or enclosures will be installed around demolition and other high dust-generating activities to limit dust dispersion into sensitive hospital areas. • Dust-generating activities including demolition, concrete cutting, and excavation will be scheduled during off-peak hospital hours to minimize disturbance to patients, visitors, and medical staff. • Demolition debris and excavated materials will be promptly collected, covered, and transported to approved disposal sites to reduce airborne dust. • Construction materials prone to generating dust will be stored in covered areas or properly secured during transport and handling. • Workers will be provided with appropriate PPE, including dust masks and respirators where necessary, and trained in their proper use. • Regular air quality monitoring will be conducted near sensitive hospital units such as ICUs, operation theatres, laboratories, and isolation wards to ensure compliance with applicable NEQS. • Warning signage will be installed around active work areas, and continuous coordination with hospital administration will be maintained regarding demolition schedules and high dust-generating activities. • Good housekeeping practices including routine cleaning of access roads, pathways, and nearby hospital areas will be implemented to minimize dust accumulation. • All monitoring records, complaints, corrective actions, and inspection findings will be properly documented and addressed in a timely manner.		

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat). Impacts are expected to be moderate to high, site-specific, temporary, and reversible in nature.			
13.	**Noise** Activities including demolition, excavation, drilling, material handling, and vehicle movement may generate temporary noise and minor vibration across all project sites. Noise generated during rehabilitation works may disturb patients, healthcare staff, attendants, and visitors, particularly within sensitive hospital areas such as ICUs, operation theatres, emergency units, laboratories, and inpatient wards. Noise impacts may be relatively more pronounced at high patient load facilities such as DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat) due to continuous patient flow, traffic movement. However, open surroundings may facilitate wider propagation of construction noise, while localized vibration impacts may occur near sloping or structurally sensitive areas during drilling and excavation activities. Vibration from demolition and heavy equipment may also pose limited risks to older hospital structures if activities are not properly controlled.	• Low-noise equipment, including machinery used for demolition, excavation, and compaction, will be selected and fitted with silencers or mufflers, and regularly maintained to prevent excessive noise and vibration on all sites. • High-noise and vibration-generating activities, including demolition, drilling, excavation, and compaction, will be scheduled during off-peak hospital hours and conducted in small, phased sections with stricter controls across all sites. • Vibration-intensive methods will be avoided near older or structurally sensitive hospital buildings and monitoring and visual inspections will be carried out to ensure no damage occurs. • Temporary acoustic barriers or enclosures will be installed near sensitive units to reduce noise propagation where required. • Work schedules will be planned to avoid simultaneous high-noise or high-vibration activities near sensitive areas, and worker rotation will be implemented to minimize prolonged exposure. • Workers will be provided with appropriate PPE, including ear protection, and trained in its proper use. • Noise and vibration monitoring will be conducted near sensitive hospital areas (ICUs, OTs, wards) to ensure compliance with NEQS standards, and corrective actions will be implemented if required.	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	Impacts are expected to be high, site-specific, and short-term in nature.	• Demolition and construction debris will be promptly handled and removed to reduce the duration of noise- and vibration-generating activities. • Advance coordination with hospital management will be maintained, and a grievance mechanism will be established to address complaints from patients, staff, or visitors.		
14.	**Traffic Management** Rehabilitation works within operational hospital premises including transportation of construction materials, movement of machinery and equipment, temporary closure of internal pathways, and partial occupation of parking or circulation areas may temporarily disrupt internal traffic circulation at all project sites. Such disruptions may lead to localized congestion and restricted movement for patients, visitors, ambulances, and service vehicles. These impacts may be relatively more pronounced at busy facilities such as DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat) due to higher patient inflow, limited parking space, and continuous emergency movement and constrained internal circulation. At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), narrower access roads and hilly terrain may create additional movement constraints during transportation of construction materials and equipment. Comparatively lower levels of disruption are anticipated at DHQ	• Construction activities will be carried out in phased sections to ensure continuous access to emergency and critical care units. • Coordination with hospital administration will be maintained to ensure uninterrupted ambulance access at all times with stricter control at all the facilities. • Alternate entry and exit routes within the hospital premises will be clearly demarcated and communicated to staff, patients, and visitors. • Advance notice will be provided to hospital staff, patients, and visitors regarding temporary route changes, parking restrictions, or access diversions. • Material deliveries and heavy vehicle movements will be scheduled during off-peak hospital hours to minimize congestion. • Dedicated pathways will be provided for pedestrians, and separate routes will be maintained for construction vehicles to avoid conflicts. • Visible directional signage, safety barricades, and protective barriers will be installed along construction zones and temporary routes. • Personnel will be stationed at key locations during peak construction activities to guide vehicles and pedestrians safely and ensure unobstructed access for ambulances and hospital staff.	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank, Given the operational sensitivity of healthcare facilities and the critical need for uninterrupted emergency access, any obstruction or delay in internal circulation may result in moderate to high, site-specific, and short-term impacts.	• Construction materials, machinery, and debris will not be stored in a manner that obstructs emergency routes, hospital entrances, or fire access corridors. • At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), special attention will be given to safe movement management along narrower or sloping access routes to avoid traffic conflicts and accidents. • All temporary traffic arrangements will be reviewed regularly in coordination with hospital management to ensure effectiveness and minimize disruption. A site-specific Traffic Management Plan will be prepared in coordination with hospital management at each facility to ensure safety, mobility, and minimal disruption during rehabilitation works. A framework Traffic Management Plan is attached as **Annexure-VIII**.		
15.	**Impact on Soil** Soil impacts from the proposed rehabilitation works are expected to be localized, minor to moderate, and short-term in nature, as project activities are confined to upgrading and rehabilitation within the existing premises of DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, DHQ Hospital Batkhela (Malakand), King Abdullah Teaching Hospital Mansehra, DHQ Hospital Mardan, DHQ Hospital Alpuri (Shangla), DHQ Hospital Tank, DHQ Hospital Saidu Sharif (Swat), and DHQ Hospital Dassu (Upper Kohistan). Temporary soil disturbance may occur during minor excavation	• Excavations for utilities or minor external works will be kept as small and short-term as possible to minimize soil disturbance. • Excavated materials will be managed within the work area to avoid blocking access routes, drains, or patient pathways. • Regular water sprinkling will be applied to exposed soil or loose material to control dust with increased frequency in drier areas such as DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank. • Refueling and maintenance of machinery will be carried out on impermeable surfaces or with drip trays to prevent soil contamination.	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	for drainage systems, sewerage lines, water supply pipelines, underground utilities, equipment foundations, and external works such as paving, landscaping, parking improvements, boundary walls, and underground water or septic tanks. Potential impacts may include localized erosion of exposed soil, temporary disruption of surface drainage, dust generation, and minor soil contamination from accidental spills of fuel, lubricants, wastewater, or construction waste. These impacts may be relatively more noticeable at DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank due to dry climatic conditions, loose soil surfaces, and wind-blown dust. At DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat), improper handling or storage of excavated material may obstruct drains and access routes, resulting in temporary accumulation of stagnant water and localized drainage issues within congested hospital surroundings. At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), hilly terrain and seasonal rainfall may result in localized soil erosion or sediment runoff from exposed excavated areas if not properly managed. Given the urban, developed, and compact nature of hospital sites, these impacts are expected to be low to moderate, site-specific, and short-term in nature.	• Construction waste and debris will be collected promptly and disposed of at approved locations to prevent contamination and obstruction. • At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), excavated material will be properly stockpiled, and exposed excavated areas will be backfilled promptly after completion of utility works to minimize localized soil erosion and sediment runoff during rainfall. • Equipment movement will be restricted to the immediate work area to avoid damage to surrounding paved or landscaped surfaces. • Disturbed areas, including small patches of soil along access routes, will be restored promptly with paving, landscaping, or other appropriate surface treatment. • Workers will be trained in dust control, spill prevention, and basic soil protection measures, and compliance will be monitored regularly.		

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	**Monitoring**
16.	**Community Health and Safety** During the hospital rehabilitation works across all the locations, minor excavation, material handling, and movement of equipment within operational hospital premises may pose risks to patients, visitors, staff, and nearby pedestrians. Potential impacts include: • Accidents from vehicle or equipment movement within hospital premises. • Exposure to dust, noise, and minor vibrations, particularly affecting vulnerable patients (children, elderly, or those with pre-existing conditions). • Localized contamination from accidental spills of fuel, lubricants, or construction materials. • Increased risk of communicable diseases among hospital users/visitors if hygiene, sanitation, and infection prevention measures are not maintained. • Slips, trips, falls, or collisions due to temporary obstacles or uneven surfaces. • Additional movement and access constraints at DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan) due to hilly terrain and relatively narrow access roads. • Enhanced dust exposure at relatively dry sites such as DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank because of dry climatic conditions and loose surface material. • Increased potential for congestion and pedestrian–vehicle interaction at DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat) due to	• Construction activities will be confined to clearly demarcated work areas, with restricted access through barricades and signage. • Safe and uninterrupted access for patients, staff, and emergency vehicles will be maintained at all times through phased works and designated routes. • Construction vehicle and equipment movement within hospital premises will be strictly controlled, and low speed limits will be enforced to minimize accident risks, particularly at DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), where access roads may be relatively narrow or sloping. • Dust, noise, and minor vibration will be minimized through water sprinkling, proper equipment maintenance, and scheduling of works during less sensitive hours with emphasis at DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank due to the higher potential for dust generation. • Additional coordination with Hospital Administration will be maintained at DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat) to safely manage pedestrian movement, emergency access, and construction activities within busy hospital premises. • All work areas near sensitive hospital units will be secured with barriers and warning signs to prevent accidental exposure across all sites • Good housekeeping will be maintained, including timely removal of debris, proper waste management, and prevention of water stagnation.	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	higher patient volumes and continuous hospital operations Impacts are expected to be moderate, site-specific, and short-term in nature.	• Refuelling and storage of fuels or lubricants will be carried out in controlled areas to prevent spills and contamination. • Additional movement safety measures including Traffic control personnel, directional signage, and controlled material transport will be implemented where internal access routes may be narrower or sloped. • Separate pedestrian pathways and construction access routes will be maintained to minimize interaction between hospital users and construction activities. • Workers will be trained on site safety, infection prevention, hygiene practices, and appropriate conduct within hospital premises. • A site-specific HSE Plan, IPC protocol, and GRM will be implemented at each hospital site to address safety concerns, complaints, and emergency situations. • A prior information will be provided to hospital staff and visitors regarding construction activities affecting access or movement. • Regular monitoring and supervision will be conducted to ensure compliance with environmental, health, and safety requirements throughout the rehabilitation period.		
17.	**Occupational health and safety** OHS risks are associated with minor rehabilitation works within operational hospitals, including small-scale excavation, utility works, equipment installation, and material handling. As hospitals will remain operational during construction, workers may also interact with patients, healthcare staff, and visitors,	• All works will be carried out in compliance with applicable occupational health and safety regulations and international good practices. • PPE including helmets, gloves, safety footwear, masks, goggles, and high-visibility vests will be provided and its use will be strictly enforced. • The Contractor shall prepare and implement OHS Plan, IPC Plan, and Emergency Response Plan (ERP) before commencement of works.	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	increasing the need for effective safety and infection prevention measures. Potential hazards include slips, trips, and falls; injuries from hand and power tools; exposure to dust, noise, and electrical hazards; manual handling injuries; and potential exposure to infectious agents while working in clinical areas. Improper handling of demolition debris, chemicals, or other hazardous materials may also pose health and safety risks. These risks will be managed through work area segregation, IPC measures, safe handling of hazardous materials, provision and use of appropriate PPE, emergency response arrangements, and prompt reporting and investigation of incidents, in accordance with the EMP and contractor's site-specific management plans. Impacts are expected to be moderate to high, site-specific, and short-term in nature.	• Workers will be trained through regular toolbox talks on hazard identification, safe work practices, equipment handling, infection prevention, and emergency procedures. • Active construction work areas will be secured with barricades, warning signage, and controlled access to prevent unauthorized entry and accidental exposure. • Hazardous materials, chemicals, fuels, and demolition wastes shall be identified, handled, stored, and disposed of in accordance with approved procedures and applicable regulations. • All machinery and equipment will be properly maintained, and safe operating procedures will be followed to minimize mechanical, electrical, and noise-related risks. • First aid facilities will be made available on-site, and arrangements will be ensured for prompt medical assistance in coordination with hospital services. • Good housekeeping will be maintained, including proper material storage, debris removal, and safe site layout to reduce risks of slips, trips, and falls. • Workers' health and hygiene will be monitored, including pre-employment fitness checks, use of existing sanitation facilities, and adherence to infection prevention protocols. Sanitation Plan is attached as **Annexure-IX.** • A designated safety supervisor will be assigned to monitor compliance, maintain records, and ensure implementation of all OHS measures.		
18.	**Generation of Solid Waste** Rehabilitation works within hospital premises will generate solid waste, including construction and	• Waste will be segregated at source into recyclable, reusable, and non-recyclable categories. • Waste will be stored in designated, covered containers to prevent littering, odor, and pest attraction.	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	demolition debris, excavated material, packaging waste, and domestic waste from contractor staff across all sites. Additional small quantities of construction-related waste may also arise from repair and upgrading activities. If not properly managed, this waste may result in localized hygiene issues, visual nuisance, blockage of drainage systems, and vector breeding within hospital premises. Impacts are expected to be moderate, site-specific, and short-term in nature.	• Construction debris and excavated material will be reused on-site where feasible (e.g., backfilling or levelling). • Non-hazardous waste will be disposed of through authorized municipal services, and open dumping or burning will be strictly prohibited. • Adequate waste collection bins will be provided at work areas and designated staff zones. • Hazardous waste (e.g., oils, lubricants, chemicals) will be stored separately and disposed of through licensed contractors. • Good housekeeping practices will be maintained to prevent accumulation of waste and debris within hospital premises. • Loose waste, spoil, and demolition debris will be covered during transport and storage, particularly at relatively dry and windy sites such as DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank. • Special care will be taken at DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), to prevent disposal or stockpiling of debris near drainage paths or sloping areas where runoff or blockage may occur. • Workers will be trained on proper waste handling, segregation, and site responsibilities. • Waste management practices will be regularly monitored as part of the contractor's EMP. • Roles and responsibilities for waste management will be clearly defined in the contractor's Code of Conduct and site procedures. A comprehensive plan for construction waste management shall be prepared for construction stage (framework plan attached as **Annexure-X**).		

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
19.	**Generation of Wastewater** The project will generate small quantities of wastewater from activities such as minor excavation and utility works, limited concrete mixing or patching, equipment cleaning, and domestic use by contractor staff. If not properly managed, wastewater generated during rehabilitation activities may lead to localized contamination of hospital grounds, drains, and surrounding surfaces; blockage of drainage systems; formation of stagnant water; odour generation; and increased risk of vector breeding, thereby affecting hygiene and sanitation conditions within hospital premises across all project sites. At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), hilly terrain and seasonal rainfall may increase the potential for localized runoff from work areas if wastewater and drainage are not properly managed. At DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank, improper wastewater handling may contribute to localized straining, soil contamination, and unsanitary conditions around work areas due to the relatively dry environmental conditions. Impacts are expected to be moderate, site-specific, and short-term in nature	• Existing hospital sanitation facilities will be utilized by workers where feasible and approved by hospital administration to avoid the need for temporary sanitation arrangements. • Construction-related wastewater (e.g., concrete wash, equipment cleaning, oils, and lubricants) will be collected and managed in designated areas and will not be discharged into hospital drains or surrounding areas. • Designated equipment and vehicle cleaning areas will be established with appropriate containment measures such as sediment traps or oil-water separators. • Fuels, oils, and chemicals will be stored on impermeable surfaces with secondary containment to prevent leakage and contamination. • Stormwater will be prevented from entering work areas to prevent waterlogging, mixing with wastewater, and potential contamination. • Special drainage and runoff management measures will be implemented at DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital Dassu (Upper Kohistan), to control wastewater movement on sloping terrain and minimize erosion or sediment transport. • Non-potable water will be reused where feasible for dust suppression and minor construction activities. • Good housekeeping practices will be maintained to prevent wastewater accumulation, blockages, or stagnant water within hospital premises. • Workers will be trained on water conservation, hygiene, and proper wastewater handling practices.	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
		• Drainage systems and wastewater handling practices will be regularly inspected to identify and address leaks, blockages, or contamination risks. • A site-specific wastewater management approach will be implemented in coordination with hospital administration, and records of wastewater generation and disposal will be maintained. • All wastewater management practices will comply with applicable environmental regulations and hospital sanitation standards.		
20.	**Impact on Water Resources** The activities within existing hospital premises such as minor excavation, utility upgrades, and equipment installation may result in limited and localized impacts on water resources across all project sites. Key considerations include: • Localized runoff from disturbed surfaces, cement works, or equipment cleaning, which may enter internal drainage systems if not properly controlled. • Risk of minor contamination from accidental spills of fuel, oil, or chemicals, potentially affecting soil or stormwater drains. • Slight increase in water demand for construction-related activities; however, this remains minimal due to the small workforce and short duration of works. • Continued reliance on existing hospital water supply and sewerage systems, with wastewater routed through established plumbing to municipal systems and no direct discharge to natural water bodies. • At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ	• Workers will utilize existing hospital sanitation facilities, eliminating the need for temporary arrangements and preventing uncontrolled wastewater discharge. • Construction-related wastewater (e.g., from concrete works, equipment cleaning, or minor activities) will be collected and managed in designated areas and will not be allowed to mix with hospital sewage or enter storm drains. • Equipment and vehicles will be cleaned only in designated service areas equipped with appropriate containment measures such as sediment traps and oil-water separators. • Fuels, oils, and chemicals will be stored on impermeable, bunded surfaces and kept away from drainage lines. • Spill prevention and response procedures will be implemented, and workers will be trained in spill containment, cleanup, and reporting. • Runoff from minor excavation or disturbed areas will be controlled through proper housekeeping, prompt backfilling of excavations, and protection of nearby drainage inlets to prevent sediment or contaminants from entering drainage systems. • At DHQ Hospital Battagram, DHQ Hospital Chitral, DHQ Hospital Alpuri (Shangla), and DHQ Hospital	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	Hospital Dassu (Upper Kohistan), hilly terrain and rainfall runoff may increase the risk of sediment transport and localized drainage disturbance if exposed areas are not adequately controlled. • At relatively dry sites such as DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank, water demand for dust suppression may be comparatively higher during peak construction activities. Impacts are expected to be low to moderate, site-specific, and short-term in nature.	Dassu (Upper Kohistan), excavated material will be properly stockpiled and managed to minimize localized runoff and sediment movement during rainfall. • Construction materials, debris, and excavated spoil will not be stored near drainage channels or water pathways to avoid blockage and contamination. • Water consumption for construction activities will be minimized, monitored, and managed efficiently, and workers will be encouraged to follow water conservation practices, particularly at relatively dry sites such as DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank. • Existing hospital sewerage connections will be maintained, and no direct discharge into natural water bodies or open drains will occur. • Regular inspections will be carried out to ensure proper functioning of drainage systems and compliance with environmental regulations and hospital sanitation protocols.		
21.	**Hazardous Waste Management** Generation of hazardous waste is expected to be limited in scale, primarily associated with equipment maintenance, minor rehabilitation activities, and the controlled use of small quantities of chemical products within hospital premises. Presence of Asbestos Containing Materials (ACM) may also pose hazardous impacts if disturbed or removed during rehabilitation works. Key potential impacts include:	• Fuels, oils, and chemicals will be stored in designated, bunded areas on impermeable surfaces, away from drains and sensitive hospital utilities. • Cement wash water and chemical residues will be collected in sealed containers and will not be discharged into hospital drainage systems; disposal will be carried out through approved waste management channels. • Spill prevention and response measures will be implemented, including availability of spill kits and training of personnel in containment, clean-up, and reporting procedures.	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	**Monitoring**
	• Localized contamination of soil and drainage systems due to accidental spills, leaks, or improper disposal of hazardous substances. • Deterioration of environmental quality within hospital premises, including risks of odor, staining, or unsafe conditions if hazardous waste is not properly contained. • Potential health and safety risks to workers and hospital users from exposure to toxic, flammable, or irritant substances, particularly in confined or sensitive areas. • Asbestos exposure may release asbestos fibers, posing potential occupational and public health risks to workers, patients, hospital staff, and visitors. • Blockage or damage to drainage infrastructure if hazardous residues (e.g., cement slurry or chemicals) enter the drainage system. Impacts are expected to be moderate, site-specific, and short-term in nature.	• Hazardous materials and wastes will be clearly labelled, segregated, and handled using appropriate PPE. • Regular inspections will be conducted to identify leaks, damaged containers, or unsafe storage and handling practices. • Hazardous waste generated in small quantities will be removed from site promptly through licensed contractors for safe treatment and disposal. • All hazardous waste management practices will comply with applicable provincial environmental standards (NEQS) and hospital safety protocols. • Where ACMs are identified, an Asbestos Management Plan (AMP) will be implemented before commencement of work. • ACMs will be removed, handled, and disposed of by licensed/authorized contractors and trained personnel, with appropriate PPE, fiber-control measures, and access controls in place. • ACMs will not be broken, reused, or incorporated into the works. Asbestos waste will be securely packaged, transported, and disposed of at an authorized facility, with disposal records maintained.		
22.	**Disturbance to Hospital Services and Shifting of Units** The proposed revamp works within an operational hospital setting may result in temporary disruption to routine healthcare services and necessitate the relocation of certain functional units during construction activities. Such disruptions may affect patient flow, internal circulation, waiting areas, access to healthcare services, and operational efficiency	• A comprehensive service continuity plan will be prepared in coordination with hospital administration, identifying relocation strategies for affected units; • Temporary functional arrangements will be established within available spaces to maintain uninterrupted delivery of critical healthcare services; • Construction activities will be scheduled to avoid peak operational hours, where feasible; • Clear wayfinding signage and information dissemination will be implemented to ensure safe	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	within hospital premises. Disruptions may be relatively more pronounced at DHQ Hospital Mardan, King Abdullah Teaching Hospital Mansehra, DHQ Hospital Batkhela (Malakand), and DHQ Hospital Saidu Sharif (Swat) due to patient influx, continuous emergency movement, and limited availability of space for temporary arrangements for relocation of services. Comparatively lower levels of disruption are anticipated at DHQ Hospital Hangu, DHQ Hospital Lakki Marwat, and DHQ Hospital Tank, where relatively lower patient volumes and less congested hospital layouts are expected to facilitate phased rehabilitation works. Impacts are expected to be high, site-specific, and short-term in nature.	and efficient movement of patients, staff, and visitors; • Continuous coordination with hospital management will be maintained to ensure uninterrupted operation of emergency and essential services at all locations. • Service continuity plan is attached as **Annexure-XI.**		
23.	**Disturbance to Utilities** The activities may involve tie-ins, minor excavation, and replacement or upgrading of existing utility connections, which could lead to temporary disruption of essential services including electricity, water supply, sewerage, medical gases, communication systems, and drainage. Such interruptions may affect critical hospital functions such as operation theaters, wards, laboratories, and emergency services if not properly managed. There is also a risk of accidental damage to underground or concealed utilities (e.g., pipelines, cables, or drainage lines), which could result in service	• Hospital administration staff and patients will be informed in advance of any planned utility interruptions, and regular updates will be provided during works to ensure awareness, maintain safety, and minimize disruption to hospital operations. • Tie-ins, repairs, or service interruptions will be scheduled during off-peak hours or planned maintenance windows to minimize impact on hospital operations. • All utility works will be performed by qualified and authorized personnel following safety and technical standards. • Exposed or nearby utility lines will be protected with physical barriers, clear markings, and warning signage during construction activities. • Backup systems, including generators, water storage, and alternative communication lines, will	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	**Monitoring**
	outages, safety hazards, or localized flooding/contamination within hospital premises. Impacts are expected to be moderate to high, site-specific, and short-term in nature.	be maintained to ensure continuity of critical hospital services during planned outages. • Hospital administration will be immediately notified in case of accidental utility damage to enable rapid restoration. • All utility works, temporary disruptions, and restoration timelines will be documented for monitoring, reporting, and accountability.		
24.	**Disposal of Mucking Material** Mucking material will be generated from minor excavation works within existing hospital premises for utility repairs, drainage improvement, foundation adjustments, or small-scale civil rehabilitation. The excavated material will primarily consist of soil, broken concrete, masonry debris, and small quantities of dismantled pipes or pavement. If not properly managed, temporary impacts may include: • Obstruction of internal hospital access roads or walkways • Dust generation affecting patients, staff, and visitors • Visual nuisance within hospital premises • Potential hygiene concerns if mixed with wastewater or old drainage lines Impacts are expected to be low to moderate, site-specific, and short-term in nature.	• Excavated soil suitable for reuse will be used for backfilling or leveling within hospital premises where feasible. • Excess or unsuitable material will be promptly removed to approved municipal or licensed disposal sites. • Temporary stockpiles, if unavoidable, will be placed away from access routes, covered, and regularly watered to control dust and runoff. • All excavation and waste material will be stored in designated areas within the hospital premises to prevent obstruction and safety hazards. • Trucks transporting debris will be covered to avoid spillage during transit. • Records of quantities, storage locations, and disposal will be maintained for monitoring and compliance. • Hospital staff and administration will be informed of storage locations and disposal schedules to ensure safety and minimal disruption. • Construction personnel will be trained on safe handling of muck, debris, and minor hazardous materials to prevent contamination or accidents.	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
25.	**Emergency Preparedness and Response** Rehabilitation works under project are small to medium scale but occur within operational hospital facilities. Key potential risks include: **A. Workplace and Fire Emergencies** • Injuries to workers from excavation, working at heights, electrical works, or equipment handling. • Fire hazards from welding, electrical short circuits, or improper storage of fuels and chemicals. • Temporary obstruction of hospital access routes affecting ambulances and emergency response. • Accidental damage to internal utilities (electricity, water, medical gases). • Exposure of patients, staff, or visitors to unsafe work zones. **B. Natural and Man-Made Disasters** • Earthquakes, floods, or extreme weather events causing injuries, damage to hospital infrastructure, and disruption of healthcare services. • Accidental incidents (e.g., chemical spills, structural failures) posing health and safety risks to staff, patients, visitors, and workers.	**A. Workplace and Fire Emergencies** • A site-specific Health, Safety, and Emergency Response Plan (ERP) will be developed and implemented. • Risk assessments and job safety analyses will be conducted prior to commencement of works. • Adequate PPE will be provided and its use will be strictly enforced. • Workers will be trained on emergency procedures, fire safety, and evacuation protocols. • Flammable materials will be stored securely in ventilated areas away from patient care zones. • Fire extinguishers, first aid kits, and clear ambulance and emergency access will be maintained at all times. • Active work zones will be barricaded and clearly signposted to prevent unauthorized access. • Utility mapping will be completed prior to excavation to avoid accidental damage. • Coordination with hospital administration will be maintained for planned outages and emergency drills. • Backup power and water systems will be utilized to ensure continuity of hospital services. • Work schedules will be adjusted during extreme weather conditions to ensure safety. • All incidents, near-misses, and corrective actions will be documented and reported. **B. Natural and Man-Made Disasters**	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	Impacts are expected to be high, site-specific, and short-term in nature.	• The Emergency Response Plan (ERP) will be aligned with local emergency services, fire, and medical authorities to ensure rapid response. • Periodic simulation drills will be conducted for hospital staff, patients, and contractors to prepare for evacuation and emergency situations. • Key emergency contact numbers and procedures will be prominently displayed throughout hospital premises and construction zones. • Hospital staff, contractors, and workers will be trained on disaster response and emergency procedures. • Incident reporting procedures will be implemented for near-misses and hazards, with prompt corrective actions taken. This comprehensive approach ensures the safety of patients, staff, visitors, and workers, while maintaining uninterrupted healthcare services during hospital rehabilitation works. Detailed ERP procedures are provided in **Annexure-XII.**		
26.	**Flora and Fauna** No significant impacts on flora or fauna are anticipated, as the project is confined to existing hospital premises within an already developed urban or semi-urban environment. Minor temporary impacts on planted vegetation and urban-adapted fauna may occur due to construction activities, dust, noise. Any unavoidable vegetation removal will be compensated through plantation and landscaping using native	Care will be taken to minimize disturbance to urban-adapted fauna, particularly birds and small animals, through controlled construction activities, proper waste management, and restriction of major construction works to daytime hours.		

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	**Monitoring**
	species to enhance green cover and the overall site environment.			
27.	**Discovery of Heritage Sites/ Structures during Excavation** Given that the project site is an already developed hospital facility, the likelihood of encountering archaeological resources is very low. However, in the unlikely event of any chance archaeological discovery during limited excavation works, construction activities will be temporarily halted and relevant authorities will be informed in accordance with applicable regulations.	• The Chance-Find Procedure (**Annexure-XIII**) will be followed in case of any discovery of artifacts or culturally sensitive remains. • Work in the immediate area will be halted, and the site will be secured. • The contractor will notify the SC, who will coordinate with the relevant archaeology authority for assessment. • Works will resume only after clearance from the concerned authority. • Workers will be briefed to identify and report any potential heritage finds. These measures will ensure appropriate handling of rare discoveries with minimal disruption to hospital operations.	Contractor in consultation with Department of Archeology	SC and PMIU
28.	**Social/ Cultural Conflicts** A limited number of skilled and unskilled workers (approximately 25 per site) will be engaged for the project, with the majority sourced locally or from existing contractor personnel, thereby minimizing labor influx. However, the temporary presence of workers within operational hospital premises may lead to minor social and institutional risks. These include potential disruption due to differences in behavior or cultural practices, minor community safety concerns related to worker movement, and public health risks such as transmission of	• Prioritize recruitment of local workers and existing contractor staff to minimize labor influx and reduce potential social tensions. • Provide induction and training for all workers on local customs, hospital rules, hygiene, infection prevention, and respectful behavior. • Limit worker movement to designated work areas and restrict entry into sensitive hospital zones to prevent disruption to staff, patients, and visitors. • Plan and phase construction activities to minimize prolonged presence of workers in high-traffic or sensitive hospital areas. • Implement hygiene measures, use of hospital sanitation facilities, and regular health screening to	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	communicable diseases if hygiene and infection prevention measures are not maintained. Impacts are expected to be low to moderate, site-specific, and short-term in nature.	reduce risks of communicable disease transmission. • Maintain accessible channels for hospital staff and visitors to report issues or concerns related to worker behavior or social conflicts. • Conduct regular oversight to ensure compliance with behavioral standards, site rules, and health protocols, with corrective actions applied as needed.		
29.	**GBV, Child Labour and Forced Labour** Although labor influx is limited, there remains a risk of inappropriate worker conduct, including harassment or gender-based violence (GBV), which may affect hospital staff, patients, or visitors, particularly women and vulnerable groups. There is also a likelihood of child labor engagement, forced labour or other non-compliance with labor regulations, which could result in reputational and legal implications. Impacts are expected to be moderate to high, site-specific, and short-term in nature.	• Contractors will comply with national labor laws, including prohibition of child labor (<15 years) and restrictions on hazardous work for adolescents, and all bidding documents will reflect these requirements. • Workers will sign an individual Code of Conduct (CoC) prior to deployment, and contractors will enforce CoCs addressing gender-based violence (GBV), sexual exploitation and abuse (SEA), and sexual harassment (SH). • Mandatory induction and periodic training will be provided on professional behavior, gender sensitivity, GBV prevention, and consequences of violations. • Access to sensitive hospital areas will be controlled to prevent unauthorized entry by workers. • A confidential GRM will be established, including female-friendly reporting channels within hospital settings, for staff, patients, and community members. • Contractors will prioritize hiring local adult labor to minimize labor influx risks.	Contractor	SC and PMIU

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	**Monitoring**
		• Non-compliance with CoC or labor provisions will result in penalties, suspension, or contract termination. • Regular supervision and monitoring will be conducted to ensure adherence to CoCs and corrective actions applied as needed.		
Operation Phase				
30.	**Water Supply & Usage** Hospital operations require substantial water for patient care, sanitation, HVAC systems, cleaning, and other daily activities. Overuse or inefficient water management can strain local water resources, reduce availability for surrounding communities, and increase operational costs. Improper storage or handling may also risk contamination of potable water supplies. Impacts are expected to be moderate, site-specific, and long-term in nature.	• Water-efficient fixtures, taps, and appliances will be installed. • Regular maintenance of plumbing systems will be conducted to prevent leaks and wastage. • Potable and non-potable water systems will be kept separate and secure to prevent contamination. • Periodic monitoring of water consumption, supply pressures, and water quality will be carried out to ensure adequacy and early detection of contamination. • Awareness measures, including signage and staff orientation, will be implemented to promote water conservation among hospital staff and visitors.	Hospital Administration	Health Department
31.	**Wastewater and Sewage** Hospitals operations will generate municipal and biomedical effluent that, if improperly treated or discharged, may contaminate soil, groundwater, or receiving water bodies. Chemical, biological, and pharmaceutical constituents in effluents may harm aquatic ecosystems and public health. Impacts are expected to be high, site-specific, and long-term in nature.	• On-site pretreatment systems for medical and laboratory wastewater will be installed and operated prior to discharge. • Wastewater streams will be segregated at source into domestic (sanitary) and medical/laboratory effluents. Domestic sewage will be discharged into municipal sewers, while medical and laboratory effluents will be pretreated prior to safe disposal. • Wastewater quality will be regularly monitored to ensure compliance with NEQS and IFC standards.	Hospital Administration	Health Department

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	**Monitoring**
		• Staff will be trained on proper handling, segregation, and disposal of wastewater to maintain hygiene and safety. • Plumbing and treatment systems will be periodically maintained to prevent leaks, blockages, and contamination.		
32.	**Solid Waste Generation** Hospital operations generate various categories of solid waste, including infectious and pathological waste, sharps, pharmaceutical waste, chemical waste, general domestic refuse, and packaging materials. Inadequate segregation, handling, storage, or disposal may result in environmental contamination, occupational health risks, vector breeding, and potential public health impacts on surrounding communities. Impacts are expected to be high, site-specific, and long-term in nature.	• Waste will be segregated at source into infectious, hazardous, and general waste streams in accordance with Hospital Waste Management Rules, 2005. • Color-coded, labeled, and covered containers will be provided for safe temporary storage in designated areas. • Waste will be collected regularly and disposed of through licensed medical and municipal waste contractors, with separate handling for hazardous and general waste. • Hospital staff will be trained periodically on proper waste segregation, handling, and emergency response procedures. • A Hospital Waste Management Plan will be implemented and maintained in line with Hospital Waste Management Rules, 2005 and WHO guidelines, including record-keeping and monitoring • Existing deficiencies in healthcare waste management will be addressed through implementation of the CAP (Section 9.13)	Hospital Administration	Health Department
33.	**Energy Consumption and Air Quality** Hospital operations including lighting, HVAC systems, diagnostic and life-support equipment create high electricity demand. Power outages or unreliable	• Energy-efficient lighting, HVAC systems, and medical equipment will be implemented to optimize electricity consumption.	Hospital Administration	Health Department

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	**Monitoring**
	supply can disrupt critical services, especially in ICUs, operating theaters, and laboratories. Backup generators may be needed during outages, which can emit pollutants affecting indoor and outdoor air quality. Energy use also contributes to the hospital's overall environmental footprint. Impacts are expected to be moderate to high, site-specific, and long-term in nature.	• Backup generators will be installed in properly ventilated enclosures with automatic switchover, and will be regularly maintained to ensure operational readiness. • Solar photovoltaic panels and other renewable energy sources will be integrated, where feasible, to support critical units and reduce reliance on fossil fuels. • Energy consumption will be monitored, and HVAC and lighting operations will be optimized to minimize energy use. • Air quality near generator exhausts and ventilation intakes will be periodically monitored to ensure compliance with environmental and occupational standards. • Records of generator operation, maintenance, and emissions will be maintained as part of the EMP.		
34.	**Noise Pollution** Hospital operations may generate noise from medical equipment, backup generators, ambulance movements, and general operational activities. Elevated noise levels may adversely affect patient recovery, staff performance, and nearby residential receptors if not properly managed. Impacts are expected to be moderate, site-specific, and long-term in nature.	• Regular maintenance and proper operation of medical equipment and generators will be ensured to minimize noise emissions. • Soundproofing materials and acoustic enclosures will be installed in sensitive areas such as ICUs, operating theaters, and generator rooms. • Generators will be located in designated areas with appropriate noise attenuation measures. • Non-essential high-noise activities will be scheduled during daytime hours where feasible. • Hospital staff will be trained and encouraged to implement noise minimization practices throughout the premises.	Hospital Administration	Health Department
	Traffic and Accessibility Increased movement of patients, visitors, ambulances, and service vehicles may result in traffic	• Clearly designated entry and exit points will be established, with organized parking to streamline vehicle movement.	Hospital Administration	Health Department

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	**Monitoring**
	congestion near hospital entrances, delays in emergency response, and elevated road safety risks for pedestrians and motorists. Impacts are expected to be moderate to high, site-specific, and long-term in nature.	• Coordination with local traffic authorities will ensure smooth traffic flow and unobstructed emergency access. • Adequate signage, road markings, and designated pedestrian pathways will be provided to enhance safety. • Separate routes and loading areas will be maintained for service and supply vehicles to prevent interference with patient and visitor traffic. • Clear access corridors for ambulances and emergency vehicles will be maintained at all times.		
35.	**Patient and Staff Safety** Hospital operations present occupational and public safety risks, including exposure to infectious and biohazardous materials; electrical hazards; fire risks; slips, trips, and falls; and equipment-related accidents. Vulnerable groups such as children, elderly patients, pregnant women, and individuals with limited mobility may be particularly susceptible to injury. Impacts are expected to be moderate to high, site-specific, and long-term in nature.	• Conduct regular safety inspections, risk assessments, and hazard audits across all hospital facilities. • Install and maintain clear safety signage, handrails, non-slip flooring, adequate lighting, and emergency illumination systems. • Implement fire safety systems, including alarms, extinguishers, and evacuation procedures, and test them periodically. • Provide ongoing training to staff on occupational health and safety (OHS), IPC, and emergency response protocols. • Ensure PPE is available and correctly used by staff handling biohazardous or hazardous materials. • Maintain robust incident reporting and corrective action procedures. • Existing gaps in fire safety preparedness will be addressed through CAP actions related to emergency response planning, training, and periodic drills.	Hospital Administration	Health Department
36.	**Infection Control and Public Health** Hospital environments are inherently susceptible to communicable disease transmission. Inadequate	• Comprehensive IPC protocols will be implemented and enforced in accordance with WHO and national health guidelines.	Hospital Administration	Health Department

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	**Monitoring**
	hygiene practices, overcrowding, poor ventilation, or improper handling of infectious materials may increase the risk of healthcare-associated infections (HAIs) among patients, staff, and visitors. Impacts are expected to be high, site-specific, and long-term in nature.	• Routine cleaning, disinfection, and sterilization of medical instruments, high-touch surfaces, and patient care areas will be carried out. • Ventilation systems, including upgraded HVAC units, will be maintained fully functional, particularly in wards, operating theaters, ICUs, and isolation rooms. • Dedicated isolation facilities for infectious patients will be provided to prevent cross-contamination. • Regular staff training on IPC practices, hand hygiene, and proper use of PPE will be conducted, with continuous compliance monitoring. • Public health awareness among patients and visitors will be promoted through clear signage and informational materials.		
37.	**Environmental and Community Impacts** Improper operational practices, such as uncontrolled waste disposal, excessive energy or water use, and traffic congestion, can indirectly affect the surrounding community's environment and quality of life. Hospital operation may attract informal services (food vendors, parking attendants), which could increase local congestion, littering, or minor social conflicts. Impacts are expected to be moderate, site-specific, and long-term in nature.	• Continuous monitoring of water, waste, air, and noise parameters will be carried out. • Community engagement and a GRM will be maintained for timely resolution of complaints. • Sustainable hospital management practices will be adopted to minimize negative impacts. • Informal vendor activities around the hospital will be regulated and monitored. • Designated service areas for vendors will be provided. • Local communities will be engaged in awareness programs about hospital operation norms.	Hospital Administration	Health Department
38.	**Noise and Odor from pretreatment of Medical Waste** Operation of on-site medical waste management activities, including autoclaving, laundry, and sterilization units, may generate localized noise and occasional odors. If not adequately controlled, these	• Enclosed and properly ventilated treatment and sterilization units will be installed to minimize noise and odor emissions. • Adequate spatial separation shall be maintained between noise-generating facilities and sensitive areas such as wards and ICUs will be appropriately sited away from patient wards, where feasible.	Hospital Administration	Health Department

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	may affect hospital staff, patients, and nearby sensitive receptors. Impacts are expected to be low to moderate, site-specific, and long-term in nature	• Regular inspection and preventive maintenance of equipment will be conducted to reduce operational noise and fugitive emissions. • Non-essential high-noise activities will be scheduled during daytime hours, where practicable. • Operational performance will be monitored to ensure compliance with applicable environmental standards and hospital waste management procedures.		
39.	**Staff and Visitor Traffic Management** Congestion at parking areas, ambulance bays, and main entrances can lead to delays, stress, and increased risk of accidents, especially during emergencies. Impacts are expected to be moderate to high, site-specific, and long-term in nature.	• Clear drop-off and pick-up zones will be defined. • Signage will be provided, and traffic management personnel will be deployed to regulate flow. • Separate access routes for emergency vehicles, staff, and visitors will be established to reduce conflicts.	Hospital Administration	Health Department
40.	**Emergency Preparedness and Disaster Management** **A. Natural Disasters** Natural disasters such as earthquakes or floods may cause structural damage, injuries, and operational disruptions. Impacts are expected to be high, site-specific, and long-term in nature. **B. Fire Safety** Fires due to electrical faults, flammable chemicals, or oxygen cylinders may threaten patients, staff, and nearby communities. Impacts are expected to be high, site-specific, and long-term in nature.	• Compliance with the Seismic Building Code of Pakistan (SBC-2021) will be ensured. • An Emergency Response Plan (ERP) will be implemented, with staff training and periodic drills conducted. • Emergency equipment and contact numbers will be clearly displayed. • Minor incidents and near-misses will be logged to inform preventive measures. • Comprehensive fire detection and suppression systems will be installed and maintained. • Fire drills and emergency evacuation plans for staff and patients will be conducted regularly. • Flammable materials will be stored and handled safely.	Hospital Administration	Health Department

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	**Monitoring**
		• Clear signage for fire exits and emergency routes will be provided.		
41.	**Climate Change Impacts** The hospitals are located across districts with diverse topographic and climatic conditions and are exposed to varying climate change and disaster-related hazards. The hospitals in Battagram, Mansehra, Shangla, and Dassu (Upper Kohistan) are particularly vulnerable to intense rainfall, flash floods, landslides, slope instability, and disruption of road access, while Chitral is exposed to extreme temperatures, heavy precipitation, flash floods, landslides, and, in higher-altitude areas, glacial lake outburst flood (GLOF) and snow-related hazards. The hospital in Batkhela, Malakand may be affected by extreme heat, intense rainfall, flash flooding, landslides, and windstorms, whereas Mardan and Saidu Sharif are vulnerable to extreme heat, intense rainfall, localized and riverine flooding, and associated water and vector-borne disease risks. The hospitals in Lakki Marwat and Tank are comparatively more exposed to extreme heat, prolonged dry periods, drought, water scarcity, and dust storms, with intense rainfall and flash flooding also posing episodic risks. These climate-related hazards may damage hospital buildings and critical infrastructure, disrupt	The proposed design incorporates climate-resilient measures, including improved drainage and flood protection, energy-efficient HVAC and lighting, rooftop solar PV with backup power, adequate water storage and filtration, and strengthened emergency preparedness. In landslide-prone areas, appropriate site protection and slope stabilization measures will be provided where required to enhance hospital resilience and continuity of essential healthcare services.	Hospital Administration	Health Department

Sr. No.	Impacts	Mitigation Measure	Responsibility	
			Implementation	Monitoring
	access and essential utilities including electricity, water supply, sanitation, drainage, and communications, and affect the reliability and operation of medical equipment. Flooding, landslides, and extreme weather may restrict the movement of patients, staff, emergency vehicles, and medical supplies, while heatwaves, water shortages, and deteriorating environmental conditions may increase pressure on healthcare services and contribute to heat-related illnesses, infectious and vector-borne diseases, and other climate-sensitive health conditions. Such hazards may also disrupt the supply of medicines and medical consumables and compromise the continuity of essential healthcare services, particularly emergency and critical care. The overall climate change impacts are expected to be moderate to high, site-specific, and potentially long-term, with the level of exposure varying according to the location, elevation, terrain, drainage conditions, and resilience of individual hospital facilities.			

9.8 MONITORING PLAN

604. To ensure the effective implementation of mitigation measures, a monitoring plan will be integrated with the mitigation plan across all stages of the project. The Contractor will conduct continuous field-level monitoring, while the SC will review and validate the Contractor's monitoring activities to ensure compliance and effectiveness.

9.8.1 Monitoring Mechanism

605. Safeguard monitoring is an essential tool for assessing whether the adopted environmental and social management measures are meeting their stated objectives. Two complementary methodologies shall be applied to monitor the proposed actions under the EMP:

- Compliance monitoring: To check the compliance of actions proposed by the EMP by visual observation, photographic documentation and the use of checklists etc.; and
- Effects monitoring: To monitor the consequences of program/activities on the biophysical and social environment; as applicable, the effects are repeatedly measured by applying selected indicators.

606. Monitoring will be carried out to ensure that the mitigation plans are regularly and effectively implemented. It will be performed at three levels. C&W through PMIU will ensure EMP monitoring regularly to ensure that the mitigation plans are being effectively implemented SC will monitor regularly the mitigation plans are being effectively implemented. At contractor's level, the environmental monitoring checklist will be filled on daily basis by their environmental manager.

9.8.2 Monitoring Plan

607. Monitoring plan during pre-construction and construction phases of the project is proposed to establish the baseline condition and ensure contractors compliance with the mitigation measures and evaluation along with the monitoring indicators and frequency **(Table 9.3)** whereas instrumental monitoring and testing in **Table 9.4.**

608. The monitoring plan for the construction phases is designed to ensure the Contractor's compliance with prescribed mitigation measures. It also defines monitoring indicators and monitoring frequency, as presented in **Table 9.3.** Instrumental monitoring and laboratory testing requirements are provided separately in **Table 9.4.**

Table 9.3: Environmental Monitoring Schedule

Sr. No.	Receptor	Monitoring Parameters / Performance Indicator	Locations	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility	
						Implementation	Supervision
1.	Water Resources/ Water Quality	Compliance with all parameters as per NEQS.	Monitoring locations will be finalized by the Contractor in the site-specific EMP, subject to approval by the SC.	Visual checks of laboratory activities Discrete grab sampling and laboratory testing of water samples by KP-EPA approved Laboratory for monitoring.	Once before the start of construction activity On quarterly basis during the construction	Contractor (through KPEPA-approved laboratory)	Supervision Consultant (SC); PMIU
2.	Soil Contamination	Soil contamination, uncontrolled solid waste disposal activities at sites.	Monitoring locations will be finalized by the Contractor in the site-specific EMP, subject to approval by the SC.	Visual observations and checks of laboratory activities Sampling and laboratory testing for soil samples.	Once before the start of construction activity On quarterly basis during the construction	Contractor	Supervision Consultant (SC); PMIU
3.	Dust Emissions	Compliance with PM_{10} $PM_{2.5}$ per NEQS	Monitoring locations will be finalized by the Contractor in the site-	Visual checks of laboratory activities	Once before the start of construction activity	Contractor (through KPEPA-approved laboratory)	Supervision Consultant (SC); PMIU

Sr. No.	Receptor	Monitoring Parameters / Performance Indicator	Locations	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility	
						Implementation	Supervision
			specific EMP, subject to approval by the SC.	Onsite Ambient Air Monitoring equipment	On quarterly basis during the construction		
4.	Noise Pollution	Compliance with dBA Leq. as per NEQS	Monitoring locations will be finalized by the Contractor in the site-specific EMP, subject to approval by the SC.	Visual checks of laboratory activities Monitoring of noise level at site.	Once before the start of construction activity On quarterly basis during the construction	Contractor (through KPEPA-approved laboratory)	Supervision Consultant (SC); PMIU
5.	Fumes and Gases	Monitoring of CO, CO_2, SO_x, NO_x, HC and $PM_{2.5}$ PM_{10} and compliance with NEQS Vehicular emissions as per NEQS	Monitoring locations will be finalized by the Contractor in the site-specific EMP, subject to approval by the SC.	Visual checks of laboratory activities Onsite monitoring of ambient air quality will be preferred.	Once before the start of construction activity On quarterly basis during the construction	Contractor (through KPEPA-approved laboratory)	Supervision Consultant (SC); PMIU
6.	Ecological Resources	Disturbance to natural habitat, uncontrolled floral cutting which can be avoidable. Implementation of Plantation Plan Fauna and avifauna	Monitoring locations will be finalized by the Contractor in the site-specific EMP, subject to approval by the SC.	Visual checks to ensure that only marked trees are cut within the Project Boundary Monitoring of animals /	Once prior to the start of construction Monitoring and reporting on monthly basis during the construction stage.	Contractor	Supervision Consultant (SC); PMIU

Sr. No.	Receptor	Monitoring Parameters / Performance Indicator	Locations	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility	
						Implementation	Supervision
		rehabilitation program		birds hunting.			

Table 9.4: Instrumental Monitoring and Lab Testing

Item No.	Components	Parameters	No. of Samples	Frequency	Duration	Amount (Rs.)
A	**Construction Phase (24 Months)**					
1	**Air Quality**	CO, NO_2, SO_2, Lead, Ozone, SPM. $PM_{2.5}PM_{10}$	1	Quarterly	24 hours	520,000/-@ Rs. 65,000/ sample
2	**Drinking Water Quality**	Total Coliforms, Fecal E. Coli, TotalColiform Bacteria, pH, TDS, Total Hardness, Taste, Turbidity, $CaCO_3$, Aluminium, Arsenic, Barium, Cadmium, Chloride, Chromium, Copper, Cyanide, Fluoride, Lead, Manganese, Mercury, Nickel, Nitrate, Nitrite, Selenium, Residual Chlorine, Zinc, Phenolic Compound as Phenols	1	Quarterly	-	256,000/- @ Rs. 32,000/sample
3	**Waste Water Quality**	Temprature, pH, Colour, TSS, TDS, Alkalinity, BOD_5, COD, Grease and Oil, Phenolic Compounds, Chlorides, Fluorides, Cyanide, An-ionic detergents, Sulphate, Sulphides, Ammonia, Calcium, Cadmium, Chromium, Lead, Mercury, Selenium, Nickel, Silver, Zinc, Arsenic, Barium, Iron, Manganese, Boron, Chlorine Total	1	Quarterly	-	256,000/- @ Rs. 32,000/sample
4	**Noise Level**	-	1	Quarterly	24 hours	40,000/-@ Rs. 5,000/point
					Sub-Total (A)	**1,072,000**
B	**Operation (For One year)**					
1	**Air Quality**	CO, NO2, SO2, Lead, Ozone, SPM. PM2.5PM10	1	Once	24 hours	65,000/-@ Rs. 65,000/ sample

2	**Drinking Water Quality**	Total Coliforms, Fecal E. Coli, Total Coliform Bacteria, pH, TDS, Total Hardness, Taste, Turbidity, $CaCO_3$, Aluminium, Arsenic, Barium, Cadmium, Chloride, Chromium, Copper, Cyanide, Fluoride, Lead, Manganese, Mercury, Nickel, Nitrate, Nitrite, Selenium, Residual Chlorine, Zinc, Phenolic Compound as Phenols	1	Once	-	32,000/- @ Rs. 32,000/sample
3	**Waste Water Quality**	Temprature, pH, Colour, TSS, TDS, Alkalinity, BOD_5, COD, Grease and Oil, Phenolic Compounds, Chlorides, Fluorides, Cyanide, An-ionic detergents, Sulphate, Sulphides, Ammonia, Calcium, Cadmium, Chromium, Lead, Mercury, Selenium, Nickel, Silver, Zinc, Arsenic, Barium, Iron, Manganese, Boron, Chlorine Total	1	Once	-	30,000/- @ Rs. 30,000/sample
4	**Noise Level**	-	1	Once	24 hours	5,000/-@ Rs. 5,000/point
					Sub-Total (B)	**132,000**
					Total (A+B)	**1,204,000**

9.9 MANAGEMENT PLANS AND WORKERS COC

609. Various management plans have been identified to ensure the effective implementation of the EMP across all phases of the proposed project. These plans will be further developed and updated by the Contractor to reflect site-specific conditions, and will be submitted to the SC for review and approval prior to the commencement of construction activities. The identified plans are listed below:

- Tree Plantation Plan;
- HSE Management Plan;
- Emergency Preparedness and Response Framework;
- Waste Management Plan;
- Traffic Management Plan;
- Change Management Plan;
- Sanitation Plan;
- Resource Conservation Plan; and
- Service Continuity Plan.

610. The worker CoC shall be developed by the Contractor's ESHS staff to address SEA, SH, GBV, and child labour, and will be submitted for approval by the SC. Once approved, the Code will be displayed prominently at the project site in the form of banners, and copies of the approved document will be made available on-site. All workers will be informed of its provisions through training and awareness sessions to ensure full understanding and compliance. This Code will clearly define acceptable behavior, prohibit all forms of misconduct, and outline disciplinary measures for violations

9.9.1 Tree Plantation Plan

611. As an Environmental enhancement measure trees will be planted. These plants can be raised within or nearby the project vicinity under the supervision of PMIU at later stage, to improve the landscape of the area. These plants can be raised in area at an average 10'*10' rate of spacing while technically observing site quality and capacity in the light of plantation objectives. A comprehensive tree plantation plan for proposed project is provided in **Annexure-XV.**

9.9.2 HSE Management Plan

612. Health risks and work safety problems may result at the workplace if the working conditions provide unsafe and/or unfavorable working environment due to storage, handling and transport of hazardous construction material. Workers will be provided with safe and healthy working environment considering risks inherent to the particular sector and specific classes of hazards in Project Area. During construction phase, Contractor will be responsible for all HSE related issues and to comply with national laws and international standards for occupational health and safety. The ultimate goal of the plan is to eliminate any injury to human and damage to facilities, materials and the environment. The Guideline HSE Plan is attached as **Annexure-XVI** in IEE**.**

613. The following measures are identified for health, safety, and environment protection during all activities of the proposed project to minimize risk of accidents, which could endanger the life of personnel, cause damage to properties and environment:

- All contractor staff shall be well informed and trained on the HSE policies and guidelines;
- Contractor shall provide adequate health services as well as site first aid services for its workforce;
- The main priority of the contractor shall be to prevent accidents during mobilization, construction phase of the proposed Project. Prevention of workplace accidents during the construction activities will be achieved using approved work plan/instructions by the supervisors;
- Work safety measures and good workmanship practices shall be followed by the contractor to ensure no health risks for workers;
- Provision of adequate sanitation, washing, cooking and dormitory facilities for workers from other cities;
- Proper maintenance of facilities for workers shall be monitored;
- Provision of protective clothing for labour handling hazardous materials, e.g. helmet, adequate footwear for bituminous pavement works, protective goggles, etc. and contractor will ensure strict use of wearing these protective clothing during work activities;
- Elaboration of a contingency planning by the contractor at work site in case of major accidents shall be carried out. A comprehensive emergency preparedness and response plan will be developed and implemented at site;
- A site-specific fire-fighting plan also needs to be developed and implemented by Contractor during construction phase;
- Accidents shall be reported and investigated by the Contractor. All personnel shall be encouraged to report all accidents/incidents and to cooperate in the investigation of such occurrence. A comprehensive accident/incident report will be produced for review and necessary action;
- Adequate signage, lightning devices, barriers, and persons with flags during construction to manage traffic at haulage shall be conducted;
- The communicable disease of most concern during construction phase, like sexually-transmitted diseases such as HIV/AIDS, will be prevented by successful initiative typically involving health awareness, education initiatives, training heath workers in disease treatment, immunization program and providing health service;
- Reducing the impacts of vector borne diseases on long-term health effect of workers will be accomplished through implementation of diverse interventions aimed at eliminating the factors that lead to disease;
- All construction activities shall be properly managed through careful planning and the applicable and relevant HSE policies; and
- Prior approval from SC will be sought before starting any construction related activity.

9.9.3 Emergency Preparedness and Response Framework

614. The framework provides an overview of the procedures to mitigate and control the impacts on community, on occupational health and safety, on the environment and on the Project in the event of emergency situations and to respond in life threatening situations usually occurring suddenly and unexpectedly during the construction and operational phases of the proposed project. This framework applies to all the processes of emergency responses to accidental calamities that can occur in an office, construction area and living area as well as first aids and emergency responses as per actual

environmental situations during construction. This framework also provides a general reference and a basis for a detailed sub-plans and procedures that have to be developed by the Contractor before the initiation of the construction of the project and will be approved by the proponent. The Guideline Emergency Preparedness and Response Plan is attached as **Annexure-XII** in IEE**.** The framework needs to be developed with following objectives:

- Outline the applicable standards with regards to emergency preparedness and response;
- Define the emergency preparedness and response procedures utilized during the construction phase;
- Define persons and departments involved in emergency preparedness and their roles and responsibilities; and
- Define training requirements.

615. Various categories of risks can be envisaged in a working or construction environment. The response to each hazard will be different. A few types of emergencies/accidents will include the following:

- Natural risk: earthquake, flood, and other natural disaster;
- Political risk: civil strife, upheaval, riot, kidnap, and terrorist attack;
- Construction: fire, traffic accident, falling, hit and electric shock;
- Public health: dengue fever, malaria, food sanitation, high-temperature operation, insect sting, and
- Security: injury and property loss resulted from theft, robbery, and law case.

616. To minimize human suffering and financial losses, all personnel must know their responsibilities under the emergency preparedness and response plan. The plan will be used to set emergency procedures, implement and communicate the procedures and ensure that any required training has been completed. Planning for emergencies will include the following points:

- Hazard identification/assessment;
- Emergency resources;
- Communication systems;
- Administration of the plan;
- Emergency response procedure;
- Communication of the procedure; and
- Debriefing and post-traumatic stress procedure.

9.9.4 Waste Management Plan

617. Management of solid and hazardous waste is one of the most important issues during construction phase of the project. It is estimated that around 25 workers will be accommodated in the construction camp during construction phase, who will utilize water for washing, cooking and bathing purposes. That will generate sewage at the construction camps. In addition to that construction camp will generate solid waste at

site. Similarly, a considerable amount of solid waste will be generated during the operation phase of the proposed project.

618. The major components of the workers' camp waste are garbage, putrescible waste, rubbish and small portion of ashes and residues, wastewater from camps toilets and washing yards, etc. The construction waste will include wastewater, oil spillage from machinery and solid waste (damaged or spoiled materials, temporary and expendable construction materials, etc.). Insecure and unhygienic disposal of the wastes may cause degradation of soil, land and water resources. However, a criterion has been developed for the solid and hazardous waste management at site. The criterion is as follows:

- All the anticipated solid wastes will be collected through a properly designed solid waste management system. Enough number of containers will be placed inside the camps and within the construction area for the collection of various types of waste;
- These containers will help the component separation of various types of waste at source. Classification will be based on organic waste, recyclable waste, reusable waste (for resource and recovery) and waste for disposal site. Based on the conditions of the region, organic waste will be frequently collected to avoid odor problems;
- Recyclable, reusable and waste for disposal site will be collected twice a week and on alternate days and will be transferred to a properly designed disposal site;
- The sewage system for camps shall be properly designed (pit latrines or, as required, septic tanks) to receive all sanitary wastewaters;
- Lined wash areas shall be constructed within the camp site or at site, for the receipt of wash waters from construction machinery;
- Medical waste and construction waste will be handled with care.;
- Construction waste i.e., waste concrete, bricks, cement, etc. will be disposed of at the designated areas; and
- Construction workers and supervisory staff will be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste for disposal.

9.9.5 Traffic Management Plan

619. A comprehensive traffic management plan will be developed by Contractor mentioning routes to be followed for transportation of construction machinery and materials e.g. cement, steel, gravels, sand, etc. to mitigate any impact that are envisaged upon the patients and staff. Traffic management plan will comprise following contents necessarily:

- Goals and objectives of plan;
- Purpose & Scope;
- Project specific traffic;
- Roles & responsibilities of contractors' environmental personnel;
- Routes to be followed along with necessary maps;
- Transportation timing; and
- Mechanism to address road accidents (if occurs).

9.9.6 Change Management Plan

620. The IEE and EMP have been prepared at feasibility phase of the proposed Project. Both are living documents and it has been foreseen that during the detailed design phase the documents may be updated and the EMP has to be refined. The EMP will be refined in the light of updated results of ambient air quality, noise, drinking water and surface water/wastewater. It will further be updated in the light of possible adverse environmental impacts and if necessary then any additional mitigation and enhancement measures will also be added to the EMP. Any sort of change in EMP has to be informed to all concerned personnel/departments.

9.9.7 Sanitation Plan

621. A Sanitation Plan shall be developed and implemented by the Contractor to ensure adequate hygiene and sanitation conditions at the project site. The plan will include provision of clean and sufficient toilets, handwashing facilities, safe drinking water, and proper waste collection and disposal systems. It will define regular cleaning schedules, maintenance responsibilities, and measures to prevent contamination and health risks especially in those areas where isolation wards are present. Separate facilities for male and female workers will be ensured where applicable, and awareness will be provided to workers on hygiene practices for hospital. The plan shall comply with relevant national regulations and international ESHS standards, and will be regularly monitored for effectiveness.

9.9.8 Resource Conservation Plan

622. A Resource Conservation Plan shall be developed and implemented for the hospital project to promote efficient use of natural resources and minimize environmental impacts. The plan will focus on optimizing water and energy consumption through measures such as installation of water-saving fixtures, rainwater harvesting, energy-efficient lighting, and use of renewable energy where feasible. It will also include strategies for minimizing material waste, promoting reuse and recycling of construction materials, and responsible procurement of sustainable resources. Specific attention will be given to high-demand hospital operations, ensuring efficient use of medical equipment, HVAC systems, and utilities. The plan will define roles and responsibilities, monitoring mechanisms, and performance targets, and will be regularly reviewed and updated to ensure continuous improvement in resource efficiency throughout the project lifecycle.

9.9.9 Service Continuity Plan

623. The Service Continuity Plan (SCP) shall be prepared prior to commencement of works and implemented throughout the construction phase to ensure uninterrupted healthcare service delivery, patient safety, and compliance with environmental and social safeguards. The plan shall identify critical services and potential disruption risks, and define appropriate mitigation measures, including backup arrangements, temporary service alternatives, and clear assignment of roles and responsibilities. It will also establish communication protocols, emergency response procedures, and coordination

mechanisms with the hospital administration and Supervision Consultant (SC). The SCP shall be regularly reviewed, updated, and, where necessary, tested to ensure its continued effectiveness in maintaining essential hospital services throughout the project implementation period.

9.10 CHANCE FIND PROCEDURE

624. In case of any chance find, the Contractor will immediately report through SC to Archaeology Department, KP and take further suitable action to preserve those antiques or sensitive remains. Representative of the Director will visit the site and observe the significance of the antique, artifact and cultural (religious) properties and significance of the Project. The report will be prepared by representative and will be given to the Director. The documentation will be completed and if required suitable action will be taken to preserve those antiques and sensitive remains. In case any artifact, antiques and sensitive remains are discovered, chance find procedures will be adopted by construction contractor workers as follows:

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

9.11 GRIEVANCE REDRESSAL MECHANISM

625. In order to receive and facilitate the resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance, an Environmental GRM will be established for the proposed project. The GRM will address affected people's concerns and complaints proactively and promptly, using an understandable and transparent process that is gender responsive, culturally appropriate and readily accessible to all segments of the affected people at no costs and without retribution.

626. The SC will facilitate the PIU for the establishment of a Grievance Redress Committee (GRC) at project location prior to the Contractor's mobilization to site. The functions of the GRC are to address the concerns and grievances of the local communities and affected parties as necessary. A complaint register will be maintained at workers' camp on routine basis. The complaint register will contain minimum of the following information:

- Name and address of complainant;
- Complaint description;
- Action taken/recommended;

- Name of responsible person;
- Status of resolution of complaints; and
- Other necessary information/record and reasons in case issue not resolved.

9.12 EMP COST

627. Implementation of the recommendations of the IEE during the construction phase is the sole responsibility of the Contractor and the monitoring activities will be carried out by the SC. Cost for environmental management and monitoring will be the part of the contract document with the Contractor. It must be noted that environmental cost will not be a separate entity because all of its components will be addressed in the bidding document under various heads of account. Cost for environmental management for each site is provided in **Table 9.5.** Break up of estimated cost for the implementation of HSE Management and PPE for each location is given in **Table 9.6 and Table 9.7** respectively. The contactor(s) shall be paid for these items after providing the implementation and cost incurred evidences duly approved by SC and PIU. Hence, the estimated EMP cost for Phase III is **Rs. 101,919,400**/-.

Table 9.5: Environmental Management Cost

Sr. No.	Item	Description	Amount (PKR) per Hospital
1	Environmental Monitoring Cost	Air, Noise and Water quality testing on quarterly basis for 24 months	1,204,000
2	Cost of training and capacity building	Four training sessions during the construction period	350,000
3	Cost of hiring EHS and social specialist for EMP implementation	One EHS Specialist and one Social and gender Specialist for 24 months	4,800,000
4	Cost of Health & Safety and other miscellaneous items	Cost of PPEs, water sprinkling medical screening of workers, construction waste handling and worker welfare facility etc.	2,411,400
5	Cost of Tree Plantation as environmental enhancement measure	Lump sum	500,000
		Grand Total	**9,265,400**

Table 9.6: HSE Management Cost

Sr. #.	Items	Description	Cost (Rs.)
1	Water Sprinkling	Lumpsum	100,000
2	Medical screening for workers	Rs. 5000 per employee and for 25 employees	125,000
3	Material Storage, handling and use	One no. of tarpaulins of Rs. 32,000 for one year	32,000
4	Handling/ transportation of solid waste including hazardous material	Rs. 30,000/month for a period of 24 months will be required for transportation of material	720,000
6	Provision of Safety sign boards, safety cones, warning tapes etc.	Lumpsum	55,000
7	Fire extinguishers in case of fire	3 Nos. DCP fire extinguisher @ Rs. 3300/-	52,400

Sr. #.	Items	Description	Cost (Rs.)
		3 Nos. CO_2 fire extinguisher @ Rs. 7500/-	
		1 No Fire alarm@Rs.20,000/-	
8	Cost of Personal Protective Equipment (PPE)*	Refer **Table 8.7**	1,327,000
		Total	**2,411,400**

Table 9.7: Break Up of PPEs

Sr. No.	Items	Quantity	Rate (Rs.)	Amount (Rs.)
	Personal Protective Equipment PPE			
I	Face masks.	2600	100	260,000
II	Safety Shoes	50	6000	300,000
III	Safety Helmet	50	1500	75,000
IV	Safety Goggles	100	550	55,000
V	Safety Jackets	50	1000	50,000
VI	Gloves	600	600	360,000
VII	First Aid Box	1	6000	6,000
VIII	Ear Plugs	2600	85	221,000
			Total	**Rs.1,327,000/-**
	Time required for Construction = 24 months			
	No. of labour required = 25			
	Detail of Personal Protective Equipment PPE			
I	Dust masks	1 dust mask to be used in a week by each labourer		
II	Safety Shoes	1 Pair of safety shoes for one year for each labourer		
III	Safety Helmet	1 safety Helmet for one year for each Worker		
IV	Safety Goggles	2 safety goggles for each labourer		
V	Safety Jackets	1 safety Jackets (Hi Vis) for each labourer		
VI	Gloves	1 pair of gloves for each labourer for a month		
VII	First Aid Box	1 first aid box		
VIII	Ear Plugs	2 set of ear plug for each labourer		

9.13 IMPLEMENTATION OF THE CORRECTIVE ACTION PLAN

The Corrective Action Plan (CAP) identifies corrective measures required to address existing environmental deficiencies at the participating hospitals. The identified actions shall be implemented prior to and during the rehabilitation works, with selected actions continuing during hospital operation to ensure sustained compliance with applicable environmental requirements and ADB SPS (2009). **Table 9.8** outlines CAP for the hospitals in phase III.

Table 9.8: Corrective Action Plan

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
1	**DHQ Battagram**	• No segregation of healthcare waste; limited colour-coded bins; open dumping; no on-site treatment; poor records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Gaps in PPE, electrical safety, housekeeping, hazardous-material handling, safety signage, sharps handling and biological exposure controls. • No fire extinguishers; fire hose cabinet available but routine inspection/maintenance not evidenced; inadequate escape routes, assembly points and signage; no documented emergency procedures, training or drills. • No structured environmental monitoring program and limited institutional capacity.	**Medical Waste:** • Provide colour-coded bins and sharps containers; • Provide waste-segregation signage at waste-generation and temporary storage areas. • Establish daily waste-generation and disposal records; • Establish a documented arrangement with an approved healthcare-waste treatment and disposal facility in accordance with national regulations and international good practice. Where feasible, prioritize environmentally sound non-incineration treatment technologies. • Provide/upgrade a secure designated temporary healthcare-waste storage area with washable surfaces, controlled access and protection from weather, patients and unauthorized persons. • Maintain waste transfer manifests/receipts or equivalent evidence of treatment and final disposal.	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	Funding by ADB under KPHSSP.	**Waste**: • 100% of identified waste-generation points provided with appropriate colour-coded bins and sharps containers. • Waste-segregation signage installed at relevant locations. • Daily waste records • Approved waste treatment/disposal arrangement documented and disposal records maintained.	Within 3 months from commencement of the project.	Cost included in KPHSSP
			Wastewater: • Rehabilitate/upgrade the internal sewerage network and discharge connection to eliminate leakage, blockage and uncontrolled discharge. • Construct septic tanks, with appropriate structural design watertight construction, properly designed inlet/outlet arrangements, access covers, and provisions for scheduled desludging. • Install screens at appropriate drainage points to prevent solids and debris from entering the wastewater system. • Apply source-specific controls/pre-treatment for wastewater streams requiring additional control, such as grease traps for kitchen wastewater and screens/lint traps for laundry wastewater.	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Wastewater**: • Rehabilitated sewerage network completed and functional; discharge connection inspected and documented. • Septic tank rehabilitated, leak-free and operational; inspection/commissioning record available. • Wastewater quality monitoring conducted at least annually through a KP-EPA approved laboratory, with results demonstrating compliance with applicable national environmental quality standards (NEQS) or corrective actions implemented where exceedances are identified.	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Ensure appropriate management of laboratory chemicals, pharmaceuticals and other hazardous liquid wastes and prevent their discharge into the wastewater system. • Establish routine inspection and maintenance of the wastewater collection system and septic tanks. • Establish scheduled septic-tank inspection and desludging, with records maintained. • Conduct periodic wastewater quality monitoring,	Hiring of KP-EPA approved Laboratory	HSE Focal Person	Health Department Budget	• Monitoring Records.	Annual basis after completion of rehabilitation works	100,000
			OHS: • Provide required PPE and close critical electrical, housekeeping, hazardous-material, sharps and biological-exposure gaps. • Improve designated storage areas and general Housekeeping.	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	• Electrical distribution, internal wiring and power-supply improvements are Included in the approved scope of work for the current project. • PPE, routine housekeeping and operational OHS measures in Health Department Budget.	**OHS:** • Monthly OHS inspections conducted and documented; PPE availability records maintained; incidents, near misses, first-aid cases, and corrective actions recorded and report.	After completion of rehabilitation works Within 3 months from commencement of the project.	Included in the approved scope of work for the current project. 7,000,000
			Fire/Life Safety: • Conduct fire-risk assessment for hospital and update emergency response procedures accordingly. • Service/replace overdue extinguishers; • Provide fire detection/alarm in Critical areas; mark and maintain unobstructed emergency escape routes/exits; • Establish documented emergency procedures; conduct fire/emergency drill and record corrective actions.	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Fire/Life Safety:** • All identified overdue/defective extinguishers serviced or replaced. • Fire detection/alarm provided and operational in identified critical areas. • Emergency exits/routes clearly marked and unobstructed. • Emergency procedure documented and at least one drill completed, with attendance and corrective-action record.	After completion of rehabilitation works	Included in the approved scope of work for the current project.
			Monitoring: • Designate hospital environmental/HSE focal person and establish monthly environmental/OHS inspection records.	Hospital Administration	PMIU Safeguards Unit	Hospital Administration Budget	**Monitoring:** • Environmental/HSE Focal Person designated and monthly inspection records maintained.	Within 3 months from commencement of the project.	2,400,000

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
								Total	9,500,000
2	**DHQ Chitral**	• No healthcare waste segregation; limited colour-coded bins; open dumping; no on-site treatment; Incinerator available but not functional poor waste records. • No on-site wastewater treatment; direct discharge to municipal sewer. • OHS deficiencies covering PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • No fire extinguishers or fire alarms; inadequate escape routes, assembly points and fire-safety signage; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	**Medical Waste:** • Provide additional colour-coded waste bins and sharps containers at all identified waste-generation points. • Provide waste-segregation signage at waste-generation and temporary storage areas. • Establish daily healthcare-waste generation, collection and disposal records. • Establish a documented arrangement with an approved healthcare-waste treatment and disposal facility in accordance with national regulations and international good practice. Where feasible, prioritize environmentally sound non-incineration treatment technologies. • Provide/upgrade a secure designated temporary healthcare-waste storage area with washable surfaces, controlled access and protection from weather, patients and unauthorized persons. • Assess the continued use of the existing incinerator against applicable environmental requirements and, where practicable, adopt an environmentally sound and approved healthcare-waste treatment/disposal arrangement. • Maintain waste transfer manifests/receipts or equivalent evidence of treatment and final disposal.	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	Funding by ADB under KPHSSP.	**Waste**: • 100% of identified waste-generation points provided with appropriate colour-coded bins and sharps containers. • Waste-segregation signage installed at relevant locations. • Daily waste records • Approved waste treatment/disposal arrangement documented and disposal records maintained.	Within 3 months from commencement of the project.	Cost included in KPHSSP
			Waste water: • Rehabilitate/upgrade the internal sewerage network and discharge connection to eliminate leakage, blockage and uncontrolled discharge. • Construct existing septic tanks, including structural repairs, inlet/outlet improvements, watertight access covers and appropriate desludging arrangements.	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Wastewater**: • Rehabilitated sewerage network completed and functional; discharge connection inspected and documented. • Septic tank rehabilitated, leak-free and operational; inspection/commissioning record available. • Wastewater quality monitoring conducted at least annually through a KP-EPA approved laboratory, with	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Install screens at appropriate drainage points to prevent solids and debris from entering the wastewater system. • Apply source-specific controls/pre-treatment for wastewater streams requiring additional control, such as grease traps for kitchen wastewater and screens/lint traps for laundry wastewater. • Ensure appropriate management of laboratory chemicals, pharmaceuticals and other hazardous liquid wastes and prevent their discharge into the wastewater system. • Establish routine inspection and maintenance of the wastewater collection system and septic tanks. • Establish scheduled septic-tank inspection and desludging, with records maintained. • Conduct periodic wastewater quality monitoring.	Hiring of KP-EPA approved Laboratory	HSE Focal Person	Health Department Budget	results demonstrating compliance with applicable national environmental quality standards (NEQS) or corrective actions implemented where exceedances are identified. • Monitoring Records.	Annual basis after completion of rehabilitation works	100,000
			OHS: • Provide required PPE and close critical electrical, housekeeping, hazardous-material, sharps and biological-exposure gaps. • Improve designated storage areas and general housekeeping.	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	• Electrical distribution, internal wiring and power-supply improvements are Included in the approved scope of work for the current project. • PPE, routine housekeeping and operational OHS measures in Health Department Budget	**OHS:** • Monthly OHS inspections conducted and documented; PPE availability records maintained; incidents, near misses, first-aid cases, and corrective actions recorded and report.	After completion of rehabilitation works **3 months**	Included in the approved scope of work for the current project. **10,000,000**
			Fire/Life Safety: • Conduct fire-risk assessment for hospital and update emergency response procedures accordingly. • Provide and properly locate fire extinguishers based on fire-risk assessment. • Provide fire detection/alarm in critical areas.	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Fire/Life Safety:** • All identified overdue/defective extinguishers serviced or replaced. • Fire detection/alarm provided and operational in identified critical areas. • Emergency exits/routes clearly marked and unobstructed. • Emergency procedure documented and at least one drill	After completion of rehabilitation works	Included in the approved scope of work for the current project. .

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Mark and maintain unobstructed emergency escape routes/exits. • Establish documented emergency procedures. • Conduct fire/emergency drill and record corrective actions.				completed, with attendance and corrective-action record.		
			Environmental Monitoring: • Designate hospital Environmental/HSE Focal Person and establish monthly environmental/OHS inspection records.	Hospital Administration	PMIU Safeguards Unit	Hospital Administration Budget	**Monitoring:** • Environmental/HSE Focal Person designated and monthly inspection records maintained.	Within 3 months from commencement of the project.	2,400,000
								Total	12,500,000
3	**DHQ Hangu**	• No healthcare waste segregation; open dumping; no colour-coded bins or on-site treatment; poor records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • Fire extinguishers inadequate/not calibrated; fire alarms available but non-functional; escape routes, assembly points and signage inadequately designated; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	**Medical Waste:** • Provide colour-coded bins and sharps containers; • Provide waste-segregation signage at waste-generation and temporary storage areas. • Establish daily waste-generation and disposal records; • Establish a documented arrangement with an approved healthcare-waste treatment and disposal facility in accordance with national regulations and international good practice. Where feasible, prioritize environmentally sound non-incineration treatment technologies. • Provide/upgrade a secure designated temporary healthcare-waste storage area with washable surfaces, controlled access and protection from weather, patients and unauthorized persons. • Maintain waste transfer manifests/receipts or equivalent evidence of treatment and final disposal.	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Funding by ADB under KPHSSP.	**Waste**: • 100% of identified waste-generation points provided with appropriate colour-coded bins and sharps containers. • Waste-segregation signage installed at relevant locations. • Daily waste records • Approved waste treatment/disposal arrangement documented and disposal records maintained.	Within 3 months from commencement of the project.	Cost included in KPHSSP
			Wastewater: • Rehabilitate/upgrade the internal sewerage network and discharge connection to eliminate leakage, blockage and uncontrolled discharge. • Construct septic tanks, with appropriate structural design watertight construction, properly designed inlet/outlet	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Wastewater**: • Rehabilitated sewerage network completed and functional; discharge connection inspected and documented. • Septic tank rehabilitated, leak-free and operational; inspection/commissioning record available.	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			arrangements, access covers, and provisions for scheduled desludging. • Install screens at appropriate drainage points to prevent solids and debris from entering the wastewater system. • Apply source-specific controls/pre-treatment for wastewater streams requiring additional control, such as grease traps for kitchen wastewater and screens/lint traps for laundry wastewater. • Ensure appropriate management of laboratory chemicals, pharmaceuticals and other hazardous liquid wastes and prevent their discharge into the wastewater system. • Establish routine inspection and maintenance of the wastewater collection system and septic tanks. • Establish scheduled septic-tank inspection and desludging, with records maintained. • Conduct periodic wastewater quality monitoring,				• Wastewater quality monitoring conducted at least annually through a KP-EPA approved laboratory, with results demonstrating compliance with applicable national environmental quality standards (NEQS) or corrective actions implemented where exceedances are identified. • Monitoring Records.	Annual basis after completion of rehabilitation works	100,000
			Hiring of KP-EPA approved Laboratory	HSE Focal Person	Health Department				
			OHS: • Provide required PPE and close critical electrical, housekeeping, hazardous-material, sharps and biological-exposure gaps. • Improve designated storage areas and general Housekeeping.	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	• Electrical distribution, internal wiring and power-supply improvements are Included in the approved scope of work for the current project. • PPE, routine housekeeping and operational OHS measures in Health Department Budget.	**OHS:** • Monthly OHS inspections conducted and documented; PPE availability records maintained; incidents, near misses, first-aid cases, and corrective actions recorded and report.	After completion of rehabilitation works Within 3 months from commencement of the project.	Included in the approved scope of work for the current project. 10,000,000
			Fire/Life Safety: • Conduct fire-risk assessment for hospital and update emergency response procedures accordingly. • Service/replace overdue extinguishers;	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Fire/Life Safety:** • All identified overdue/defective extinguishers serviced or replaced. • Fire detection/alarm provided and operational in identified critical areas. • Emergency exits/routes clearly marked and unobstructed.	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Provide fire detection/alarm in Critical areas; mark and maintain unobstructed emergency escape routes/exits; • Establish documented emergency procedures; conduct fire/emergency drill and record corrective actions.				• Emergency procedure documented and at least one drill completed, with attendance and corrective-action record.		
			Monitoring: • Designate hospital environmental/HSE focal person and establish monthly environmental/OHS inspection records.	Hospital Administration	PMIU Safeguards Unit	Hospital Administration Budget	**Monitoring:** • Environmental/HSE Focal Person designated and monthly inspection records maintained.	Within 3 months from commencement of the project.	2,400,000
								Total	**12,500,000**
4	DHQ Lakki Marwat	• No healthcare waste segregation or colour-coded bins; open dumping; no on-site treatment; incomplete records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Drinking Water quality is not reliable • Gaps in PPE, electrical safety, housekeeping, hazardous-material handling, signage, sharps and biological exposure controls. • No fire extinguishers, fire detection/alarm or fixed firefighting system; inadequate escape routes, assembly points and signage; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	**Medical Waste:** • Provide colour-coded bins and sharps containers; • Provide waste-segregation signage at waste-generation and temporary storage areas. • Establish daily waste-generation and disposal records; • Establish a documented arrangement with an approved healthcare-waste treatment and disposal facility in accordance with national regulations and international good practice. Where feasible, prioritize environmentally sound non-incineration treatment technologies. • Provide/upgrade a secure designated temporary healthcare-waste storage area with washable surfaces, controlled access and protection from weather, patients and unauthorized persons. • Maintain waste transfer manifests/receipts or equivalent evidence of treatment and final disposal.	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	Funding by ADB under KPHSSP.	**Waste**: • 100% of identified waste-generation points provided with appropriate colour-coded bins and sharps containers. • Waste-segregation signage installed at relevant locations. • Daily waste records • Approved waste treatment/disposal arrangement documented and disposal records maintained.	Within 3 months from commencement of the project.	Cost included in KPHSSP
			Wastewater: • Rehabilitate/upgrade the internal sewerage network and discharge connection to eliminate leakage, blockage and uncontrolled discharge. • Construct septic tanks, with appropriate structural design watertight construction,	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Wastewater**: • Rehabilitated sewerage network completed and functional; discharge connection inspected and documented. • Septic tank rehabilitated, leak-free and operational; inspection/commissioning record available.	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			properly designed inlet/outlet arrangements, access covers, and provisions for scheduled desludging. • Install screens at appropriate drainage points to prevent solids and debris from entering the wastewater system. • Apply source-specific controls/pre-treatment for wastewater streams requiring additional control, such as grease traps for kitchen wastewater and screens/lint traps for laundry wastewater. • Ensure appropriate management of laboratory chemicals, pharmaceuticals and other hazardous liquid wastes and prevent their discharge into the wastewater system. • Establish routine inspection and maintenance of the wastewater collection system and septic tanks. • Establish scheduled septic-tank inspection and desludging, with records maintained. • Conduct periodic wastewater quality monitoring,	Hiring of KP-EPA approved Laboratory	HSE Focal Person	Health Department	• Wastewater quality monitoring conducted at least annually through a KP-EPA approved laboratory, with results demonstrating compliance with applicable national environmental quality standards (NEQS) or corrective actions implemented where exceedances are identified. • Monitoring Records.	Annual basis after completion of rehabilitation works	100,000
			Drinking water • Provision of Safe and adequate drinking water facilities	Hospital Administration	HSE Focal Person	Health Department Budget	• Safe drinking water available at all designated drinking-water points. • Required water-storage/backup arrangement provided and functional. • Water coolers/filtration units operational and maintained. • Water-storage tanks cleaned/disinfected and records maintained. • Drinking water quality tested at least annually by an accredited laboratory and meeting national drinking water quality standards.	3 months	1,000,000
			• Conduct periodic drinking water quality monitoring,	Hiring of KP-EPA approved Laboratory	HSE Focal Person	Health Department Budget	• Monitoring Records.	Annual basis after completion of rehabilitation works	100,000
			OHS: • Provide required PPE and close critical electrical,	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	• Electrical distribution, internal wiring and	**OHS:** • Monthly OHS inspections conducted and documented; PPE	After completion of rehabilitation works	Included in the approved scope of work for the

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			housekeeping, hazardous-material, sharps and biological-exposure gaps. • Improve designated storage areas and general Housekeeping.			power-supply improvements are Included in the approved scope of work for the current project. • PPE, routine housekeeping and operational OHS measures in Health Department Budget.	availability records maintained; incidents, near misses, first-aid cases, and corrective actions recorded and report.		current project.
								Within 3 months from commencement of the project.	10,000,000
			Fire/Life Safety: • Conduct fire-risk assessment for hospital and update emergency response procedures accordingly. • Service/replace overdue extinguishers; • Provide fire detection/alarm in Critical areas; mark and maintain unobstructed emergency escape routes/exits; • Establish documented emergency procedures; conduct fire/emergency drill and record corrective actions.	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Fire/Life Safety:** • All identified overdue/defective extinguishers serviced or replaced. • Fire detection/alarm provided and operational in identified critical areas. • Emergency exits/routes clearly marked and unobstructed. • Emergency procedure documented and at least one drill completed, with attendance and corrective-action record.	After completion of rehabilitation works	Included in the approved scope of work for the current project.
			Monitoring: • Designate hospital environmental/HSE focal person and establish monthly environmental/OHS inspection records.	Hospital Administration	PMIU Safeguards Unit	Hospital Administration Budget	**Monitoring:** • Environmental/HSE Focal Person designated and monthly inspection records maintained.	Within 3 months from commencement of the project.	2,400,000
								Total	**13,600,000**
5	DHQ Batkhela	• Inadequate healthcare waste segregation; no colour-coded bins; open dumping; no on-site treatment; incomplete records. • Soakage pits available, with discharge to municipal sewer after retention in soakage pits; no treatment system identified. • Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • Fire extinguishers available; limited fire detection/alarms; routine inspection and operational status not verified; inadequate escape routes, assembly points and signage;	**Medical Waste:** • Provide colour-coded bins and sharps containers; • Provide waste-segregation signage at waste-generation and temporary storage areas. • Establish daily waste-generation and disposal records; • Establish a documented arrangement with an approved healthcare-waste treatment and disposal facility in accordance with national regulations and international good practice. Where feasible, prioritize environmentally sound non-incineration treatment technologies. • Provide/upgrade a secure designated temporary	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	Funding by ADB under KPHSSP.	**Waste**: • 100% of identified waste-generation points provided with appropriate colour-coded bins and sharps containers. • Waste-segregation signage installed at relevant locations. • Daily waste records • Approved waste treatment/disposal arrangement documented and disposal records maintained.	Within 3 months from commencement of the project.	Cost included in KPHSSP

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
		no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	healthcare-waste storage area with washable surfaces, controlled access and protection from weather, patients and unauthorized persons. • Maintain waste transfer manifests/receipts or equivalent evidence of treatment and final disposal.						
			Wastewater: • Rehabilitate/upgrade the internal sewerage network and discharge connection to eliminate leakage, blockage and uncontrolled discharge. • Construct/upgrade septic tanks, with appropriate structural design watertight construction, properly designed inlet/outlet arrangements, access covers, and provisions for scheduled desludging. • Install screens at appropriate drainage points to prevent solids and debris from entering the wastewater system. • Apply source-specific controls/pre-treatment for wastewater streams requiring additional control, such as grease traps for kitchen wastewater and screens/lint traps for laundry wastewater. • Ensure appropriate management of laboratory chemicals, pharmaceuticals and other hazardous liquid wastes and prevent their discharge into the wastewater system. • Establish routine inspection and maintenance of the wastewater collection system and septic tanks. • Establish scheduled septic-tank inspection and desludging, with records maintained. • Conduct periodic wastewater quality monitoring,	Hospital Administration Hiring of KP-EPA approved Laboratory	HSE Focal Person/PMIU Safeguards Unit HSE Focal Person	Included in the approved scope of work for the current project. Health Department	**Wastewater**: • Rehabilitated sewerage network completed and functional; discharge connection inspected and documented. • Septic tank rehabilitated, leak-free and operational; inspection/commissioning record available. • Wastewater quality monitoring conducted at least annually through a KP-EPA approved laboratory, with results demonstrating compliance with applicable national environmental quality standards (NEQS) or corrective actions implemented where exceedances are identified. • Monitoring Records.	After completion of rehabilitation works Annual basis after completion of rehabilitation works	Included in the approved scope of work for the current project. 100,000

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			OHS: • Provide required PPE and close critical electrical, housekeeping, hazardous-material, sharps and biological-exposure gaps. • Improve designated storage areas and general Housekeeping.	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	• Electrical distribution, internal wiring and power-supply improvements are Included in the approved scope of work for the current project. • PPE, routine housekeeping and operational OHS measures in Health Department Budget.	**OHS:** • Monthly OHS inspections conducted and documented; PPE availability records maintained; incidents, near misses, first-aid cases, and corrective actions recorded and report.	After completion of rehabilitation works	Included in the approved scope of work for the current project.
			Fire/Life Safety: • Conduct fire-risk assessment for hospital and update emergency response procedures accordingly. • Service/replace overdue extinguishers; • Provide fire detection/alarm in Critical areas; mark and maintain unobstructed emergency escape routes/exits; • Establish documented emergency procedures; conduct fire/emergency drill and record corrective actions.	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Fire/Life Safety:** • All identified overdue/defective extinguishers serviced or replaced. • Fire detection/alarm provided and operational in identified critical areas. • Emergency exits/routes clearly marked and unobstructed. • Emergency procedure documented and at least one drill completed, with attendance and corrective-action record.	After completion of rehabilitation works	Included in the approved scope of work for the current project.
			Monitoring: • Designate hospital environmental/HSE focal person and establish monthly environmental/OHS inspection records.	Hospital Administration	PMIU Safeguards Unit	Hospital Administration Budget	**Monitoring:** • Environmental/HSE Focal Person designated and monthly inspection records maintained.	Within 3 months from commencement of the project.	2,400,000
								Within 3 months from commencement of the project.	12,000,000
								Table	**14,500,000**
6	**King Abdullah Teaching Hospital, Mansehra**	• No healthcare waste segregation or colour-coded bins; open dumping; incinerator available and functional; incomplete records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Drinking Water quality is not reliable • Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls.	**Medical Waste:** • Provide colour-coded bins and sharps containers; • Provide waste-segregation signage at waste-generation and temporary storage areas. • Establish daily waste-generation and disposal records; • Conduct environmental compliance assessment of existing incinerators and ensure operation, maintenance, emissions control, and ash disposal comply with applicable national requirements.	Hospital Administration	HSE Focal Person / PMIU Safeguards Unit	Funding by ADB under KPHSSP.	**Waste**: • 100% of identified waste-generation points provided with appropriate colour-coded bins and sharps containers. • Waste-segregation signage installed at relevant locations. • Daily waste records. • Approved waste treatment/disposal arrangement documented and disposal records maintained.	Within 3 months from commencement of the project.	Cost included in KPHSSP

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
		• Fire extinguishers and limited fire detection/alarms available, but routine inspection and operational status not verified; inadequate escape routes, assembly points and signage; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	• Establish a documented arrangement with an approved healthcare-waste treatment and disposal facility in accordance with national regulations and international good practice. Where feasible, prioritize environmentally sound non-incineration treatment technologies. • Provide/upgrade a secure designated temporary healthcare-waste storage area with washable surfaces, controlled access and protection from weather, patients and unauthorized persons. • Maintain waste transfer manifests/receipts or equivalent evidence of treatment and final disposal.						
			Wastewater: • Rehabilitate/upgrade the internal sewerage network and discharge connection to eliminate leakage, blockage and uncontrolled discharge. • Construct septic tanks, with appropriate structural design watertight construction, properly designed inlet/outlet arrangements, access covers, and provisions for scheduled desludging. • Install screens at appropriate drainage points to prevent solids and debris from entering the wastewater system. • Apply source-specific controls/pre-treatment for wastewater streams requiring additional control, such as grease traps for kitchen wastewater and screens/lint traps for laundry wastewater. • Ensure appropriate management of laboratory chemicals, pharmaceuticals and other hazardous liquid wastes and prevent their discharge into the wastewater system. • Establish routine inspection and maintenance of the	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Wastewater**: • Rehabilitated sewerage network completed and functional; discharge connection inspected and documented. • Septic tank rehabilitated, leak-free and operational; inspection/commissioning record available. • Wastewater quality monitoring conducted at least annually through a KP-EPA approved laboratory, with results demonstrating compliance with applicable national environmental quality standards (NEQS) or corrective actions implemented where exceedances are identified.	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			wastewater collection system and septic tanks. • Establish scheduled septic-tank inspection and desludging, with records maintained.						
			• Conduct periodic wastewater quality monitoring,	Hiring of KP-EPA approved Laboratory	HSE Focal Person	Health Department	• Monitoring Records.	Annual basis after completion of rehabilitation works	100,000
			Drinking water • Provision of Safe and adequate drinking water facilities	Hospital Administration	HSE Focal Person	Health Department Budget	• Safe drinking water available at all designated drinking-water points. • Required water-storage/backup arrangement provided and functional. • Water coolers/filtration units operational and maintained. • Water-storage tanks cleaned/disinfected and records maintained. • Drinking water quality tested at least annually by an accredited laboratory and meeting national drinking water quality standards.	3 months	1,000,000
			• Conduct periodic drinking water quality monitoring,	Hiring of KP-EPA approved Laboratory	HSE Focal Person	Health Department Budget	• Monitoring Records.	Annual basis after completion of rehabilitation works	100,000
			OHS: • Provide required PPE and close critical electrical, housekeeping, hazardous-material, sharps and biological-exposure gaps. • Improve designated storage areas and general Housekeeping.	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	• Electrical distribution, internal wiring and power-supply improvements are Included in the approved scope of work for the current project. • PPE, routine housekeeping and operational OHS measures in Health Department Budget.	**OHS:** • Monthly OHS inspections conducted and documented; PPE availability records maintained; incidents, near misses, first-aid cases, and corrective actions recorded and report.	After completion of rehabilitation works Within 3 months from commencement of the project.	Included in the approved scope of work for the current project. 12,000,000
			Fire/Life Safety: • Conduct fire-risk assessment for hospital and update emergency response procedures accordingly. • Service/replace overdue extinguishers; • Provide fire detection/alarm in Critical areas; mark and maintain unobstructed emergency escape routes/exits;	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Fire/Life Safety:** • All identified overdue/defective extinguishers serviced or replaced. • Fire detection/alarm provided and operational in identified critical areas. • Emergency exits/routes clearly marked and unobstructed. • Emergency procedure documented and at least one drill completed, with attendance and corrective-action record.	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Establish documented emergency procedures; conduct fire/emergency drill and record corrective actions.						
			Monitoring: • Designate hospital environmental/HSE focal person and establish monthly environmental/OHS inspection records.	Hospital Administration	PMIU Safeguards Unit	Hospital Administration Budget	**Monitoring:** • Environmental/HSE Focal Person designated and monthly inspection records maintained.	Within 3 months from commencement of the project.	2,400,000
								Total	**15,600,000**
7.	DHQ Mardan	• Inadequate healthcare waste segregation; no colour-coded bins; open dumping; incinerator available but non-functional; incomplete records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • Fire extinguishers, fire alarms and fire hose reel available, but routine inspection and operational status not evidenced; escape routes, assembly points and signage inadequately designated; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	**Medical Waste:** • Provide colour-coded bins and sharps containers; • Provide waste-segregation signage at waste-generation and temporary storage areas. • Establish daily waste-generation and disposal records; • Establish a documented arrangement with an approved healthcare-waste treatment and disposal facility in accordance with national regulations and international good practice. Where feasible, prioritize environmentally sound non-incineration treatment technologies. • Provide/upgrade a secure designated temporary healthcare-waste storage area with washable surfaces, controlled access and protection from weather, patients and unauthorized persons. • Maintain waste transfer manifests/receipts or equivalent evidence of treatment and final disposal.	Hospital Administration	HSE Focal Person / PMIU Safeguards Unit	Funding by ADB under KPHSSP.	**Waste**: • 100% of identified waste-generation points provided with appropriate colour-coded bins and sharps containers. • Waste-segregation signage installed at relevant locations. • Daily waste records. • Approved waste treatment/disposal arrangement documented and disposal records maintained.	Within 3 months from commencement of the project.	Cost included in KPHSSP
			Wastewater: • Rehabilitate/upgrade the internal sewerage network and discharge connection to eliminate leakage, blockage and uncontrolled discharge. • Construct septic tanks, with appropriate structural design watertight construction, properly designed inlet/outlet arrangements, access covers, and provisions for scheduled desludging.	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Wastewater**: • Rehabilitated sewerage network completed and functional; discharge connection inspected and documented. • Septic tank rehabilitated, leak-free and operational; inspection/commissioning record available. • Wastewater quality monitoring conducted at least annually through a KP-EPA approved laboratory, with results demonstrating compliance with applicable national	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Install screens at appropriate drainage points to prevent solids and debris from entering the wastewater system. • Apply source-specific controls/pre-treatment for wastewater streams requiring additional control, such as grease traps for kitchen wastewater and screens/lint traps for laundry wastewater. • Ensure appropriate management of laboratory chemicals, pharmaceuticals and other hazardous liquid wastes and prevent their discharge into the wastewater system. • Establish routine inspection and maintenance of the wastewater collection system and septic tanks. • Establish scheduled septic-tank inspection and desludging, with records maintained.				environmental quality standards (NEQS) or corrective actions implemented where exceedances are identified.		
			• Conduct periodic wastewater quality monitoring,	Hiring of KP-EPA approved Laboratory	HSE Focal Person	Health Department	• Monitoring Records.	Annual basis after completion of rehabilitation works	100,000
			OHS: • Provide required PPE and close critical electrical, housekeeping, hazardous-material, sharps and biological-exposure gaps. • Improve designated storage areas and general Housekeeping.	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Electrical distribution, internal wiring and power-supply improvements are Included in the approved scope of work for the current project.	**OHS:** • Monthly OHS inspections conducted and documented; PPE availability records maintained; incidents, near misses, first-aid cases, and corrective actions recorded and report.	After completion of rehabilitation works	Included in the approved scope of work for the current project.
						PPE, routine housekeeping and operational OHS measures in Health Department Budget.		Within 3 months from commencement of the project.	15,000,000
			Fire/Life Safety: • Conduct fire-risk assessment for hospital and update emergency response procedures accordingly. • Service/replace overdue extinguishers; • Provide fire detection/alarm in Critical areas; mark and maintain unobstructed emergency escape routes/exits;	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Fire/Life Safety:** • All identified overdue/defective extinguishers serviced or replaced. • Fire detection/alarm provided and operational in identified critical areas. • Emergency exits/routes clearly marked and unobstructed. • Emergency procedure documented and at least one drill completed, with attendance and corrective-action record.	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Establish documented emergency procedures; conduct fire/emergency drill and record corrective actions.						
			Monitoring: • Designate hospital environmental/HSE focal person and establish monthly environmental/OHS inspection records.	Hospital Administration	PMIU Safeguards Unit	Hospital Administration Budget	**Monitoring:** • Environmental/HSE Focal Person designated and monthly inspection records maintained.	Within 3 months from commencement of the project.	2,400,000
								Total	17,500,000
8.	DHQ Shangla	• No healthcare waste segregation; no colour-coded bins; open dumping; no on-site treatment; incomplete records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • Fire extinguishers available but no fire alarms; inadequate escape routes, assembly points and fire-safety signage; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	**Medical Waste:** • Provide colour-coded bins and sharps containers; • Provide waste-segregation signage at waste-generation and temporary storage areas. • Establish daily waste-generation and disposal records; • Establish a documented arrangement with an approved healthcare-waste treatment and disposal facility in accordance with national regulations and international good practice. Where feasible, prioritize environmentally sound non-incineration treatment technologies. • Provide/upgrade a secure designated temporary healthcare-waste storage area with washable surfaces, controlled access and protection from weather, patients and unauthorized persons. • Maintain waste transfer manifests/receipts or equivalent evidence of treatment and final disposal.	Hospital Administration	HSE Focal Person / PMIU Safeguards Unit	Funding by ADB under KPHSSP.	**Waste**: • 100% of identified waste-generation points provided with appropriate colour-coded bins and sharps containers. • Waste-segregation signage installed at relevant locations. • Daily waste records. • Approved waste treatment/disposal arrangement documented and disposal records maintained.	Within 3 months from commencement of the project.	Cost included in KPHSSP
			Wastewater: • Rehabilitate/upgrade the internal sewerage network and discharge connection to eliminate leakage, blockage and uncontrolled discharge. • Construct septic tanks, with appropriate structural design watertight construction, properly designed inlet/outlet arrangements, access covers, and provisions for scheduled desludging.	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Wastewater**: • Rehabilitated sewerage network completed and functional; discharge connection inspected and documented. • Septic tank rehabilitated, leak-free and operational; inspection/commissioning record available. • Wastewater quality monitoring conducted at least annually through a KP-EPA approved laboratory, with results demonstrating compliance with applicable national	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Install screens at appropriate drainage points to prevent solids and debris from entering the wastewater system. • Apply source-specific controls/pre-treatment for wastewater streams requiring additional control, such as grease traps for kitchen wastewater and screens/lint traps for laundry wastewater. • Ensure appropriate management of laboratory chemicals, pharmaceuticals and other hazardous liquid wastes and prevent their discharge into the wastewater system. • Establish routine inspection and maintenance of the wastewater collection system and septic tanks. • Establish scheduled septic-tank inspection and desludging, with records maintained.				environmental quality standards (NEQS) or corrective actions implemented where exceedances are identified.		
			• Conduct periodic wastewater quality monitoring,	Hiring of KP-EPA approved Laboratory	HSE Focal Person	Health Department	• Monitoring Records.	Annual basis after completion of rehabilitation works	100,000
			OHS: • Provide required PPE and close critical electrical, housekeeping, hazardous-material, sharps and biological-exposure gaps. • Improve designated storage areas and general Housekeeping.	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Electrical distribution, internal wiring and power-supply improvements are Included in the approved scope of work for the current project.	**OHS:** • Monthly OHS inspections conducted and documented; PPE availability records maintained; incidents, near misses, first-aid cases, and corrective actions recorded and report.	After completion of rehabilitation works	Included in the approved scope of work for the current project.
						PPE, routine housekeeping and operational OHS measures in Health Department Budget.		Within 3 months from commencement of the project.	12,000,000
			Fire/Life Safety: • Conduct fire-risk assessment for hospital and update emergency response procedures accordingly. • Service/replace overdue extinguishers; • Provide fire detection/alarm in Critical areas; mark and maintain unobstructed emergency escape routes/exits;	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Fire/Life Safety:** • All identified overdue/defective extinguishers serviced or replaced. • Fire detection/alarm provided and operational in identified critical areas. • Emergency exits/routes clearly marked and unobstructed. • Emergency procedure documented and at least one drill completed, with attendance and corrective-action record.	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Establish documented emergency procedures; conduct fire/emergency drill and record corrective actions.						
			Monitoring: • Designate hospital environmental/HSE focal person and establish monthly environmental/OHS inspection records.	Hospital Administration	PMIU Safeguards Unit	Hospital Administration Budget	**Monitoring:** • Environmental/HSE Focal Person designated and monthly inspection records maintained.	Within 3 months from commencement of the project.	2,400,000
								Total	14,500,000
9.	DHQ Tank	• Inadequate healthcare waste segregation; colour-coded bins available; open dumping; incinerator available but non-functional; poor records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • Fire extinguishers available but no fire alarms; inadequate escape routes, assembly points and signage; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	**Medical Waste:** • Provide colour-coded bins and sharps containers; • Provide waste-segregation signage at waste-generation and temporary storage areas. • Establish daily waste-generation and disposal records; • Establish a documented arrangement with an approved healthcare-waste treatment and disposal facility in accordance with national regulations and international good practice. Where feasible, prioritize environmentally sound non-incineration treatment technologies. • Provide/upgrade a secure designated temporary healthcare-waste storage area with washable surfaces, controlled access and protection from weather, patients and unauthorized persons. • Maintain waste transfer manifests/receipts or equivalent evidence of treatment and final disposal.	Hospital Administration	HSE Focal Person / PMIU Safeguards Unit	Funding by ADB under KPHSSP.	**Waste**: • 100% of identified waste-generation points provided with appropriate colour-coded bins and sharps containers. • Waste-segregation signage installed at relevant locations. • Daily waste records. • Approved waste treatment/disposal arrangement documented and disposal records maintained.	Within 3 months from commencement of the project.	Cost included in KPHSSP
			Wastewater: • Rehabilitate/upgrade the internal sewerage network and discharge connection to eliminate leakage, blockage and uncontrolled discharge. • Construct septic tanks, with appropriate structural design watertight construction, properly designed inlet/outlet arrangements, access covers, and provisions for scheduled desludging.	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Wastewater**: • Rehabilitated sewerage network completed and functional; discharge connection inspected and documented. • Septic tank rehabilitated, leak-free and operational; inspection/commissioning record available. • Wastewater quality monitoring conducted at least annually through a KP-EPA approved laboratory, with results demonstrating compliance with applicable national	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Install screens at appropriate drainage points to prevent solids and debris from entering the wastewater system. • Apply source-specific controls/pre-treatment for wastewater streams requiring additional control, such as grease traps for kitchen wastewater and screens/lint traps for laundry wastewater. • Ensure appropriate management of laboratory chemicals, pharmaceuticals and other hazardous liquid wastes and prevent their discharge into the wastewater system. • Establish routine inspection and maintenance of the wastewater collection system and septic tanks. • Establish scheduled septic-tank inspection and desludging, with records maintained.				environmental quality standards (NEQS) or corrective actions implemented where exceedances are identified.		
			• Conduct periodic wastewater quality monitoring,	Hiring of KP-EPA approved Laboratory	HSE Focal Person	Health Department	• Monitoring Records.	Annual basis after completion of rehabilitation works	100,000
			OHS: • Provide required PPE and close critical electrical, housekeeping, hazardous-material, sharps and biological-exposure gaps. • Improve designated storage areas and general Housekeeping.	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Electrical distribution, internal wiring and power-supply improvements are Included in the approved scope of work for the current project.	**OHS:** • Monthly OHS inspections conducted and documented; PPE availability records maintained; incidents, near misses, first-aid cases, and corrective actions recorded and report.	After completion of rehabilitation works	Included in the approved scope of work for the current project.
						PPE, routine housekeeping and operational OHS measures in Health Department Budget.		Within 3 months from commencement of the project.	5,000,000
			Fire/Life Safety: • Conduct fire-risk assessment for hospital and update emergency response procedures accordingly. • Service/replace overdue extinguishers; • Provide fire detection/alarm in Critical areas; mark and maintain unobstructed emergency escape routes/exits;	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Fire/Life Safety:** • All identified overdue/defective extinguishers serviced or replaced. • Fire detection/alarm provided and operational in identified critical areas. • Emergency exits/routes clearly marked and unobstructed. • Emergency procedure documented and at least one drill completed, with attendance and corrective-action record.	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Establish documented emergency procedures; conduct fire/emergency drill and record corrective actions.						
			Monitoring: • Designate hospital environmental/HSE focal person and establish monthly environmental/OHS inspection records.	Hospital Administration	PMIU Safeguards Unit	Hospital Administration Budget	**Monitoring:** • Environmental/HSE Focal Person designated and monthly inspection records maintained.	Within 3 months from commencement of the project.	2,400,000
								Total	7,500,000
10.	DHQ Swat	• No healthcare waste segregation; limited colour-coded bins; open dumping; incinerator available but non-functional; poor records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • Fire extinguishers, fire alarms and fire hose reel available, but routine inspection and operational status not evidenced; escape routes, assembly points and signage inadequately designated; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	**Medical Waste:** • Provide colour-coded bins and sharps containers; • Provide waste-segregation signage at waste-generation and temporary storage areas. • Establish daily waste-generation and disposal records; • Establish a documented arrangement with an approved healthcare-waste treatment and disposal facility in accordance with national regulations and international good practice. Where feasible, prioritize environmentally sound non-incineration treatment technologies. • Provide/upgrade a secure designated temporary healthcare-waste storage area with washable surfaces, controlled access and protection from weather, patients and unauthorized persons. • Maintain waste transfer manifests/receipts or equivalent evidence of treatment and final disposal.	Hospital Administration	HSE Focal Person / PMIU Safeguards Unit	Funding by ADB under KPHSSP.	**Waste**: • 100% of identified waste-generation points provided with appropriate colour-coded bins and sharps containers. • Waste-segregation signage installed at relevant locations. • Daily waste records. • Approved waste treatment/disposal arrangement documented and disposal records maintained.	Within 3 months from commencement of the project.	Cost included in KPHSSP
			Wastewater: • Rehabilitate/upgrade the internal sewerage network and discharge connection to eliminate leakage, blockage and uncontrolled discharge. • Construct septic tanks, with appropriate structural design watertight construction, properly designed inlet/outlet arrangements, access covers, and provisions for scheduled desludging.	Hospital Administration	HSE Focal Person/ PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Wastewater**: • Rehabilitated sewerage network completed and functional; discharge connection inspected and documented. • Septic tank rehabilitated, leak-free and operational; inspection/commissioning record available. • Wastewater quality monitoring conducted at least annually through a KP-EPA approved laboratory, with results demonstrating compliance with applicable national	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Install screens at appropriate drainage points to prevent solids and debris from entering the wastewater system. • Apply source-specific controls/pre-treatment for wastewater streams requiring additional control, such as grease traps for kitchen wastewater and screens/lint traps for laundry wastewater. • Ensure appropriate management of laboratory chemicals, pharmaceuticals and other hazardous liquid wastes and prevent their discharge into the wastewater system. • Establish routine inspection and maintenance of the wastewater collection system and septic tanks. • Establish scheduled septic-tank inspection and desludging, with records maintained.				environmental quality standards (NEQS) or corrective actions implemented where exceedances are identified.		
			• Conduct periodic wastewater quality monitoring,	Hiring of KP-EPA approved Laboratory	HSE Focal Person	Health Department	• Monitoring Records.	Annual basis after completion of rehabilitation works	100,000
			OHS: • Provide required PPE and close critical electrical, housekeeping, hazardous-material, sharps and biological-exposure gaps. • Improve designated storage areas and general Housekeeping.	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Electrical distribution, internal wiring and power-supply improvements are Included in the approved scope of work for the current project.	**OHS:** • Monthly OHS inspections conducted and documented; PPE availability records maintained; incidents, near misses, first-aid cases, and corrective actions recorded and report.	After completion of rehabilitation works	Included in the approved scope of work for the current project.
						PPE, routine housekeeping and operational OHS measures in Health Department Budget.		Within 3 months from commencement of the project.	16,000,000
			Fire/Life Safety: • Conduct fire-risk assessment for hospital and update emergency response procedures accordingly. • Service/replace overdue extinguishers; • Provide fire detection/alarm in Critical areas; mark and maintain unobstructed emergency escape routes/exits;	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Fire/Life Safety:** • All identified overdue/defective extinguishers serviced or replaced. • Fire detection/alarm provided and operational in identified critical areas. • Emergency exits/routes clearly marked and unobstructed. • Emergency procedure documented and at least one drill completed, with attendance and corrective-action record.	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Establish documented emergency procedures; conduct fire/emergency drill and record corrective actions.						
			Monitoring: • Designate hospital environmental/HSE focal person and establish monthly environmental/OHS inspection records.	Hospital Administration	PMIU Safeguards Unit	Hospital Administration Budget	**Monitoring:** • Environmental/HSE Focal Person designated and monthly inspection records maintained.	Within 3 months from commencement of the project.	2,400,000
								Total	18,500,000
11.	DHQ Dassu	• No healthcare waste segregation; limited colour-coded bins; open dumping; no on-site treatment; poor records. • No on-site wastewater treatment; direct discharge to municipal sewer. • Gaps in PPE, electrical safety, housekeeping, hazardous materials, signage, sharps and biological exposure controls. • Fire extinguishers available but no fire alarms; inadequate escape routes, assembly points and fire-safety signage; no documented emergency procedures, training or drills. • No structured environmental monitoring programme and limited institutional capacity.	**Medical Waste:** • Provide colour-coded bins and sharps containers; • Provide waste-segregation signage at waste-generation and temporary storage areas. • Establish daily waste-generation and disposal records; • Establish a documented arrangement with an approved healthcare-waste treatment and disposal facility in accordance with national regulations and international good practice. Where feasible, prioritize environmentally sound non-incineration treatment technologies. • Provide/upgrade a secure designated temporary healthcare-waste storage area with washable surfaces, controlled access and protection from weather, patients and unauthorized persons. • Maintain waste transfer manifests/receipts or equivalent evidence of treatment and final disposal.	Hospital Administration	HSE Focal Person / PMIU Safeguards Unit	Funding by ADB under KPHSSP.	**Waste**: • 100% of identified waste-generation points provided with appropriate colour-coded bins and sharps containers. • Waste-segregation signage installed at relevant locations. • Daily waste records. • Approved waste treatment/disposal arrangement documented and disposal records maintained.	Within 3 months from commencement of the project.	Cost included in KPHSSP
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Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Install screens at appropriate drainage points to prevent solids and debris from entering the wastewater system. • Apply source-specific controls/pre-treatment for wastewater streams requiring additional control, such as grease traps for kitchen wastewater and screens/lint traps for laundry wastewater. • Ensure appropriate management of laboratory chemicals, pharmaceuticals and other hazardous liquid wastes and prevent their discharge into the wastewater system. • Establish routine inspection and maintenance of the wastewater collection system and septic tanks. • Establish scheduled septic-tank inspection and desludging, with records maintained.				environmental quality standards (NEQS) or corrective actions implemented where exceedances are identified.		
			• Conduct periodic wastewater quality monitoring,	Hiring of KP-EPA approved Laboratory	HSE Focal Person	Health Department	• Monitoring Records.	Annual basis after completion of rehabilitation works	100,000
			OHS: • Provide required PPE and close critical electrical, housekeeping, hazardous-material, sharps and biological-exposure gaps. • Improve designated storage areas and general Housekeeping.	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Electrical distribution, internal wiring and power-supply improvements are Included in the approved scope of work for the current project.	**OHS:** • Monthly OHS inspections conducted and documented; PPE availability records maintained; incidents, near misses, first-aid cases, and corrective actions recorded and report.	After completion of rehabilitation works	Included in the approved scope of work for the current project.
						PPE, routine housekeeping and operational OHS measures in Health Department Budget.		Within 3 months from commencement of the project.	5,000,000
			Fire/Life Safety: • Conduct fire-risk assessment for hospital and update emergency response procedures accordingly. • Service/replace overdue extinguishers; • Provide fire detection/alarm in Critical areas; mark and maintain unobstructed emergency escape routes/exits;	Hospital Administration	HSE Focal Person/PMIU Safeguards Unit	Included in the approved scope of work for the current project.	**Fire/Life Safety:** • All identified overdue/defective extinguishers serviced or replaced. • Fire detection/alarm provided and operational in identified critical areas. • Emergency exits/routes clearly marked and unobstructed. • Emergency procedure documented and at least one drill completed, with attendance and corrective-action record.	After completion of rehabilitation works	Included in the approved scope of work for the current project.

Sr. No.	Hospital	Existing Environmental Liability	Corrective Action	Responsibility			Indicator	Timeline	Indicative Cost (PKR) Annual Basis
				Implementation	Monitoring	Funding Source			
			• Establish documented emergency procedures; conduct fire/emergency drill and record corrective actions.						
			Monitoring: • Designate hospital environmental/HSE focal person and establish monthly environmental/OHS inspection records.	Hospital Administration	PMIU Safeguards Unit	Hospital Administration Budget	**Monitoring:** • Environmental/HSE Focal Person designated and monthly inspection records maintained.	Within 3 months from commencement of the project.	2,400,000
								Total	7,500,000

10 CONCLUSION AND RECOMMENDATIONS

10.1 CONCLUSION

628. This report presents IEE of the project entitled as; KPHSSP, Revamping of Non-Teaching (DHQs) Hospitals across KP, Phase-III. The report has been prepared in accordance with the requirements of the KP Environmental Protection Act, 2014, KP Environmental Assessment Rules, 2021. and ADB SPS, 2009.

629. The project encompasses comprehensive upgrades and service improvements across secondary healthcare hospitals in Khyber Pakhtunkhwa which includes; internal upgrades such as renovation and improvement of washrooms, flooring, lighting, HVAC systems, burn units, isolation wards, and counselling areas to enhance functionality and patient comfort. It also covers external service improvements, including rehabilitation of sewerage and drainage networks, upgrading electrification systems, installation of water filtration units, and integration of solar energy solutions to ensure reliable and sustainable utility services. In addition, specialized units will be established, including emergency stabilization rooms and pandemic response infrastructure, to strengthen emergency preparedness and rapid response capacity.

630. The project with an estimated cost of **Rs. 5617.154 million**, will be implemented over a period of twenty-four (24) months and focuses on the rehabilitation and upgrading of existing hospital facilities in KP.

631. The IEE findings indicate that the project will deliver substantial environmental, social, and operational benefits through the rehabilitation of existing healthcare facilities, enhancing infrastructure reliability and extending asset life without additional land requirements. Upgrades to HVAC systems, internal layouts, and specialized units will strengthen infection prevention and control, improving indoor air quality, thermal comfort, and reducing hospital-acquired infection risks. Improvements in sewerage, drainage, and stormwater systems will minimize leakages and flooding, while enhanced healthcare waste management will ensure safe and compliant disposal.

632. The integration of energy-efficient systems and solar power will reduce grid dependency, emissions, and operational costs. Strengthened emergency preparedness, along with reliable fire-fighting, medical gas, and electrical systems, will enhance resilience and service continuity. Overall, the project will improve accessibility, patient comfort, operational efficiency, and occupational health and safety, while generating short-term employment and supporting local economic activity. However, following negative impacts are also anticipated during implementation of the project;

633. During the pre-construction and design phase, potential impacts are limited to inefficient operational considerations and possible utility disruptions. No land acquisition, major impacts on flora or fauna, or disturbance to physical cultural resources are expected.

634. Construction may cause site-specific, temporary impacts, including soil disturbance, dust, noise, vibration, and interruptions to utilities. Sensitive hospital areas such as ICUs,

operating theaters, and emergency routes may be affected. Additional impacts include generation of construction and hazardous waste, restricted access for vehicles and ambulances, occupational health and safety risks, and potential social concerns such as child labor and gender-based issues. Temporary relocation or operational adjustments may also be required.

635. During operation, the hospital may experience high water and energy demand, generation of biomedical and municipal waste, noise, traffic congestion, occupational and public health risks, potential healthcare-associated infections, and localized odor or noise from waste treatment. Emergency scenarios, including fires and natural disasters, present high-risk impacts that could disrupt hospital services.

10.2 RECOMMENDATIONS

636. Mitigation of these impacts will be achieved through careful planning, design, and operational controls. During the design phase, operational efficiencies will be optimized, utility layouts coordinated, and resource conservation measures incorporated.

637. Construction-phase impacts will be managed through site-specific measures such as dust and noise control, phased and off-peak work, proper handling and disposal of construction and hazardous waste, protection of sensitive hospital areas and continued availability of hospital services and operations, safe access for vehicles and ambulances, and strict adherence to occupational health, safety, and labor standards.

638. During operation, water and energy-efficient systems, proper biomedical and municipal waste segregation and disposal, noise and odor control, traffic and access management, infection prevention, and emergency preparedness plans including fire safety and natural disaster response will ensure minimal disruption, protection of patients, staff, and visitors, and compliance with environmental and public health standards. Continuous monitoring and staff training will support the effective implementation of these measures across all phases.

639. An EMP has been prepared as an integral component of this report, providing a comprehensive mitigation matrix that outlines potential impacts, corresponding mitigation measures, assigned roles and responsibilities, and institutional requirements for both the construction and operational phases. The EMP is designed to avoid, minimize, or mitigate adverse environmental and social impacts associated with the project. During the construction phase, the contractor will be required to strictly implement all mitigation measures specified in the EMP and develop a site-specific EMP to address location-specific conditions and ensure full compliance with environmental, health, and safety standards.

Initial Environmental Examination

Date: July 2026

Pakistan: Khyber Pakhtunkhwa Health Systems Strengthening Program (KPHSSP)

Revamping of Non-Teaching District Head Quarters (DHQs) Hospitals across KP, Phase-III

Volume-II

Prepared by Project Management Implementation Unit (PMIU), Communication and Works (C & W) Department, Government of Khyber Pakhtunkhwa, Pakistan for the Asian Development Bank.

ANNEXURES

LIST OF ANNEXURES

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Annexure-IV	Land use and Sensitive receptors
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Annexure-VI	Impact Evaluation Matrix
Annexure-VII	Resource Conservation Plan
Annexure-VIII	Traffic Management Plan
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ANNEXURE-I: SCOPE OF WORK

DHQ HOSPITAL BATTAGRAM



- PLINTH RPOTECTION 3'–0" WIDE ALL AROUND THE BUILDINGS
- ALL GREEN AREAS TO BE FINISHED 0'–6" BELOW THE ROAD LEVEL
- ALL COVERED CORRIDORS TO BE FINISHED IN TERRAZO TILE
- ALL PAVEMENTS TO BE FINISHED IN CONCRETE PAVERS
- BOUNDARY WALL AND COLUMNS OF GATES NEED TO BE REVAMPED AND REPAIRED WHERE REQUIRED AS APPROVED BY ENGINEER

PROJECT MANAGEMENT & IMPLEMENTATION UNIT
COMMUNICATION & WORKS DEPARTMENT MEGA PROJECT-I PESHAWAR

DHQ HOSPITAL BATTAGRAM

SCOPE OF WORK

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. PESHAWAR

DESIGN	RECOMMENDED	VERIFIED	APPROVED
DRAWN			
M.E			
CKD	DATE	DRAWING NO	rev.
SUBM		33169/021/TD/BTM/00B01	0

DHQ HOSPITAL BATTAGRAM



NOTE:
1) ALL DOORS & WINDOWS ARE TO BE REPLACED AS APPROVED BY THE ENGINEER/ARCHITECT.
2) ALL TOILET FIXTURES ARE SHOWN SYMBOLICALLY. FOR ACCURATE PLACEMENT OF FIXTURES, REFER PLUMBING DRAWINGS.
3) ALL TOILET DOORS WILL BE OPEN TOWARDS OUTSIDE
4) FURNITURE ITEMS ARE SHOWN ONLY TO FACILITATE OTHER DISCIPLINES FOR PROVIDING SERVICES. NO FURNITURE ITEM IS PART OF BOQ EXCEPT RECEPTION DESKS.

PROPOSED INTERVENTIONS
DEMOLISHED WALL
PROPOSED WALL

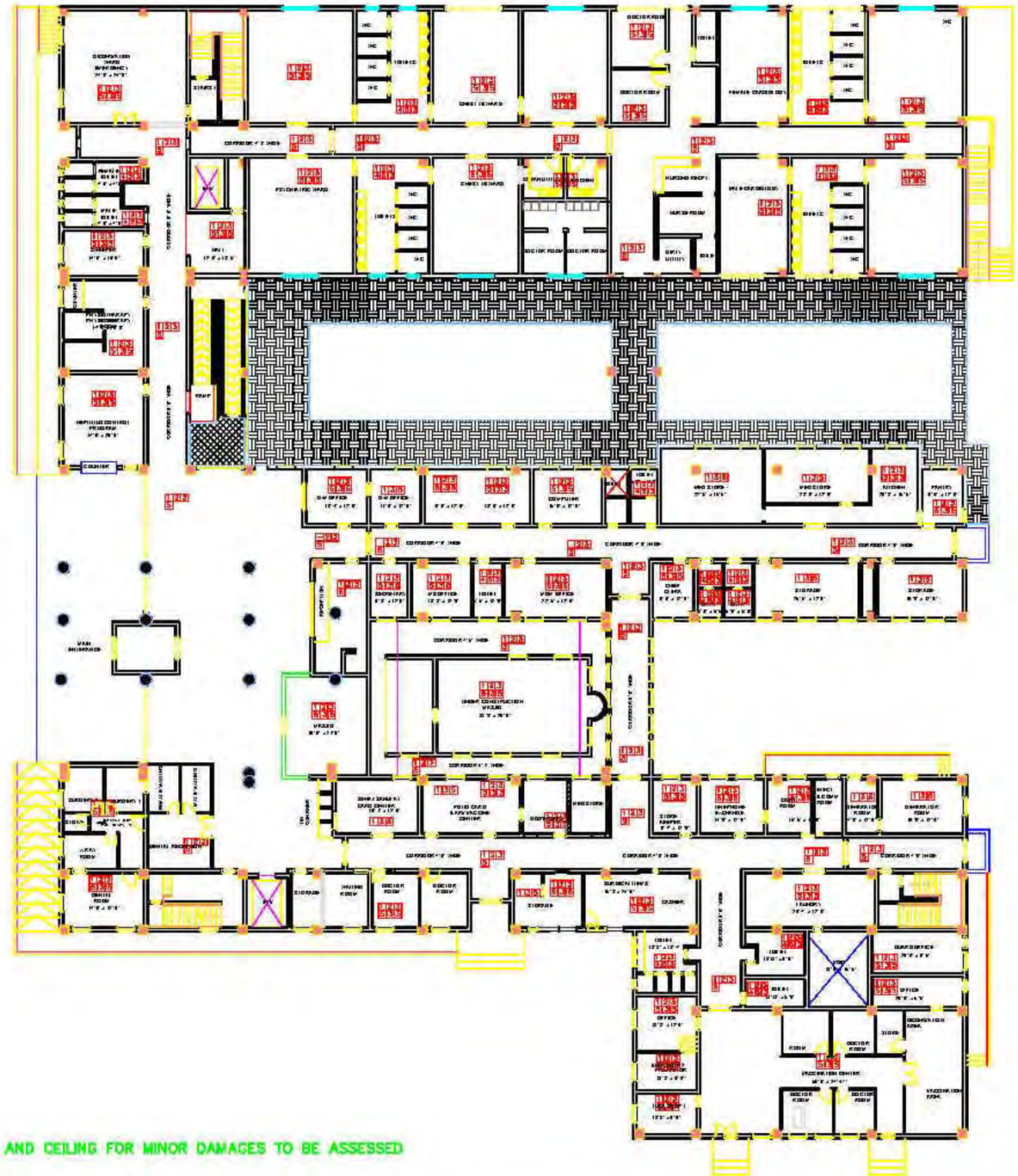
PROJECT MANAGEMENT & IMPLEMENTATION UNIT
COMMUNICATION & WORKS DEPARTMENT MEGA PROJECT PESHAWAR

DHQ HOSPITAL BATTAGRAM
I C U +OT+GYANE BLOCK
GROUND FLOOR PLAN (FURNITURE LAYOUT)

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. PESHAWAR

DESIGN	RECOMMENDED	VERIFIED	APPROVED
DWN			
FILE			
CHD	DATE	DRAWING NO.	REV.
SCALE	REV. DATE	43161/021/TD/ETM/0.1801	0

DHQ HOSPITAL BATTAGRAM



REVAMPING
SCOPE OF WORK

1. FLOOR FINISH
2. CEILING FINISH
3. DADO/ SKIRTING
4. DAMPNESS TREATMENT
5. PAINT FINISH
6. CABINETS
7. NURSING COUNTER FINISHES
8. DEMOLISH/ PROPOSED INTERVENTION
9. OPENINGS TO BE OPEN OR CLOSE
10. WASHBASIN/ TOILET FIXTURE
11. ADDITIONAL AREA
12. DOOR TO BE RETAINED
13. DOOR TO BE REPLACED
14. WINDOW TO BE RETAINED
15. WINDOW TO BE REPLACED
16. FLOOR POLISHING
17. NOT IN CONTRACT

NOTE:

1) REPLACEMENT OF FLOORING AND CEILING FOR MINOR DAMAGES TO BE ASSESSED AND APPROVED BY ENGINEER.

PROJECT MANAGEMENT & IMPLEMENTATION UNIT
COMMUNICATION & WORKS DEPARTMENT MEGA PROJECT I PESHAWAR

DHQ HOSPITAL BATTAGRAM
I C U +OT+GYANE BLOCK
GROUND FLOOR PLAN (PROPOSED FINISHES)

NATIONAL ENGINEERING SERVICES
PAKISTAN (PVT.) LTD. PESHAWAR

DESIGN	RECOMMENDED	VERIFIED	APPROVED
DWN			
FILE			
CHD	DATE	DRAWING NO.	REV
SCALE	NOV 2020	4316\022\TD\BTM\0.1B10	0

DHQ HOSPITAL, CHITRAL



LEGEND

- BUILDINGS IN SCOPE
- NOT IN SCOPE
- CONCRETE PAVERS
- CHEQUERED TILES
- ASPHALT ROAD
- GREEN AREA
- PROPOSED BOUNDARY WALL



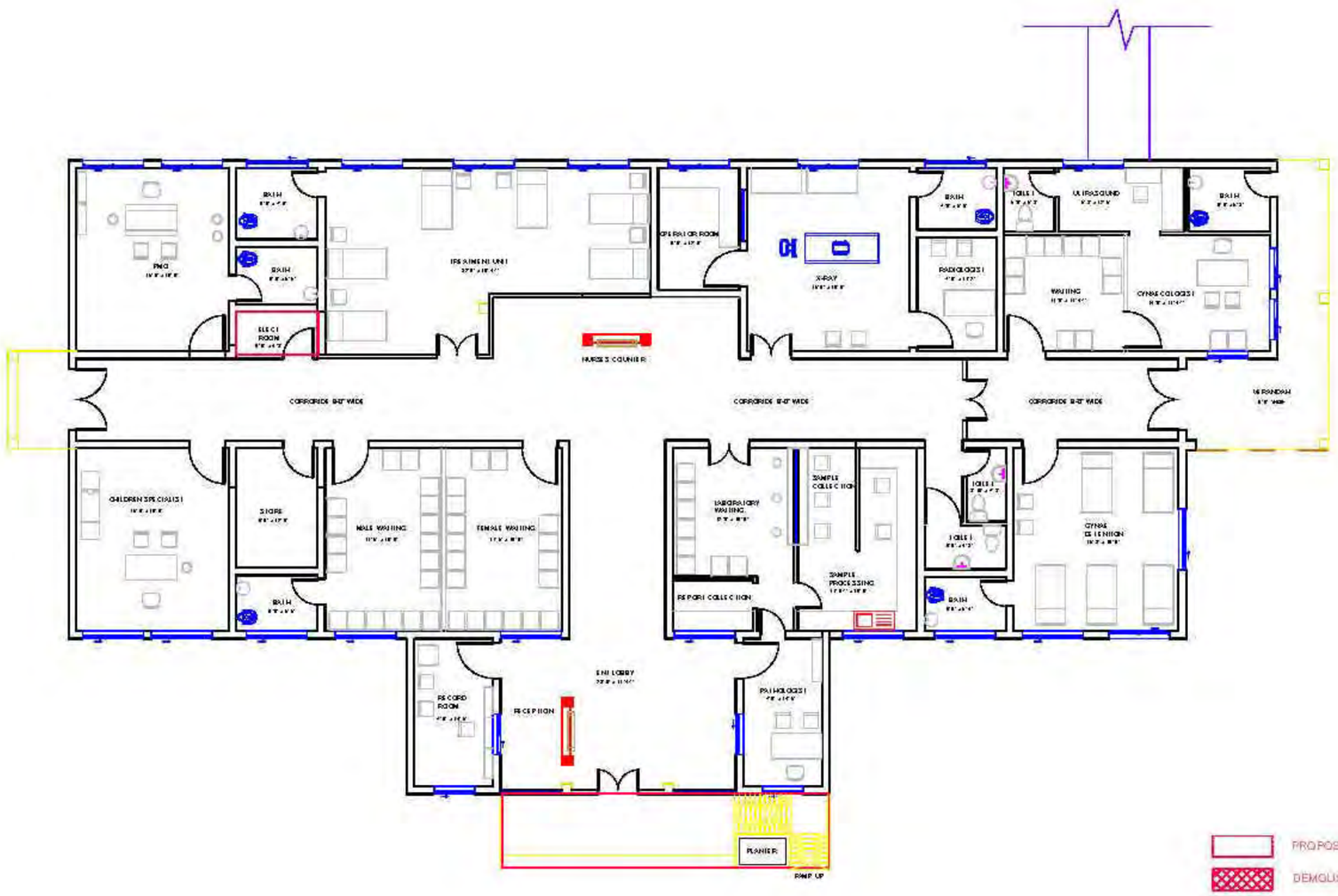
- PLINTH RPOTECTION 3'-0" WIDE ALL AROUND THE BUILDINGS
- ALL GREEN AREAS TO BE FINISHED 0'-6" BELOW THE ROAD LEVEL
- ALL COVERED CORRIDORS TO BE FINISHED IN TERRAZO TILE
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- BOUNDARY WALL AND COLUMNS OF GATES NEED TO BE REVAMPED AND REPAIRED WHERE REQUIRED AS APPROVED BY ENGINEER

PROJECT MANAGEMENT & IMPLEMENTATION UNIT

DHQ HOSPITAL CHITRAL
MASTER PLAN
SCOPE OF WORK

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. PESHAWAR

DHQ HOSPITAL, CHITRAL



NOTE:
1) ALL DOORS & WINDOWS ARE TO BE REPLACED AS APPROVED BY THE ENGINEER/ARCHITECT.

2) ALL TOILET FIXTURES ARE SHOWN SYMBOLICALLY. FOR ACCURATE PLACEMENT OF FIXTURES, REFER PLUMBING DRAWINGS.

3) ALL TOILET DOORS WILL BE OPEN TOWARDS OUTSIDE

4) FURNITURE ITEMS ARE SHOWN ONLY TO FACILITATE OTHER DISCIPLINES FOR PROVIDING SERVICES. NO FURNITURE ITEM IS PART OF BOQ EXCEPT RECEPTION DESKS.

PROJECT MANAGEMENT & IMPLEMENTATION UNIT

DHQ HOSPITAL CHITRAL
WOMEN & CHILDREN OPD
GROUND FLOOR PLAN (FURNITURE LAYOUT)

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. PESHAWAR

DESIGN KESRAN
DRWN
CHK
QRD

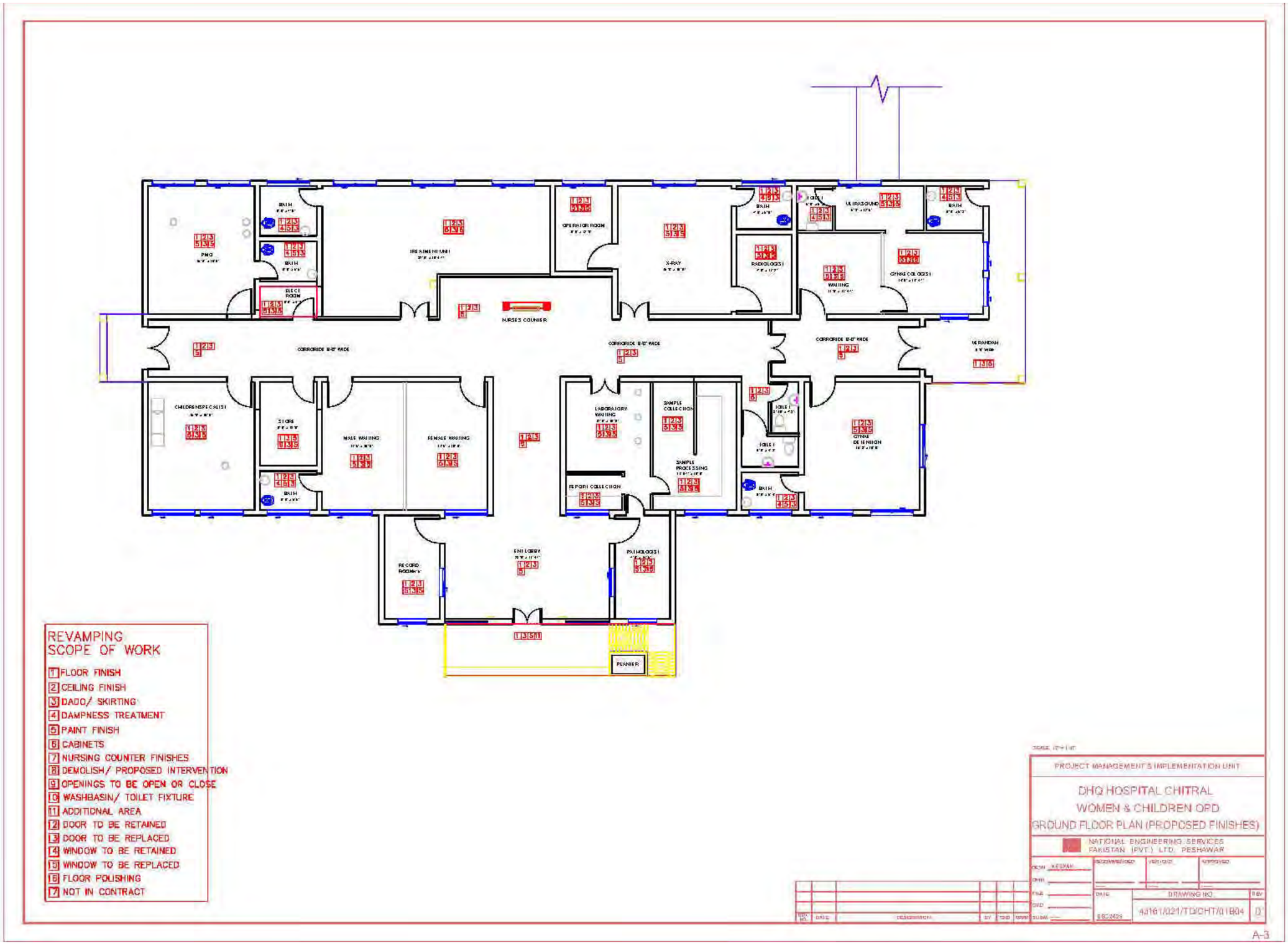
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DATE 8/6/2020

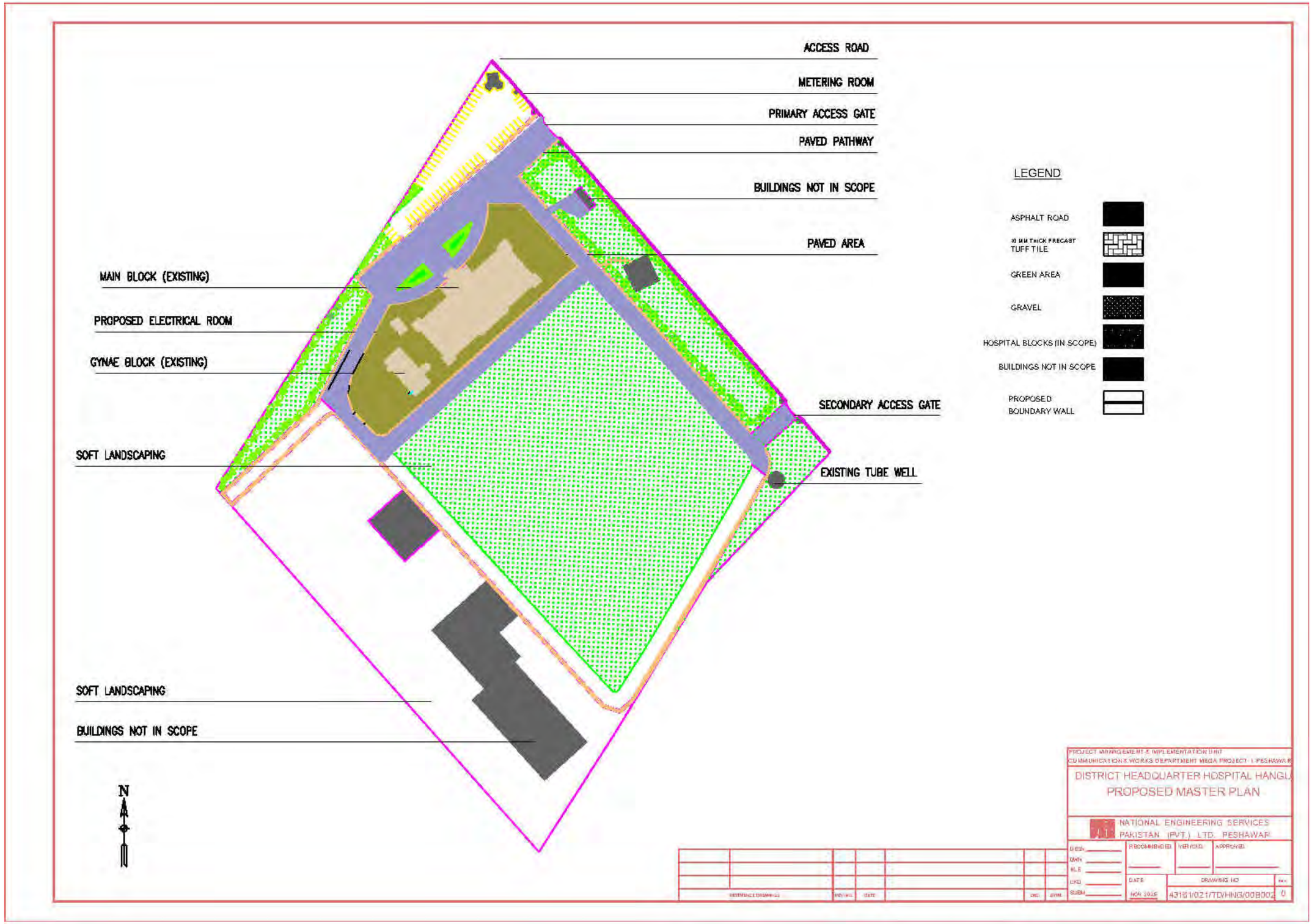
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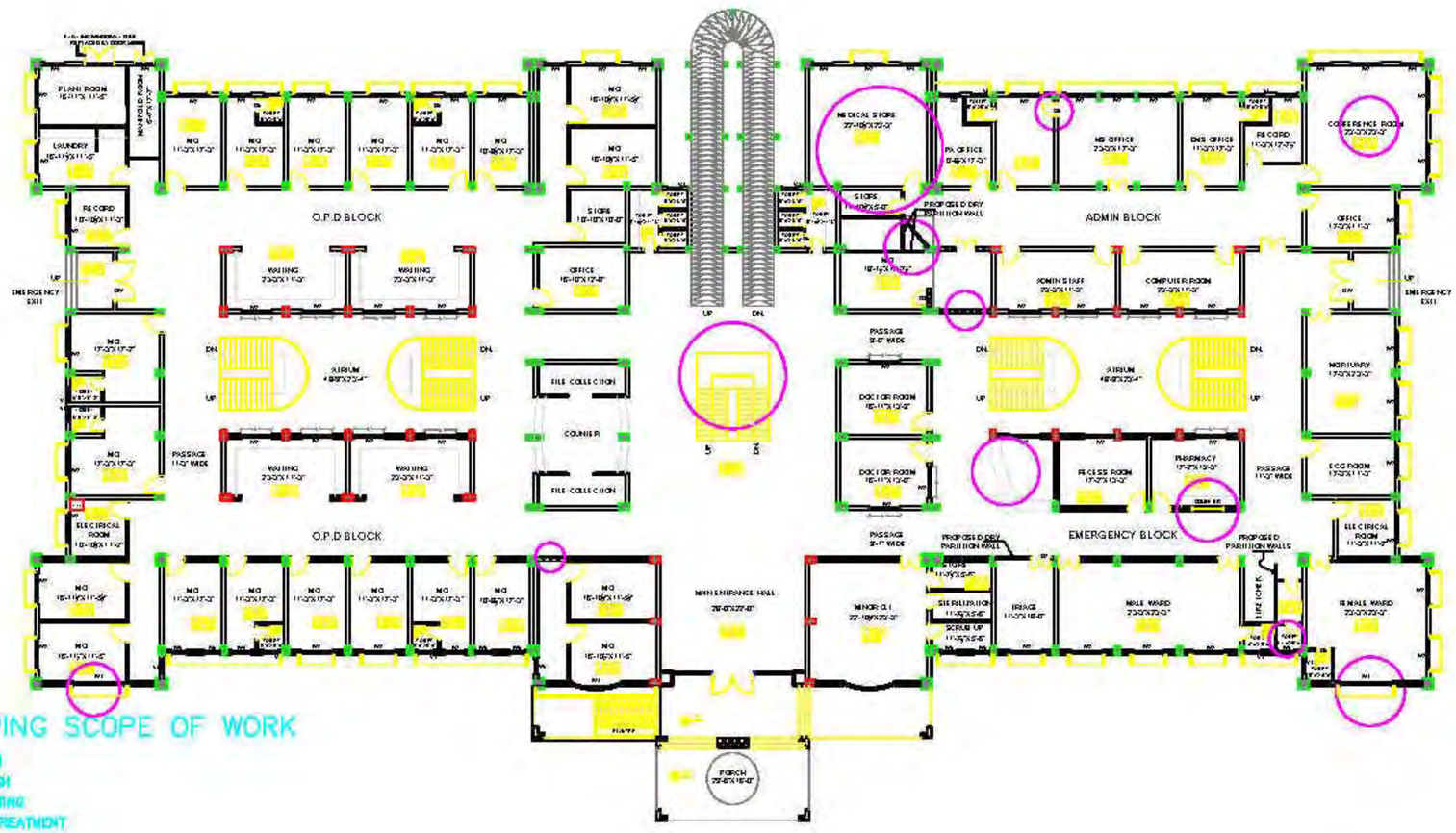
DHQ HOSPITAL, CHITRAL



DHQ HOSPITAL, HANGU



DHQ HOSPITAL, HANGU



REVAMPING SCOPE OF WORK

1. FLOOR FINISH
2. CEILING FINISH
3. DADO/ SKIRTING
4. DAMPNESS TREATMENT
5. PAINT FINISH
6. CABINETS
7. NURSING COUNTER FINISHES
8. DEMOLISH/ NEW CONSTRUCTION
9. OPENINGS TO BE OPEN OR CLOSE
10. WASHBASIN/ TOILET FIXTURE
11. ADDITIONAL AREA
12. DOOR TO BE RETAINED
13. DOOR TO BE REPLACED
14. WINDOW TO BE RETAINED
15. WINDOW TO BE REPLACED
16. DOME TO BE REPLACED

OUTSOURCE FOR REVAMP

ABANDONED PORTION/ NOT TO BE REVAMPED

PROJECT MANAGEMENT & IMPLEMENTATION UNIT
COMMUNICATION & WORKS DEPARTMENT MEGA PROJECT-1 PESHAWAR

DHQ HOSPITAL HANGU

MAIN BUILDING

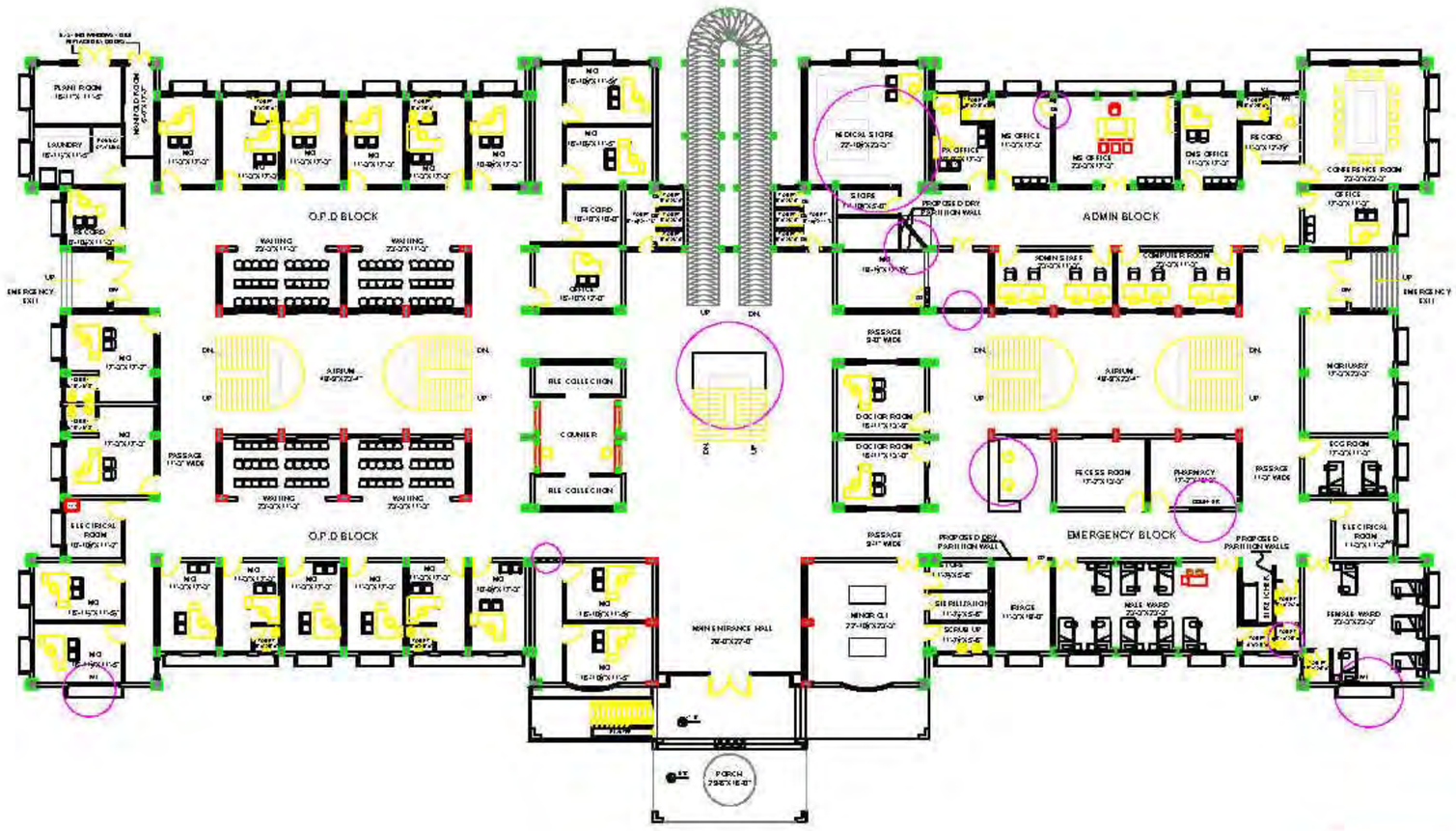
PROPOSED FINISHES PLAN

GROUND FLOOR

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. PESHAWAR

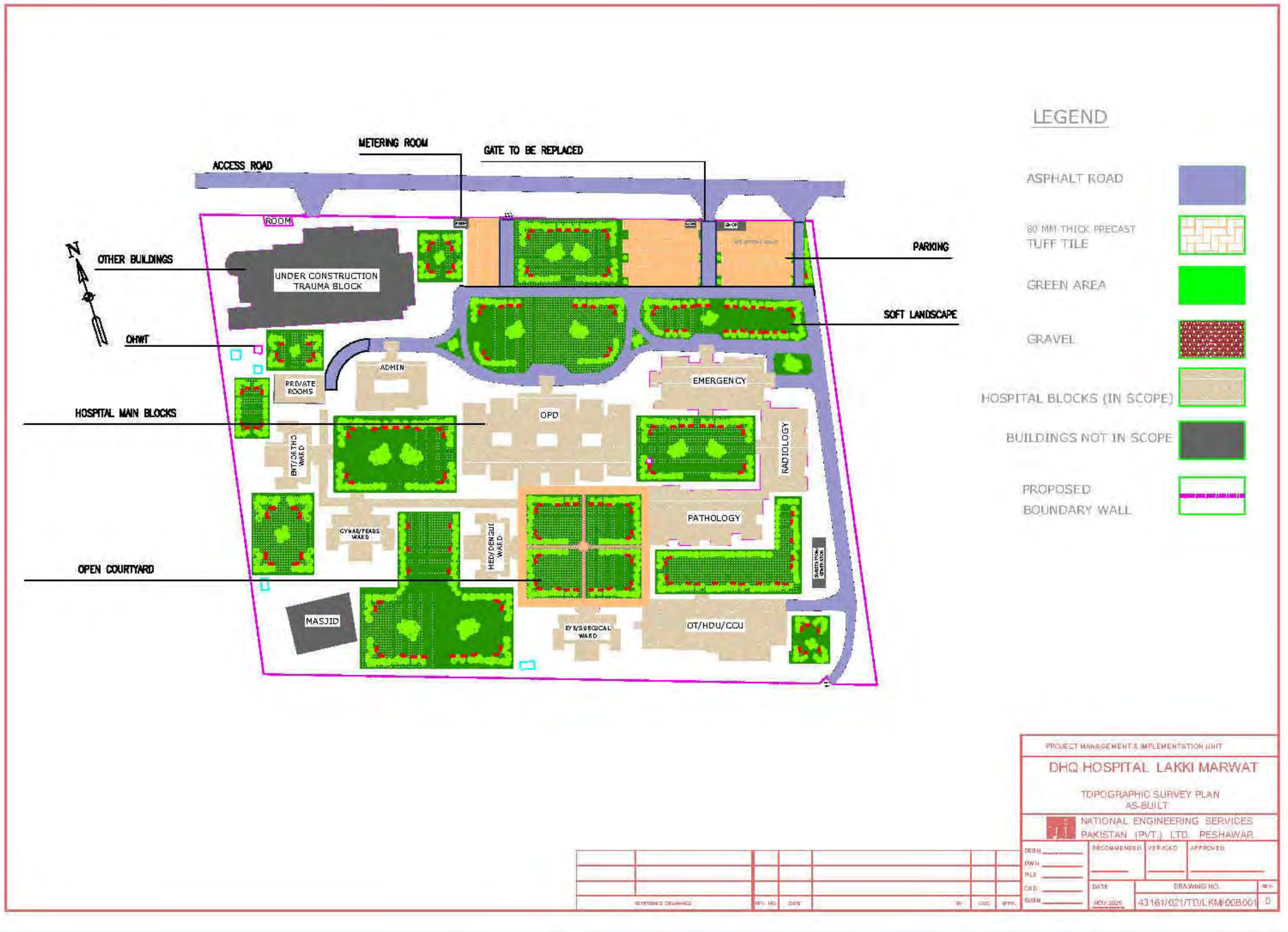
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DWN			
CKD			
SIGN	DATE: NOV 2025	DRAWING NO: 43161/021/TD/HNG/01B017	REV: 0

DHQ HOSPITAL, HANGU

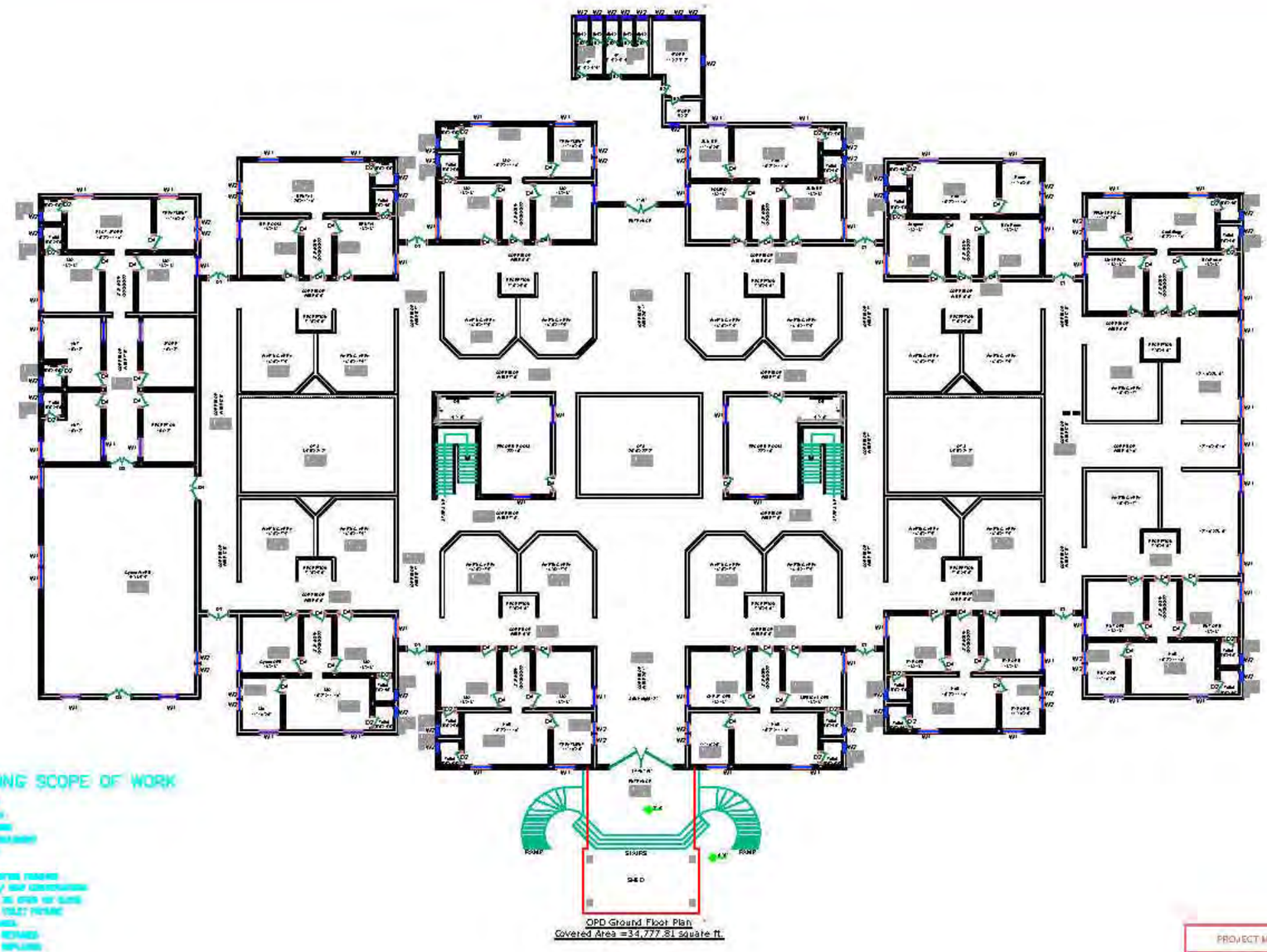


DHQ HOSPITAL, LAKKI MARWAT

DHQ HOSPITAL, LAKKI MARWAT



DHQ HOSPITAL, LAKKI MARWAT



OPD Ground Floor Plan
Covered Area =34,777.81 square ft.

REVAMPING SCOPE OF WORK

PROJECT MANAGEMENT & IMPLEMENTATION UNIT

DHQ HOSPITAL LAKKI MARWAT

OPD

Ground Floor Plan
(Proposed Finishes Plan)

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. PESHAWAR

DESIGN | RECOMMENDED | VERIFIED | APPROVED

DWN

FILE

CKD

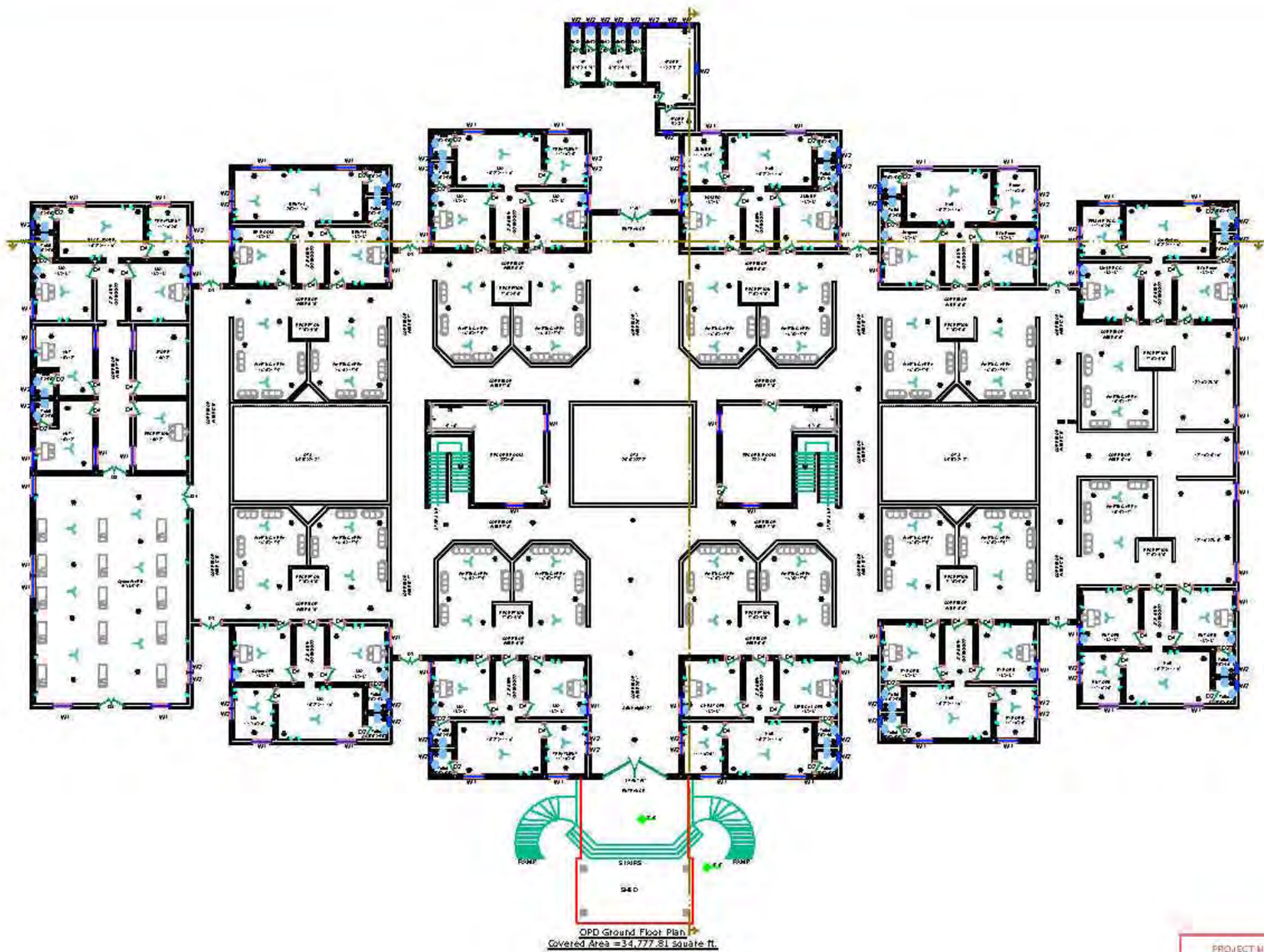
SIGN

DATE: NOV 2025

DRAWING NO: 45181/021/TD/LKM/01B001

REV:

DHQ HOSPITAL, LAKKI MARWAT



OPD Ground Floor Plan
Covered Area =34,777.81 square ft.

PROJECT MANAGEMENT & IMPLEMENTATION UNIT

DHQ HOSPITAL LAKKI MARWAT
OPD
Ground Floor Plan
(Proposed Fixtures Plan)

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. PESHAWAR

DESIG.	RECOMMENDED	VERIFIED	APPROVED
DWN			
FILE			
CKD			
SIGN			

DATE: NOV 2020
DRAWING NO: 45181/021/TD/LKM/01B012
REV: 0

DHQ HOSPITAL, BATKHELA, MALAKAND





LEGEND

BUILDINGS IN SCOPE	
NOT IN SCOPE	
CONCRETE PAVERS	CP
CHEQUERED TILES	CT
ASPHALT ROAD	AR
GREEN AREA	GREEN

- PLINTH RPOTECTION IN CONCRETE CHEQUERED TILES 3'-0" WIDE ALL AROUND THE BUILDINGS
- ALL PAVEMENTS AND PARKING LOTS TO BE FINISHED IN CONCRETE PAVERS
- ALL GREEN AREAS TO BE FINISHED 0'-6" BELOW THE ROAD LEVEL
- ALL COVERED CORRIDORS TO BE FINISHED IN TERRAZO TILE

PROJECT MANAGEMENT & IMPLEMENTATION UNIT

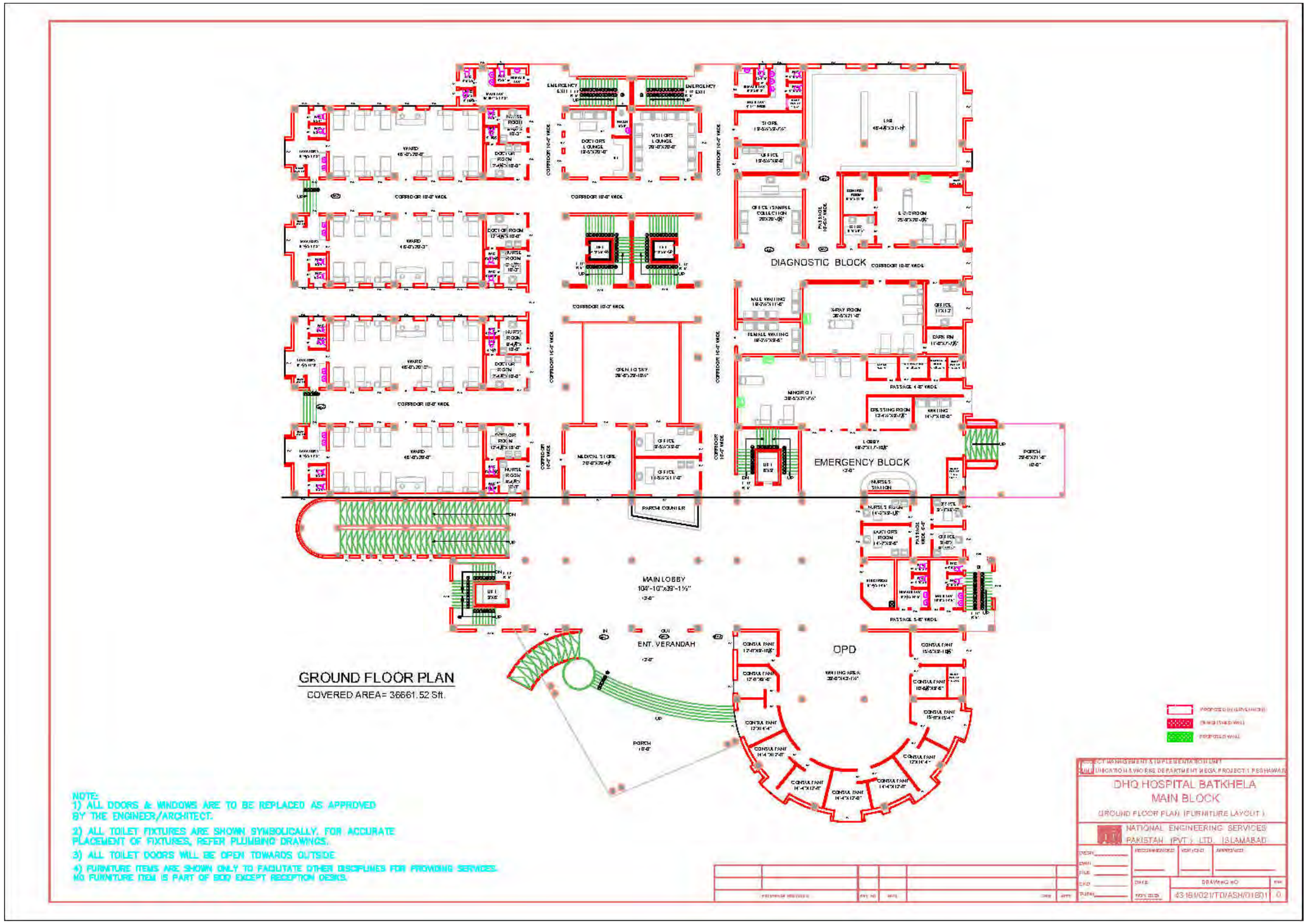
DHQ HOSPITAL BATKHELA

SCOPE OF WORK

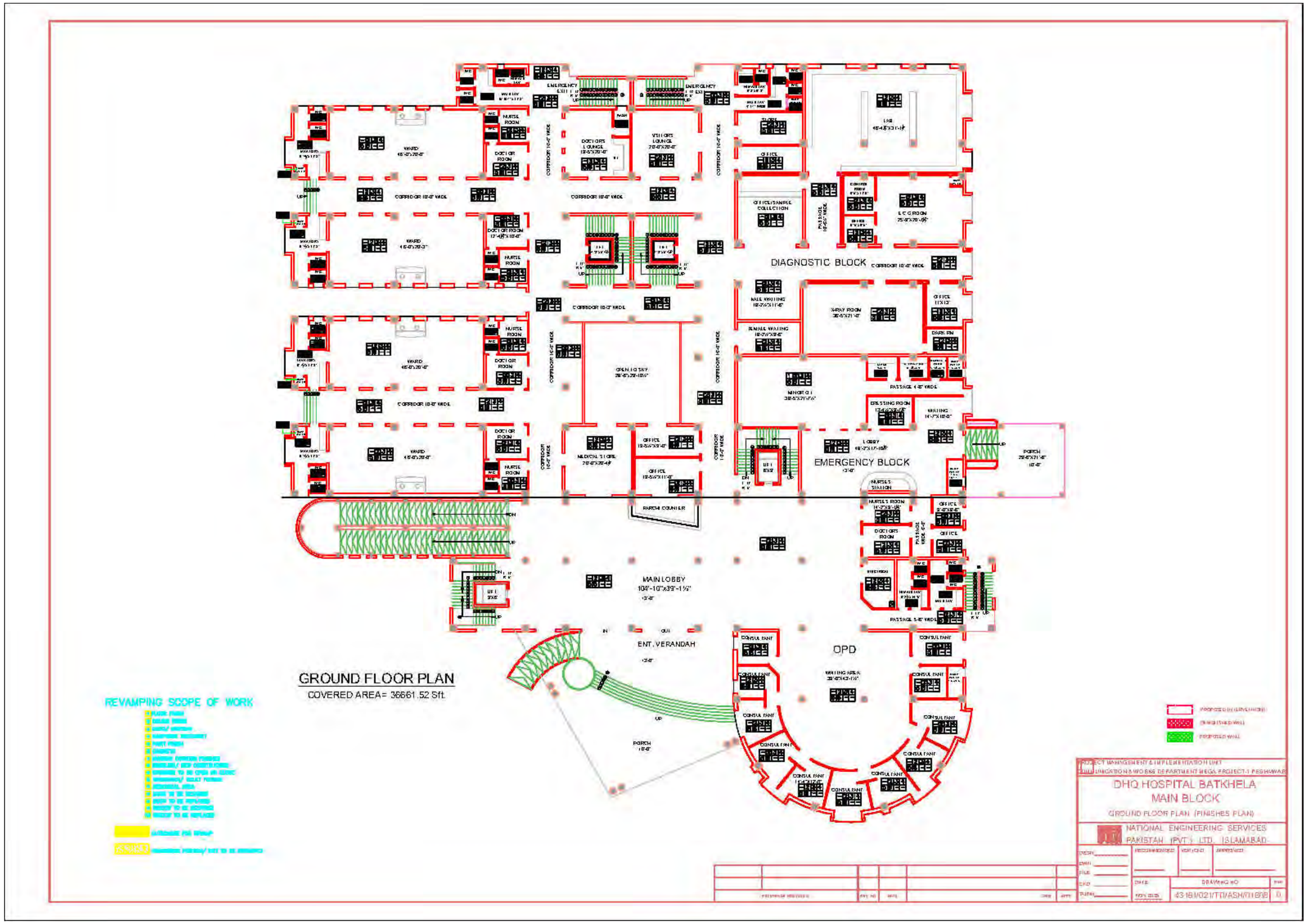
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. PESHAWAR

DESIGN	RECOMMENDED	VERIFIED	APPROVED
DRAWN			
M. E			
CHKD	DATE	DRAWING NO	REV
RSUBM		13169/021/TD/ASHK/0801	0

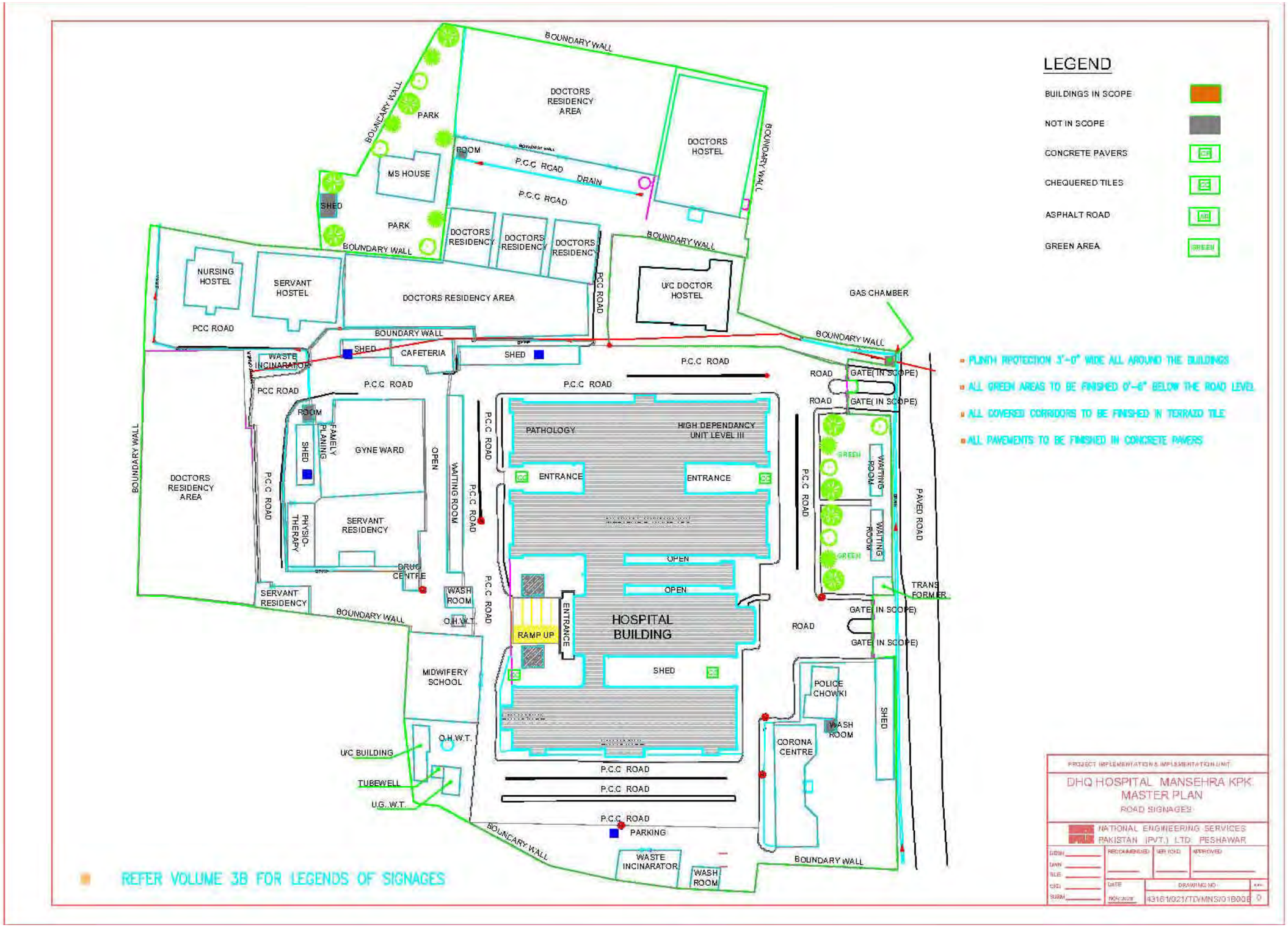
DHQ HOSPITAL, BATKHELA, MALAKAND



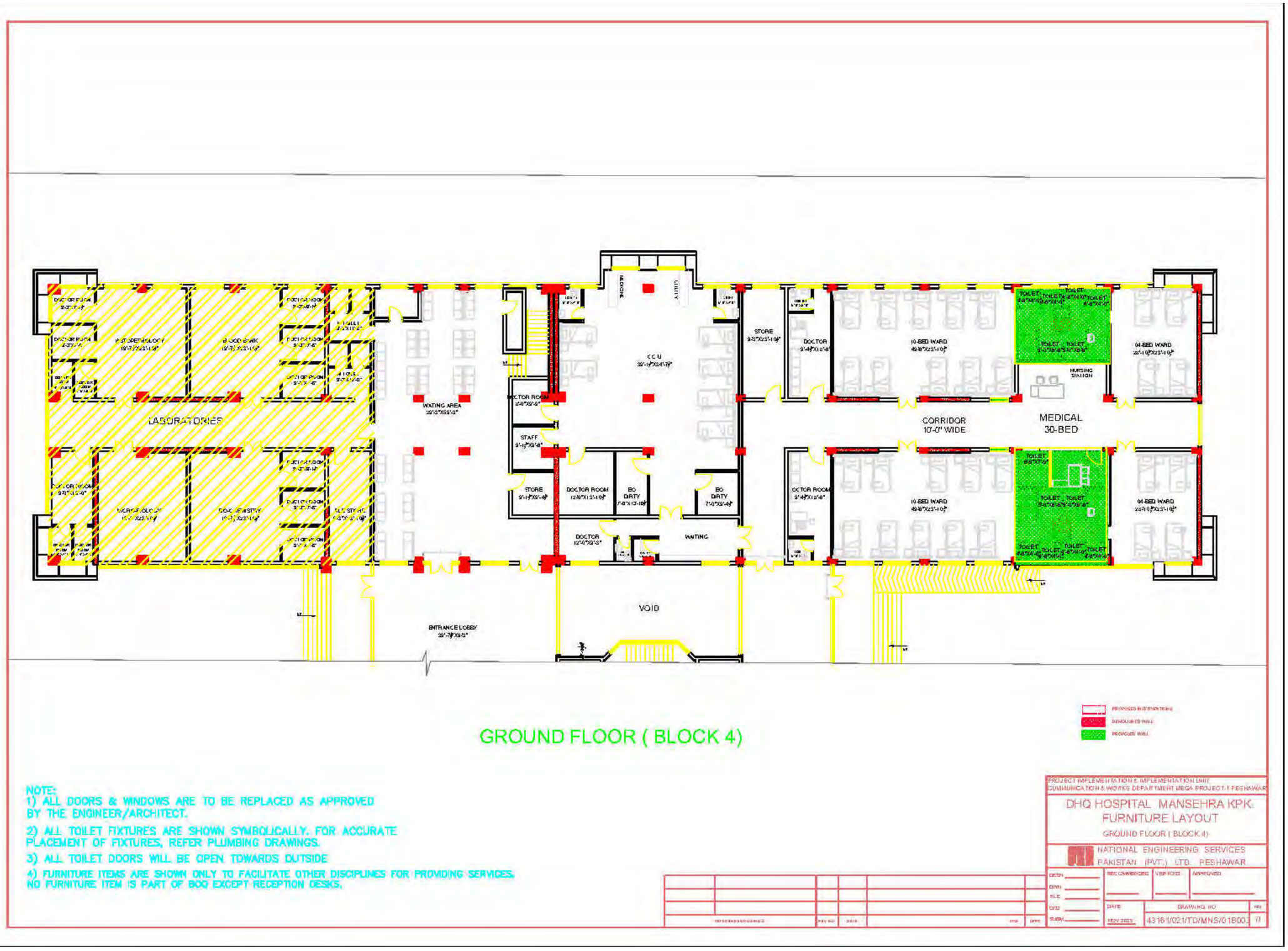
DHQ HOSPITAL, BATKHELA, MALAKAND



KING ABDULLAH TEACHING HOSPITAL, MANSEHRA



KING ABDULLAH TEACHING HOSPITAL, MANSEHRA



GROUND FLOOR (BLOCK 4)

NOTE:
1) ALL DOORS & WINDOWS ARE TO BE REPLACED AS APPROVED BY THE ENGINEER/ARCHITECT.
2) ALL TOILET FIXTURES ARE SHOWN SYMBOLICALLY. FOR ACCURATE PLACEMENT OF FIXTURES, REFER PLUMBING DRAWINGS.
3) ALL TOILET DOORS WILL BE OPEN TOWARDS OUTSIDE
4) FURNITURE ITEMS ARE SHOWN ONLY TO FACILITATE OTHER DISCIPLINES FOR PROVIDING SERVICES. NO FURNITURE ITEM IS PART OF BOQ EXCEPT RECEPTION DESKS.

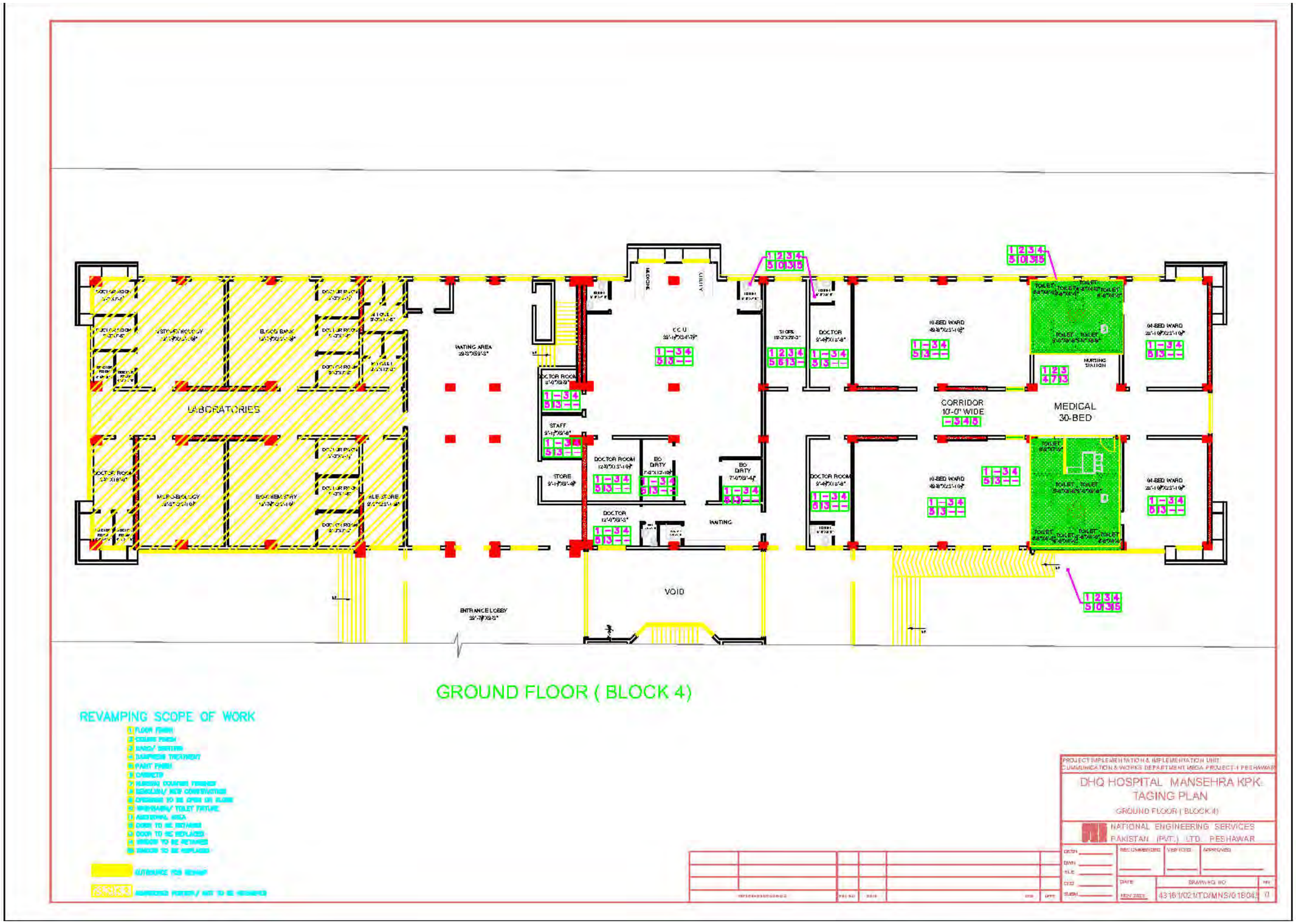
PROJECT IMPLEMENTATION & IMPLEMENTATION UNIT
COMMUNICATION & WORKS DEPARTMENT MEGA PROJECT (PESHAWAR

DHQ HOSPITAL MANSEHRA KPK
FURNITURE LAYOUT
GROUND FLOOR (BLOCK 4)

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. PESHAWAR

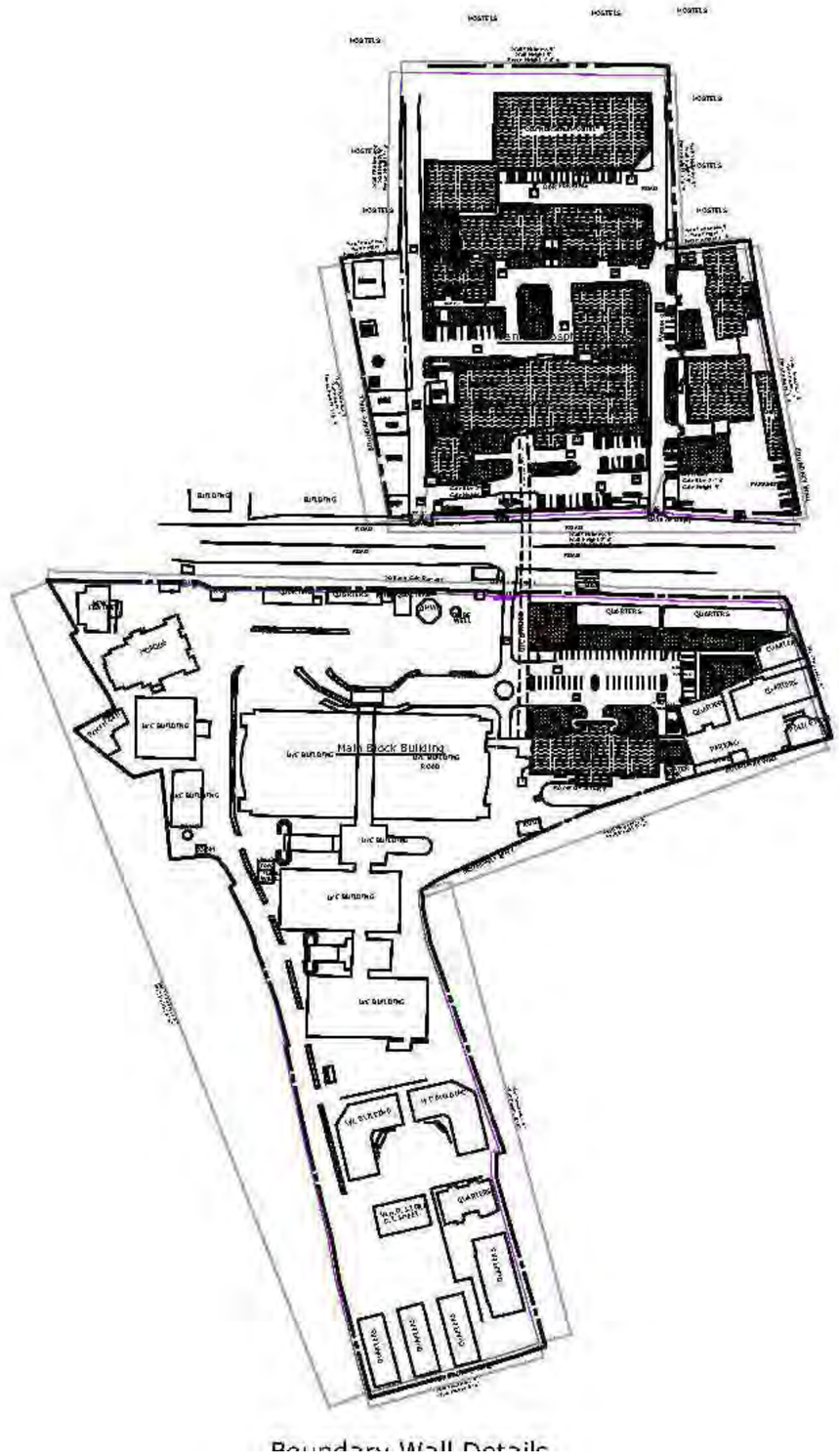
DRAWING NO: 43161/021/TD/MNS/018003

KING ABDULLAH TEACHING HOSPITAL, MANSEHRA



DHQ HOSPITAL MARDAN

DHQ HOSPITAL MARDAN



LEGEND

- BUILDINGS IN SCOPE
- NOT IN SCOPE
- CONCRETE PAVERS (CP)
- CHEQUERED TILES (CT)
- ASPHALT ROAD (AR)
- GREEN AREA (GREEN)

N

NOTES

- PLINTH PROTECTION 3'-0" WIDE ALL AROUND THE BUILDINGS
- ALL GREEN AREAS TO BE FINISHED 0'-6" BELOW THE ROAD LEVEL
- ALL COVERED CORRIDORS TO BE FINISHED IN TERRAZZO TILE
- ALL PAVEMENTS TO BE FINISHED IN CONCRETE PAVERS

INFRASTRUCTURE DEVELOPMENT AUTHORITY OF THE PUNJAB

DISTRICT HEAD QUARTER HOSPITAL MARDAN

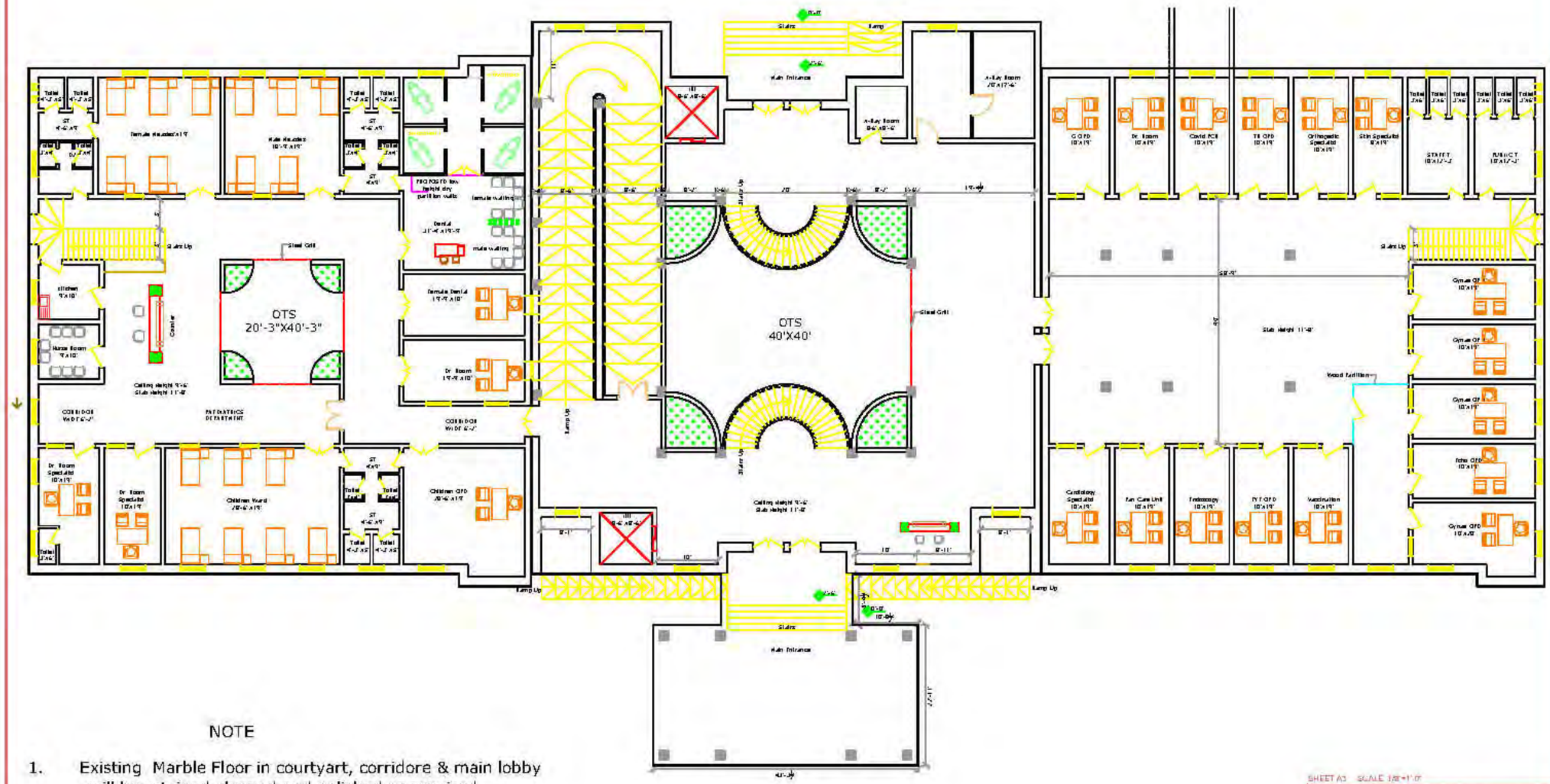
MASTER PLAN

SCOPE OF WORK

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. ISLAMABAD

DESN. NESPAK	RECOMMENDED	VER.CKD.	APPROVED
DWN. ARSHAD			
FILE			
CKD.	DATE	DRAWING NO.	REV
SUBM.	APRIL,2023	4337/322/TD/MDN/01B00A	0

DHQ HOSPITAL MARDAN



NOTE

1. Existing Marble Floor in courtyart, corridore & main lobby will be retained cleaned and polished as required.

2. Replacement of Flooring for minor damages to be assesed and approved by engineer.

SHEET A3 SCALE 1/8"=1'-0"

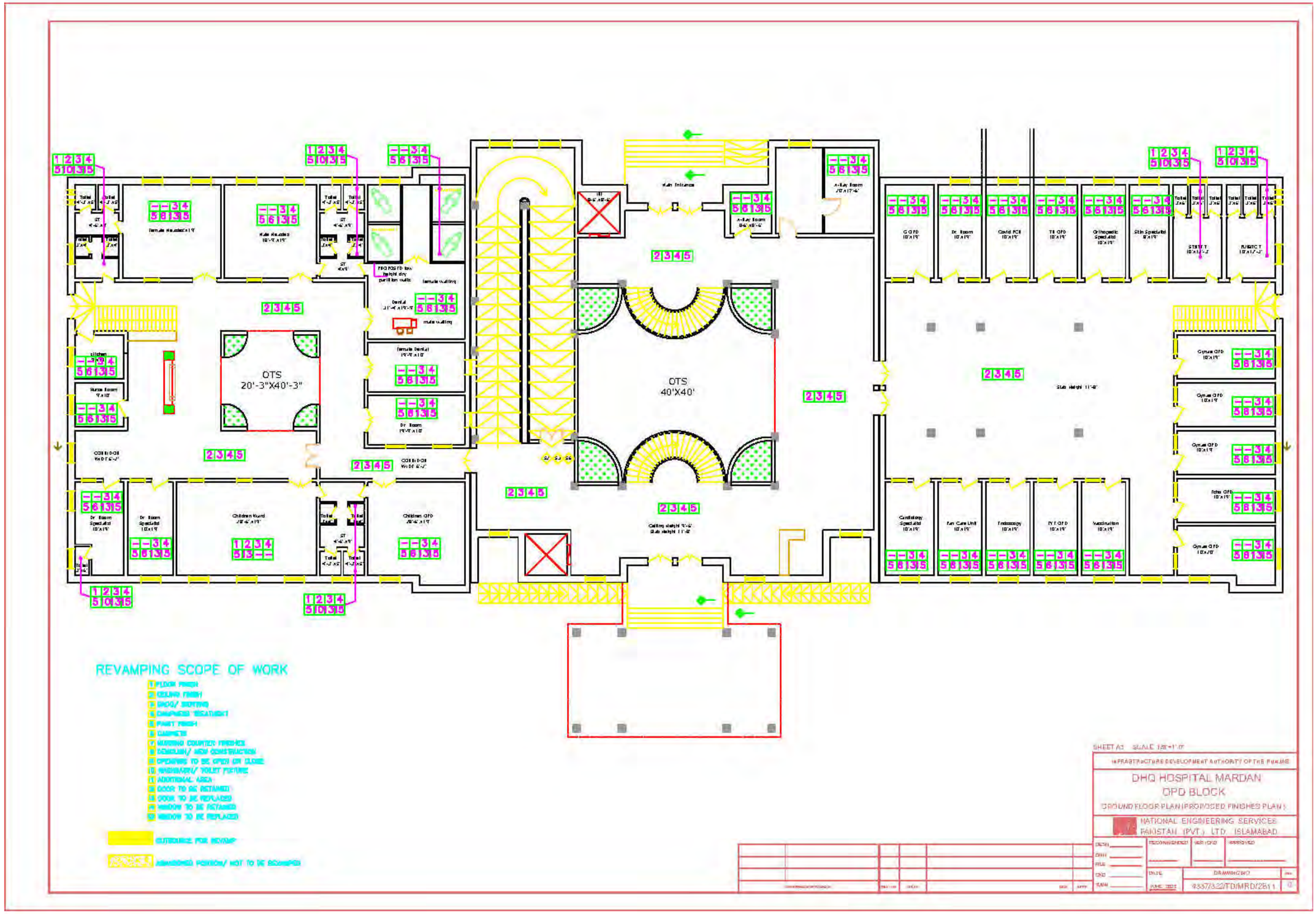
INFRASTRUCTURE DEVELOPMENT AUTHORITY OF THE PUNJAB

DHQ HOSPITAL MARDAN
OPD BLOCK
GROUND FLOOR PLAN (PROPOSED FURNITURE)

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. ISLAMABAD

DESIGN	RECOMMENDED	AGENCY	APPROVED
DRWN			
TRACE			
CHKD	DATE	DRAWING NO	Rev
SUBM	JUNE 2021	9337/322/TD/MRD/280-2	0

DHQ HOSPITAL MARDAN



DHQ HOSPITAL ALPURI, SHANGLA



LEGEND

- BUILDINGS IN SCOPE
- NOT IN SCOPE
- CONCRETE PAVERS (CP)
- CHEQUERED TILES (CT)
- ASPHALT ROAD (AR)
- GREEN AREA (GREEN)

- PLINTH RPOTECTION IN CONCRETE CHEQUERED TILES 3'-0" WIDE ALL AROUND THE BUILDINGS
- ALL PAVEMENTS AND PARKING LOTS TO BE FINISHED IN CONCRETE PAVERS
- ALL GREEN AREAS TO BE FINISHED 0'-6" BELOW THE ROAD LEVEL
- ALL COVERED CORRIDORS TO BE FINISHED IN TERRAZO TILE

PROJECT MANAGEMENT & IMPLEMENTATION UNIT

DHQ HOSPITAL ALPURI SHANGLA

SCOPE OF WORK

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. PESHAWAR

DESIGN	RECOMMENDED	VERIFIED	APPROVED
DRAWN			
M. E			
CHKD			
SUBM	DATE	DRAWING NO	REV
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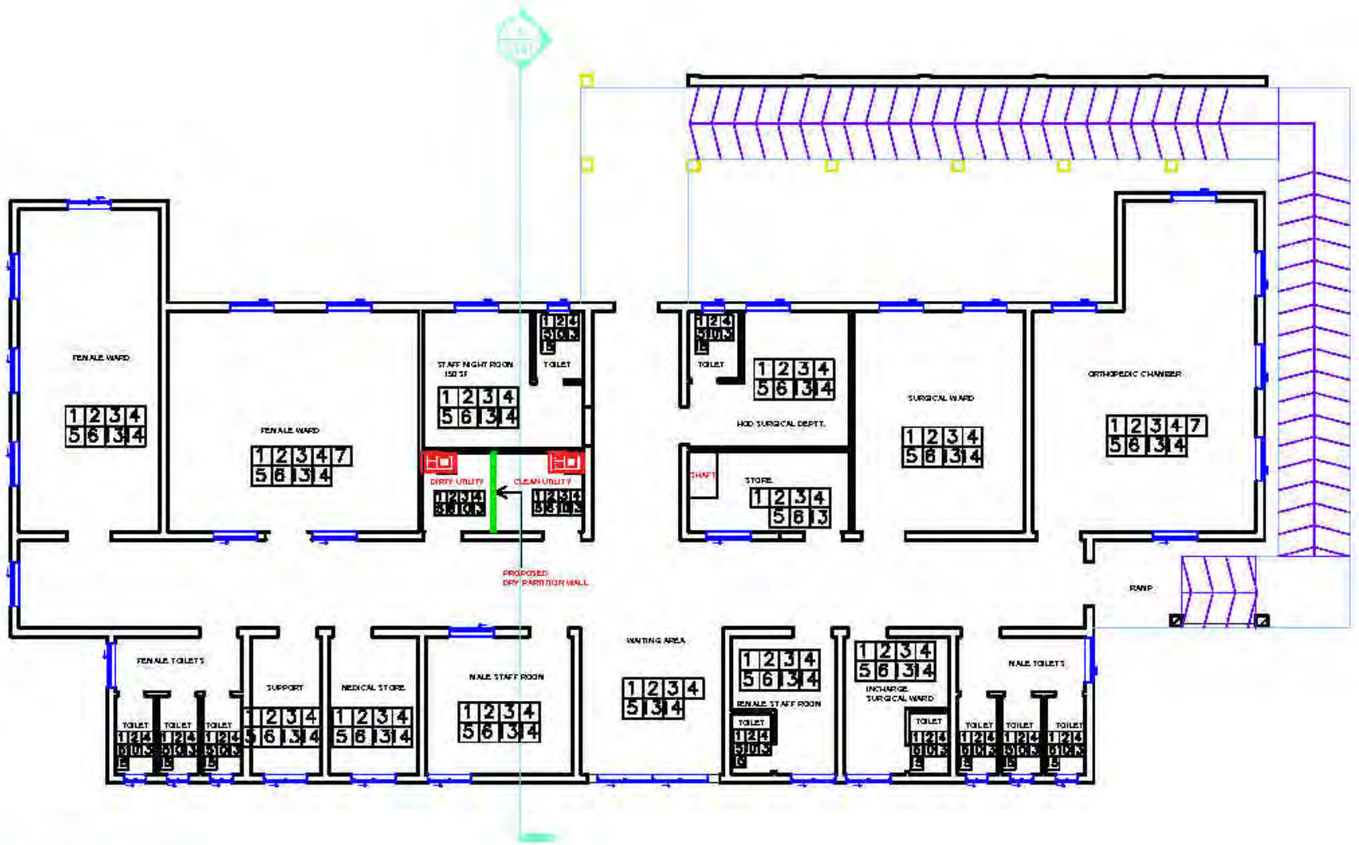
DHQ HOSPITAL ALPURI, SHANGLA



NOTE:
1) ALL DOORS & WINDOWS ARE TO BE REPLACED AS APPROVED BY THE ENGINEER/ARCHITECT.
2) ALL TOILET FIXTURES ARE SHOWN SYMBOLICALLY. FOR ACCURATE PLACEMENT OF FIXTURES, REFER PLUMBING DRAWINGS.
3) ALL TOILET DOORS WILL BE OPEN TOWARDS OUTSIDE
4) FURNITURE ITEMS ARE SHOWN ONLY TO FACILITATE OTHER DISCIPLINES FOR PROVIDING SERVICES. NO FURNITURE ITEM IS PART OF BOQ EXCEPT RECEPTION DESKS.

PROJECT MANAGEMENT & IMPLEMENTATION UNIT
COMMUNICATION & WORKS DEPARTMENT (M&E) PROJECT (PESHAWAR)
DHQ HOSPITAL ALPURI SHANGLA
MEDICAL & SURGICAL WARDS
GROUND FLOOR PLAN (FURNITURE LAYOUT)
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. PESHAWAR
DESIGN
DWN
FILE
CHD
PLAN
RECOMMENDED
VERIFIED
APPROVED
DATE
DRAWING NO
4316/021/TD/ASH/0280 15
0

DHQ HOSPITAL ALPURI, SHANGLA



REVAMPING SCOPE OF WORK

1. FLOOR FINISH
2. CEILING FINISH
3. RADIO/ SYSTEM
4. DAMPNESS TREATMENT
5. PAINT FINISH
6. CABINETS
7. NURSING COUNTER FINISHES
8. REMOUNT/ NEW CONSTRUCTION
9. OPENINGS TO BE OPEN OR CLOSE
10. WASHBASIN/ TOILET FIXTURE
11. ADDITIONAL AREA
12. DOOR TO BE RETAINED
13. DOOR TO BE REPLACED
14. WINDOW TO BE RETAINED
15. WINDOW TO BE REPLACED

EXISTING TO BE REVAMP

DEMOLISHED PORTION / NOT TO BE REVAMPED

PROPOSED INTERVENTION

DEMOLISHED WALL

PROPOSED WALL

PROJECT MANAGEMENT & IMPLEMENTATION UNIT
PROJECT MANAGEMENT & IMPLEMENTATION UNIT
COMMUNICATIONS & WORKS DEPARTMENT (C&W) PROJECT - I PESHAWAR

DHQ HOSPITAL ALPURI SHANGLA
MEDICAL & SURGICAL WARDS
FIRST FLOOR PLAN (PROPOSED FINISHES)

NATIONAL ENGINEERING SERVICES
PAKISTAN (PVT.) LTD. PESHAWAR

DESIGN
DWN
FILE
CHD
TURN

RECOMMENDED | VERIFIED | APPROVED

DATE | DRAWING NO | REV

4316/021/TD/ASH/028024 | 0

DHQ HOSPITAL TANK

- PLINTH RPOTECTION IN CONCRETE CHEQUERED TILES 3'-0" WIDE ALL AROUND THE BUILDINGS
- ALL PAVEMENTS AND PARKING LOTS TO BE FINISHED IN CONCRETE PAVERS
- ALL GREEN AREAS TO BE FINISHED 0'-6" BELOW THE ROAD LEVEL
- ALL COVERED CORRIDORS TO BE FINISHED IN TERRAZO TILE



PROJECT MANAGEMENT & IMPLEMENTATION UNIT

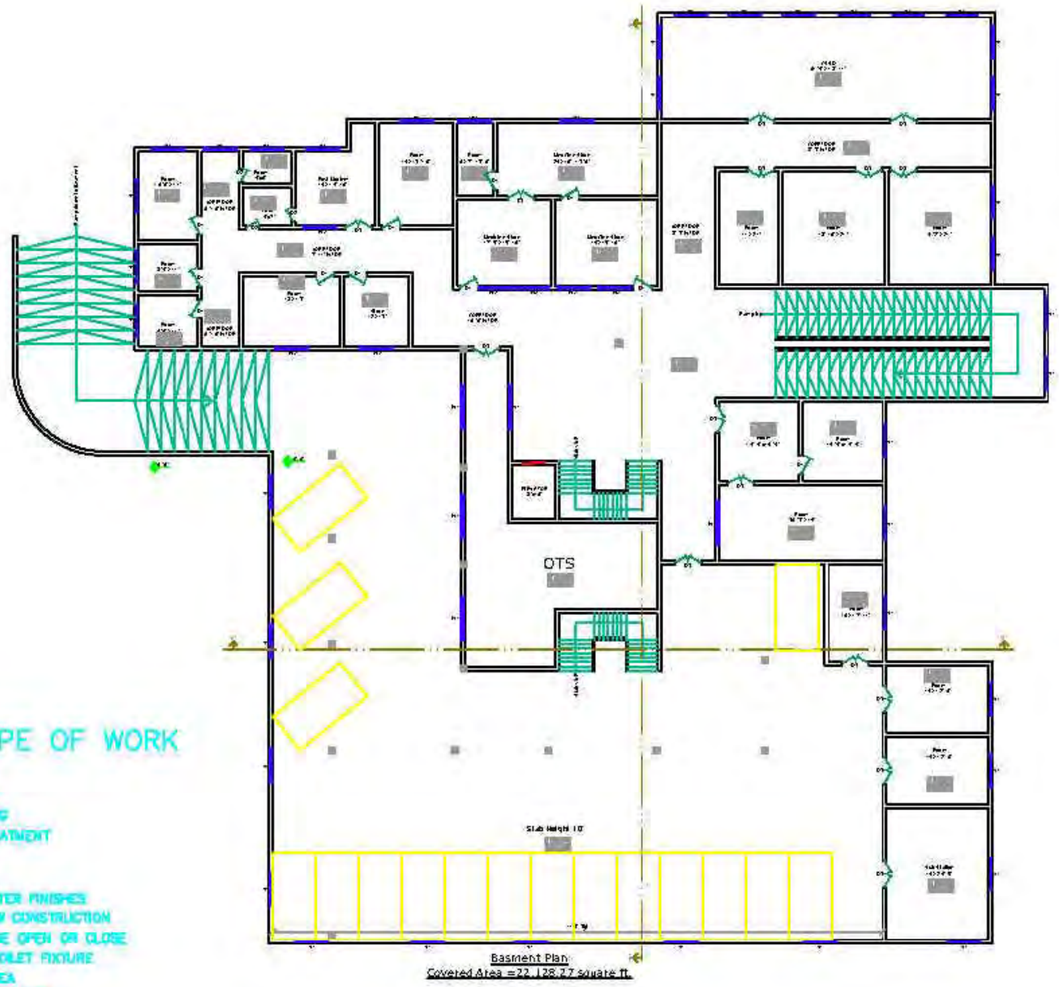
DHQ HOSPITAL TANK

SCOPE OF WORK

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. PESHAWAR

DESIGN	RECOMMENDED	VERIFIED	APPROVED
DWN			
TILE			
CKD	DATE: NOV 2025	DRAWING NO: 43161/021/TD/TNK/00B001A	REV. 0
SHEET			

DHQ HOSPITAL TANK



REVAMPING SCOPE OF WORK

1. FLOOR FINISH
2. CEILING FINISH
3. DADO/ SKIRTING
4. DAMPNESS TREATMENT
5. PAINT FINISH
6. CABINETS
7. NURSING COUNTER FINISHES
8. DEMOLISH/ NEW CONSTRUCTION
9. OPENINGS TO BE OPEN OR CLOSE
10. WASHBASIN/ TOILET FIXTURE
11. ADDITIONAL AREA
12. DOOR TO BE RETAINED
13. DOOR TO BE REPLACED
14. WINDOW TO BE RETAINED
15. WINDOW TO BE REPLACED

OUTSOURCE FOR REVAMP

ABANDONED PORTION/ NOT TO BE REVAMPED

PROJECT MANAGEMENT & IMPLEMENTATION UNIT

DHQ HOSPITAL TANK
MAIN BLOCK
BASEMENT PLAN
(PROPOSED FINISHES PLAN)

NATIONAL ENGINEERING SERVICES
PAKISTAN (PVT.) LTD. PESHAWAR

DESIGN | RECOMMENDED | VERIFIED | APPROVED
DRWN
M.E.
CHD
CLIENT
DATE: NOV 2020
DRAWING NO: 43-161/621/TD/TNK/01B/001 | rev: 0

DHQ HOSPITAL TANK



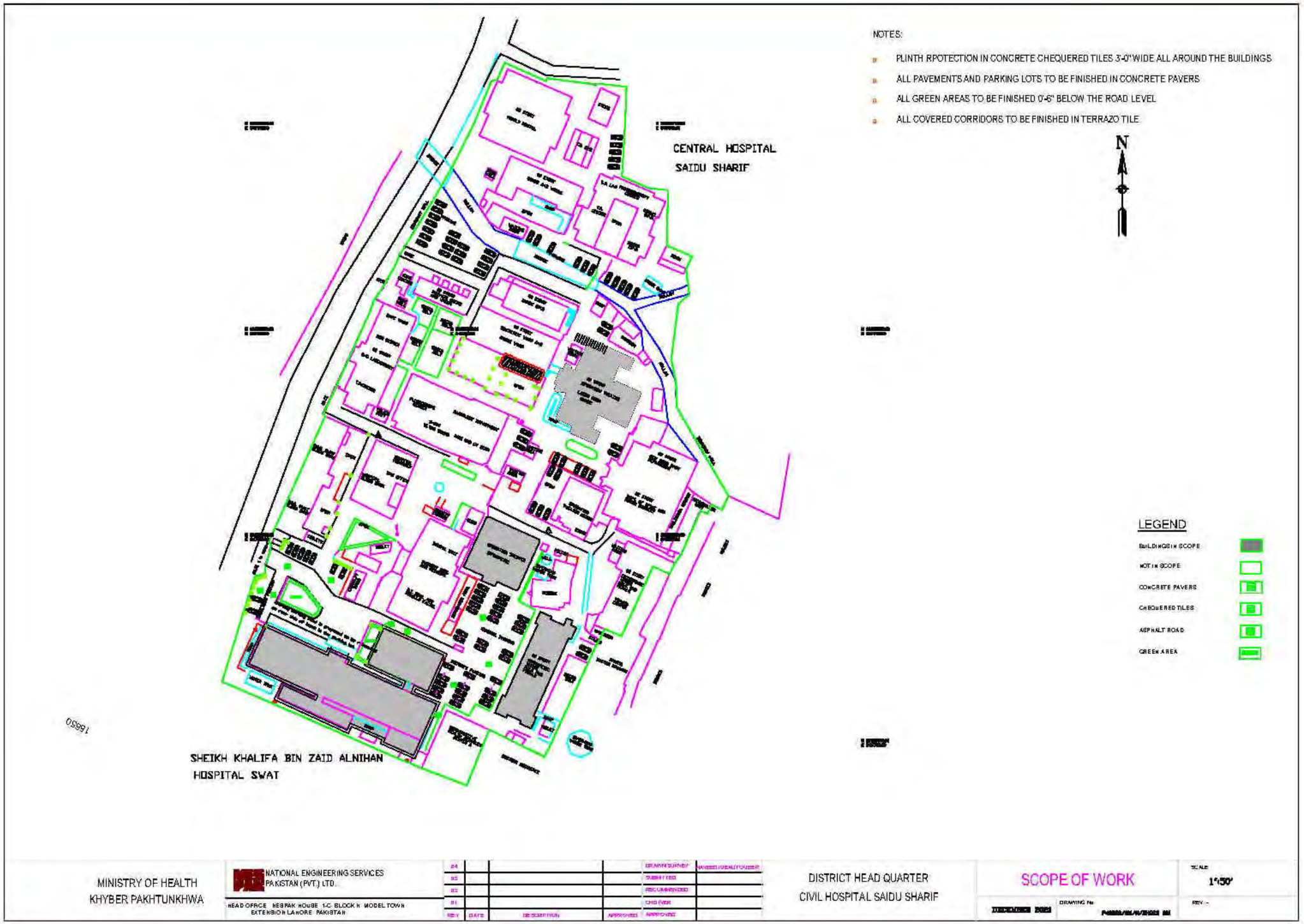
PROJECT MANAGEMENT & IMPLEMENTATION UNIT

DHQ HOSPITAL TANK
MAIN BLOCK
GROUND FLOOR PLAN
(PROPOSED FIXTURES PLAN)

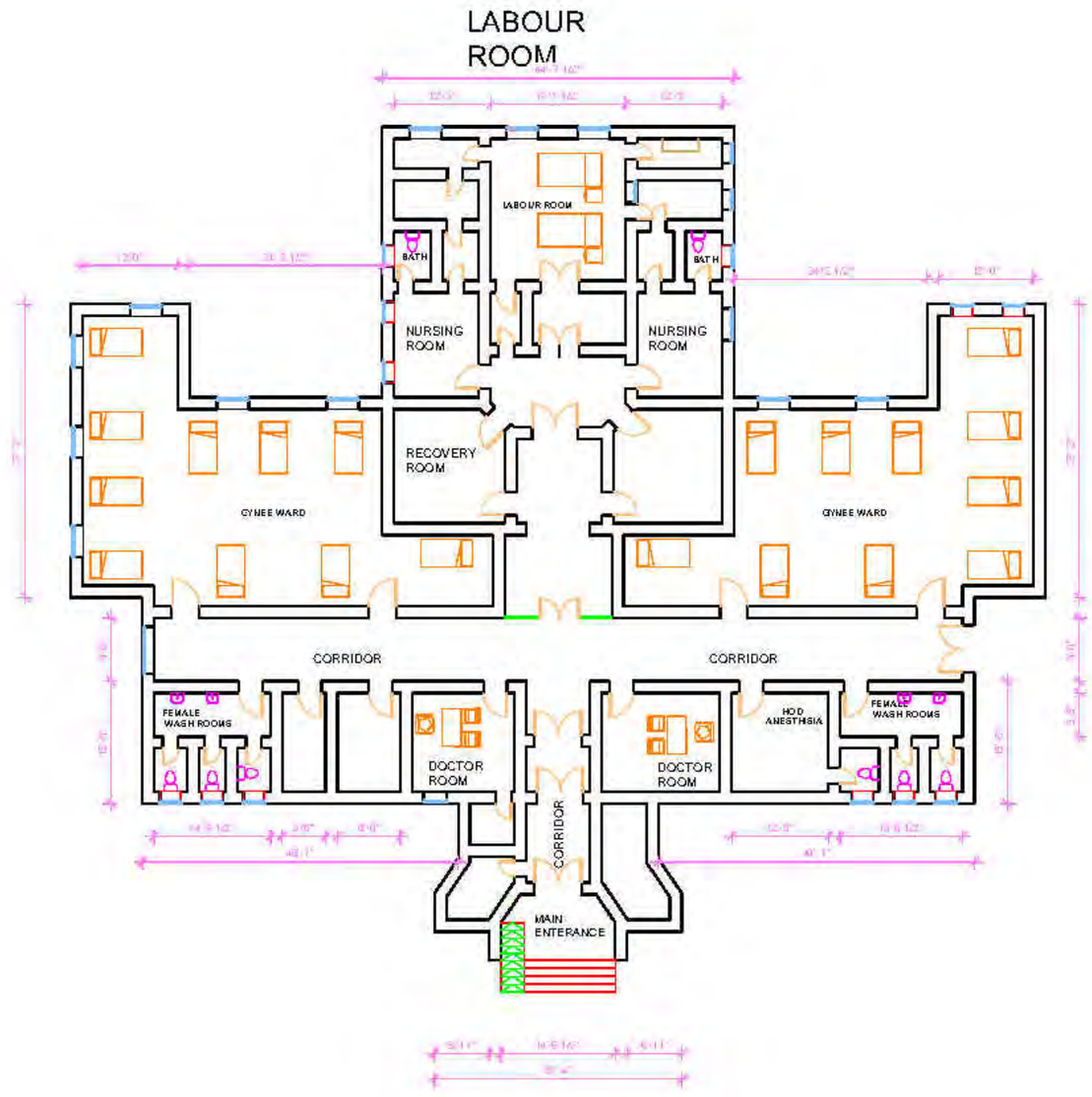
NATIONAL ENGINEERING SERVICES
PAKISTAN (PVT.) LTD. PESHAWAR

DRAWING NO.
43161/021/TDVTNK/01B006

DHQ HOSPITAL, SAIDU SHARIF SWAT



DHQ HOSPITAL, SAIDU SHARIF SWAT



SHEET A3 SCALE 1/16"=1'-0"

PROJECT MANAGMENT & IMPLEMENTATION UNIT
COMMUNICATION & WORKS DEPARTMENT MEGA PROJECT-1 PESHAWAR

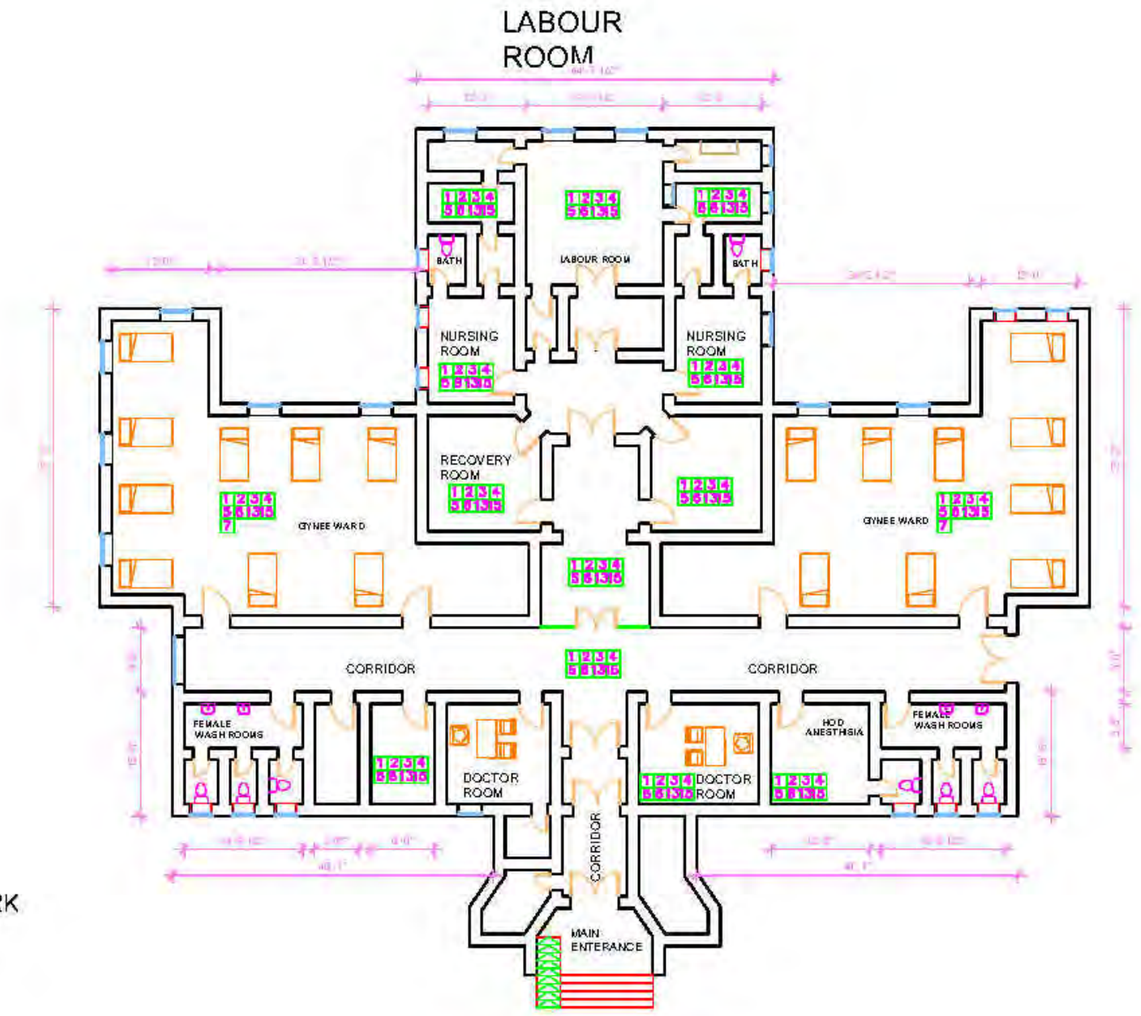
DHQ HOSPITAL SAIDU SHARIF SWAT
LABOUR ROOM
GROUND FLOOR PLAN (FURNITURE PLAN)

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. PESHAWAR

DESIGN	RECOMMENDED	VERIFIED	APPROVED
DRAWN			
CHKD			
SUBM			

DATE	DRAWING NO	REV
DEC 2025	03161/021/AB/SDUS/1B02	0

DHQ HOSPITAL, SAIDU SHARIF SWAT



REVAMPING SCOPE OF WORK

1. FLOOR FINISH
2. CEILING FINISH
3. DADO/ SKIRTING
4. DAMPNESS TREATMENT
5. PAINT FINISH
6. CABINETS
7. NURSING COUNTER FINISHES
8. DEMOLISH/ NEW CONSTRUCTION
9. OPENINGS TO BE OPEN OR CLOSE
10. WASHBASIN/ TOILET FIXTURE
11. ADDITIONAL AREA
12. DOOR TO BE RETAINED
13. DOOR TO BE REPLACED
14. WINDOW TO BE RETAINED
15. WINDOW TO BE REPLACED

OUTSOURCE FOR REVAMP

ABANDONED PORTION/ NOT TO BE REVAMPED

SHEET A3 SCALE 1/16"=1'-0"

PROJECT MANAGMENT & IMPLEMENTATION UNIT
COMMUNICATION & WORKS DEPARTMENT MEGA PROJECT-1 PESHAWAR

DHQ HOSPITAL SAIDU SHARIF SWAT
LABOUR ROOM
GROUND FLOOR PLAN (FINISHING PLAN)

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. PESHAWAR

DESIGN	RECOMMENDED	RECOMMENDED	APPROVED
DRAWN			
TRACED			
CHKD			
SUBM			

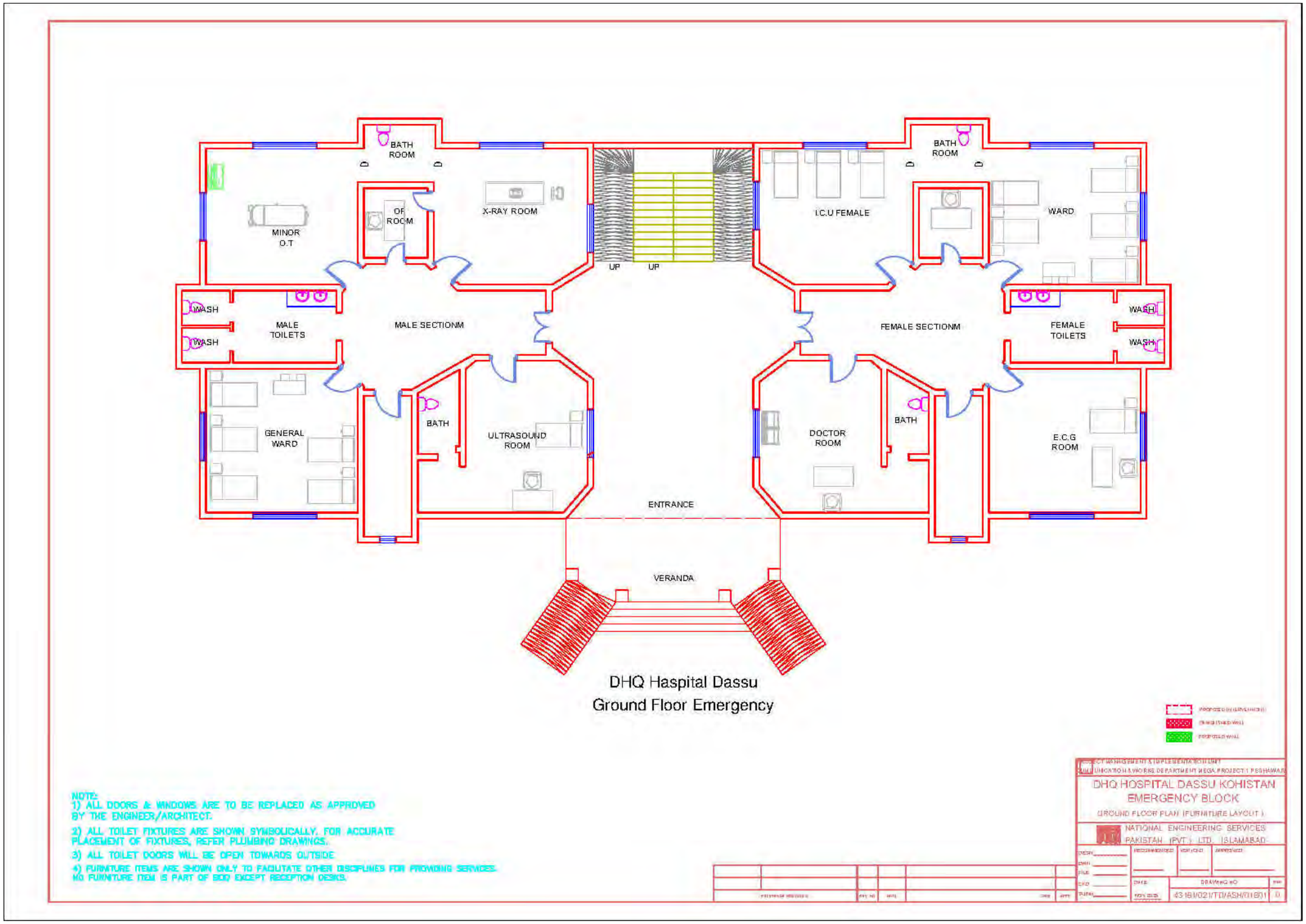
DATE: DEC 2025 | DRAWING NO: 03161/021/AB/SDUSV1B02 | REV: 0

DHQ HOSPITAL DASSU UPPER KOHISTAN

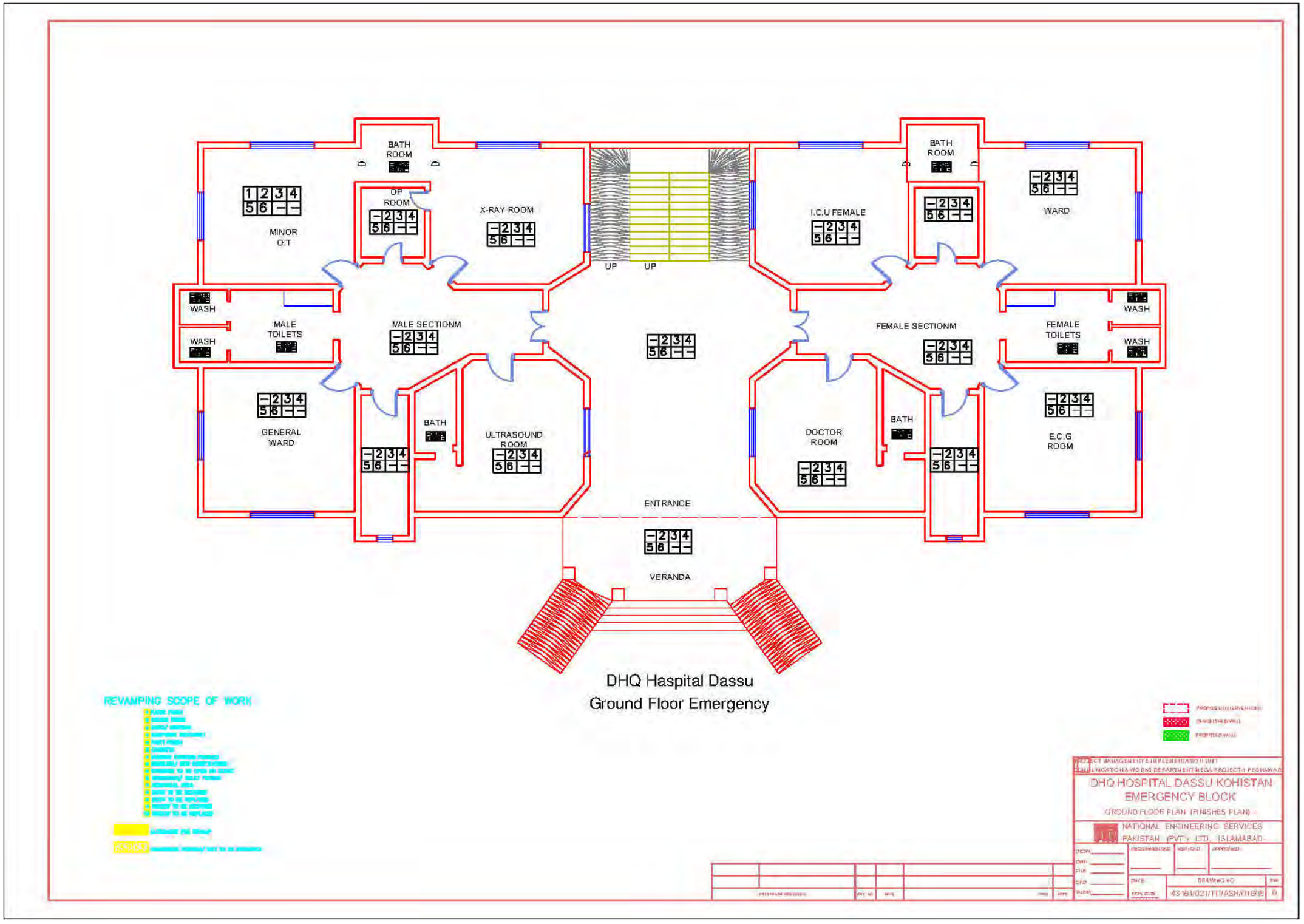


- PLINTH RPOTECTION IN CONCRETE CHEQUERED TILES 3'-0" WIDE ALL AROUND THE BUILDINGS
- ALL PAVEMENTS AND PARKING LOTS TO BE FINISHED IN CONCRETE PAVERS
- ALL GREEN AREAS TO BE FINISHED 0'-6" BELOW THE ROAD LEVEL
- ALL COVERED CORRIDORS TO BE FINISHED IN TERRAZO TILE

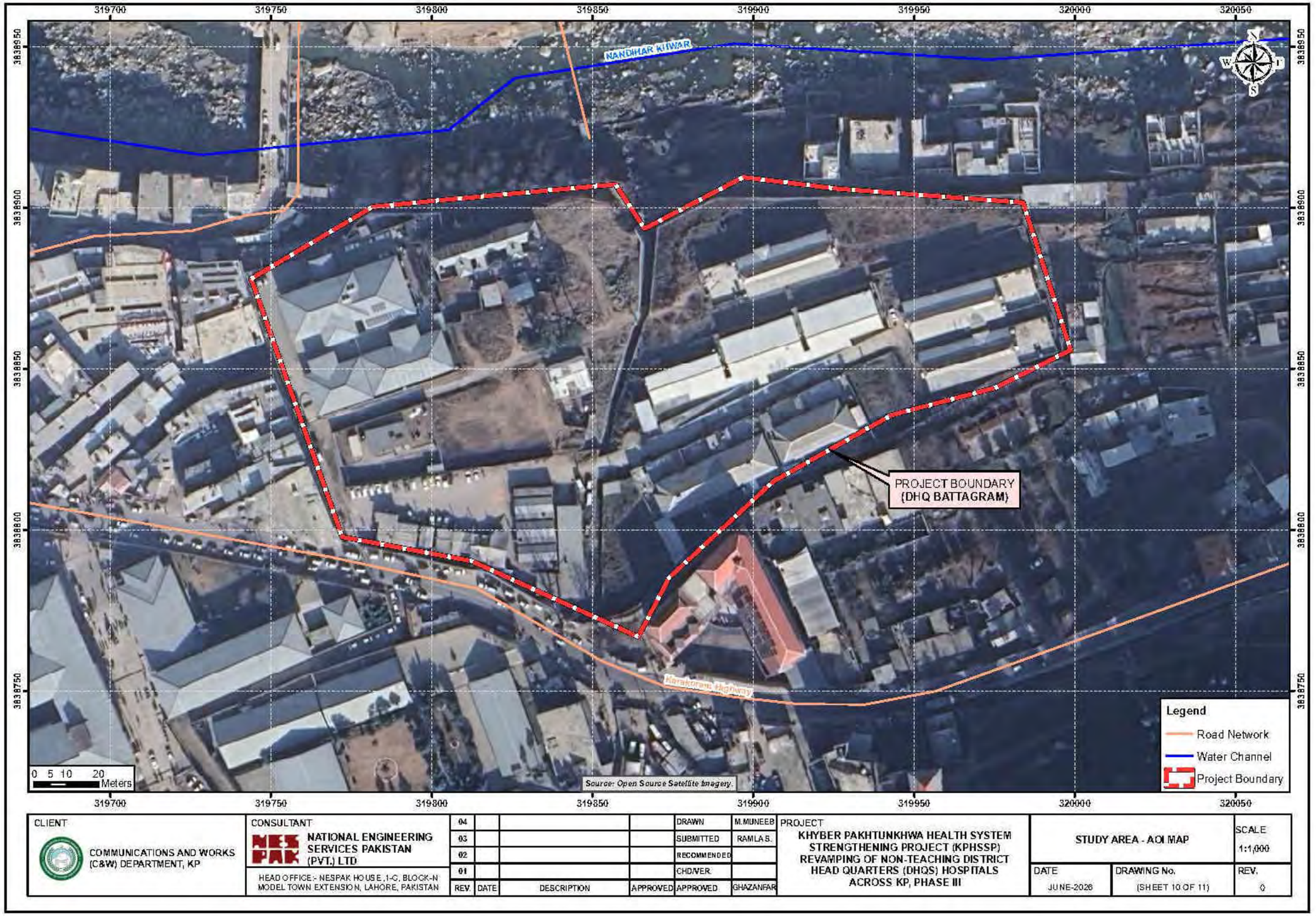
DHQ HOSPITAL DASSU UPPER KOHISTAN



DHQ HOSPITAL DASSU UPPER KOHISTAN



ANNEXURE-II: AOI MAPS



CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	M.MUNEEB	PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III	STUDY AREA - AOI MAP	SCALE 1:1,000
		03				SUBMITTED	RAMLA S.			
		02				RECOMMENDED				
		01				CHD/VER.			DATE: JUNE-2026	DRAWING No.: (SHEET 10 OF 11)
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	GHAZANFAR			REV.: 0



CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04			DRAWN	M.MUNEEB	PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III
		03			SUBMITTED	RAMLA S.	
		02			RECOMMENDED		
		01			CHD/VER.		
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	GHAZANFAR

STUDY AREA - AOI MAP		SCALE: 1:1,500
DATE: JUNE-2026	DRAWING No.: (SHEET 01 OF 11)	REV.: 0



CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04			DRAWN	M.MUNEEB
		03			SUBMITTED	RAMLA S.
		02			RECOMMENDED	
		01			CHD/VER.	
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED GHAZANFAR

PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III

STUDY AREA - AOI MAP

SCALE: 1:3,000

DATE: JUNE-2026

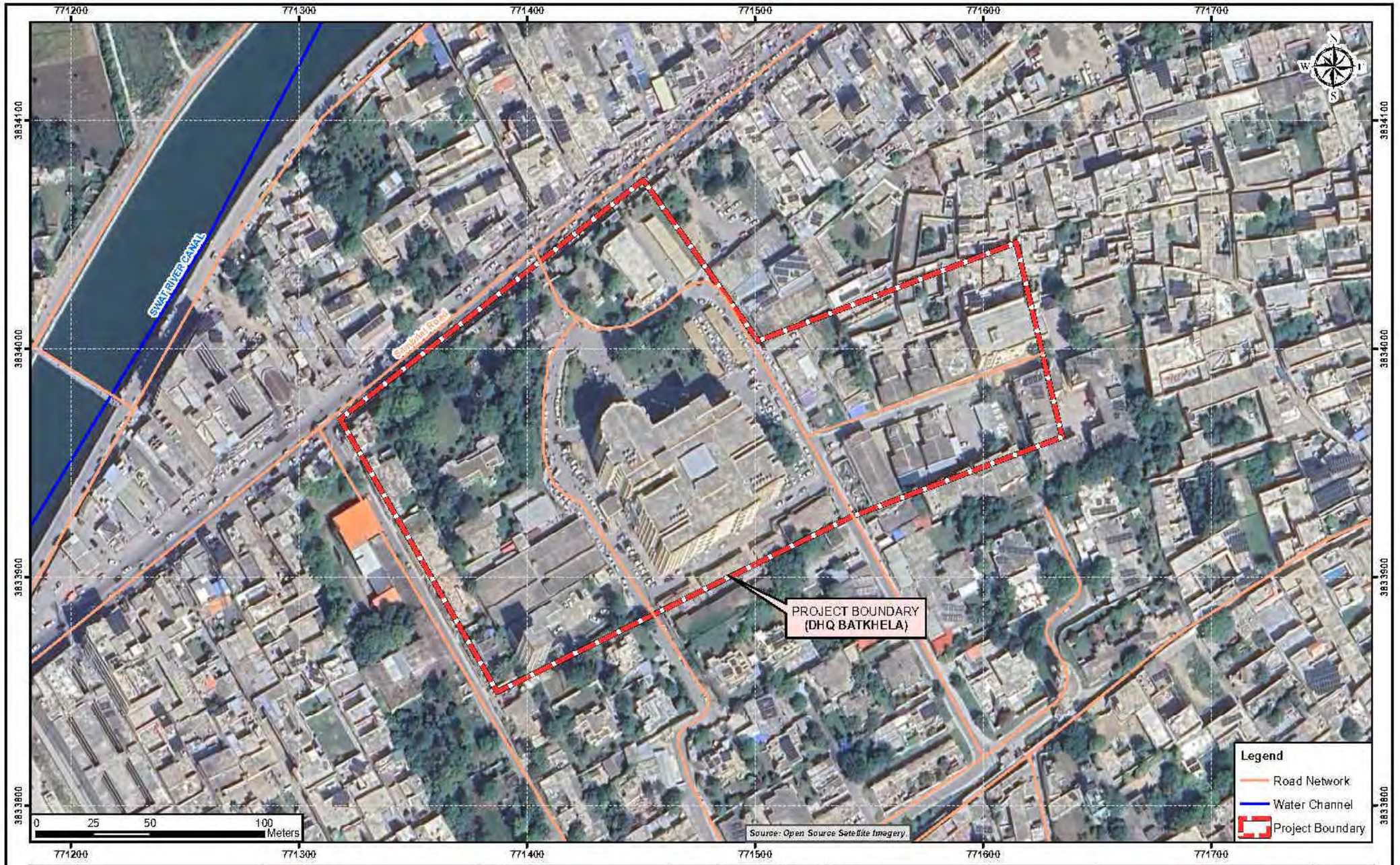
DRAWING No.: (SHEET 04 OF 11)

REV.: 0



CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04			DRAWN	M.MUNEEB	PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III
		03			SUBMITTED	RAMLA S.	
		02			RECOMMENDED		
		01			CHD/VER.		
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	GHAZANFAR

STUDY AREA - AOI MAP		SCALE: 1:2,500
DATE: JUNE-2026	DRAWING No.: (SHEET 05 OF 11)	REV.: 0

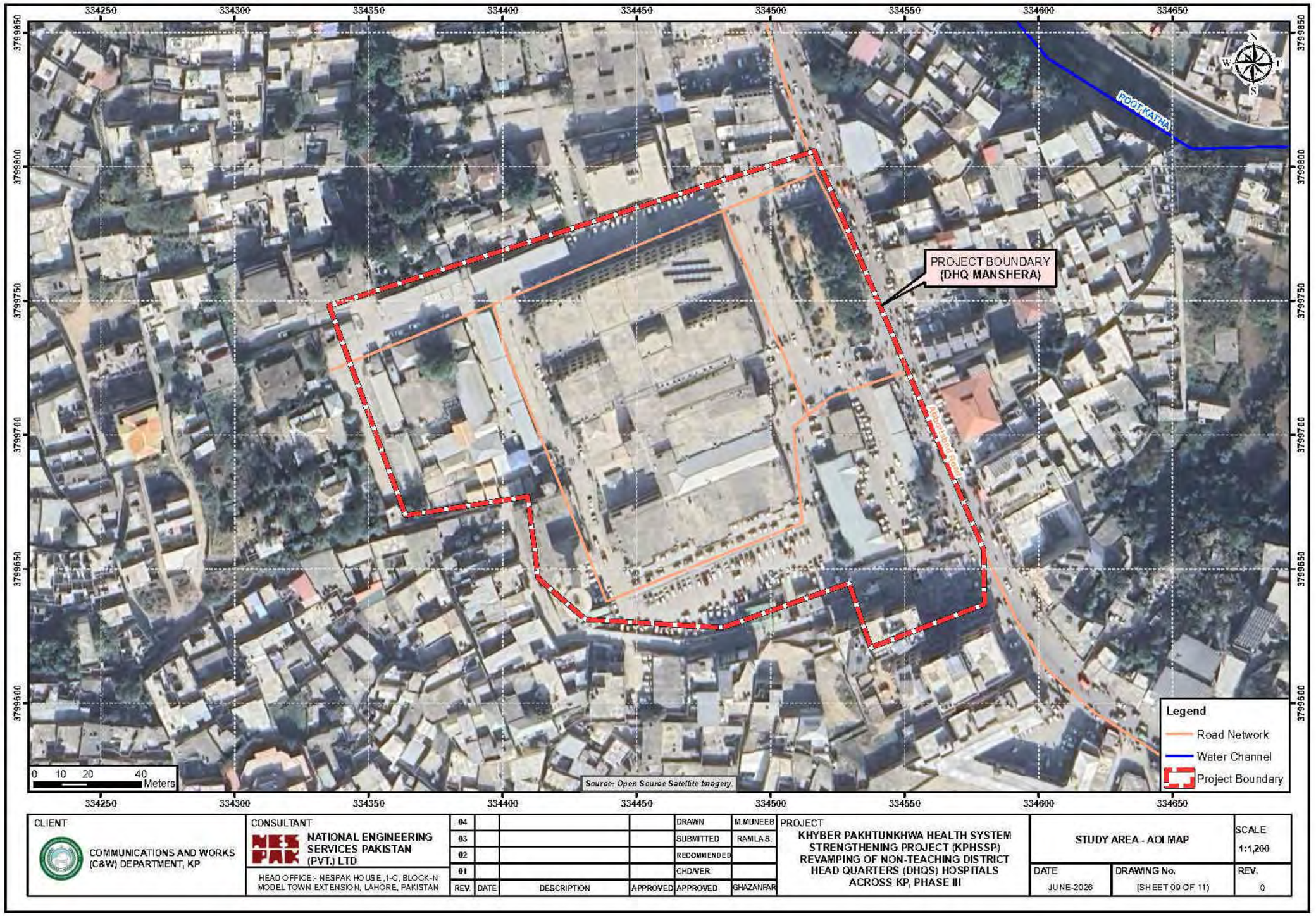


CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04			DRAWN	M.MUNEEB
		03			SUBMITTED	RAMLA S.
		02			RECOMMENDED	
		01			CHD/VER.	
		REV.	DATE	DESCRIPTION / APPROVED	APPROVED	GHAZANFAR

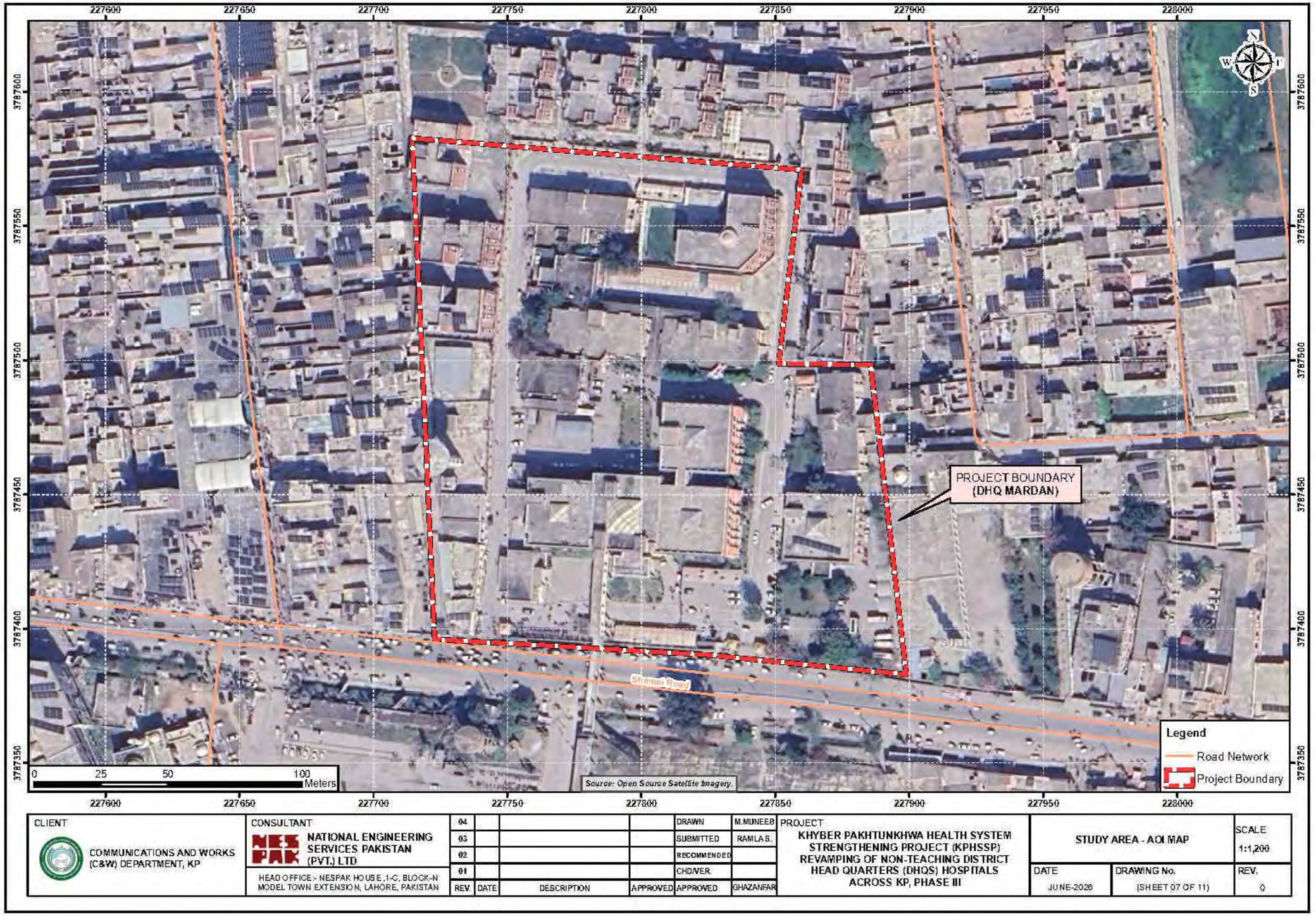
PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III

STUDY AREA - AOI MAP

SCALE	DATE	DRAWING No.	REV.
1:1,500	JUNE-2026	(SHEET 03 OF 11)	0

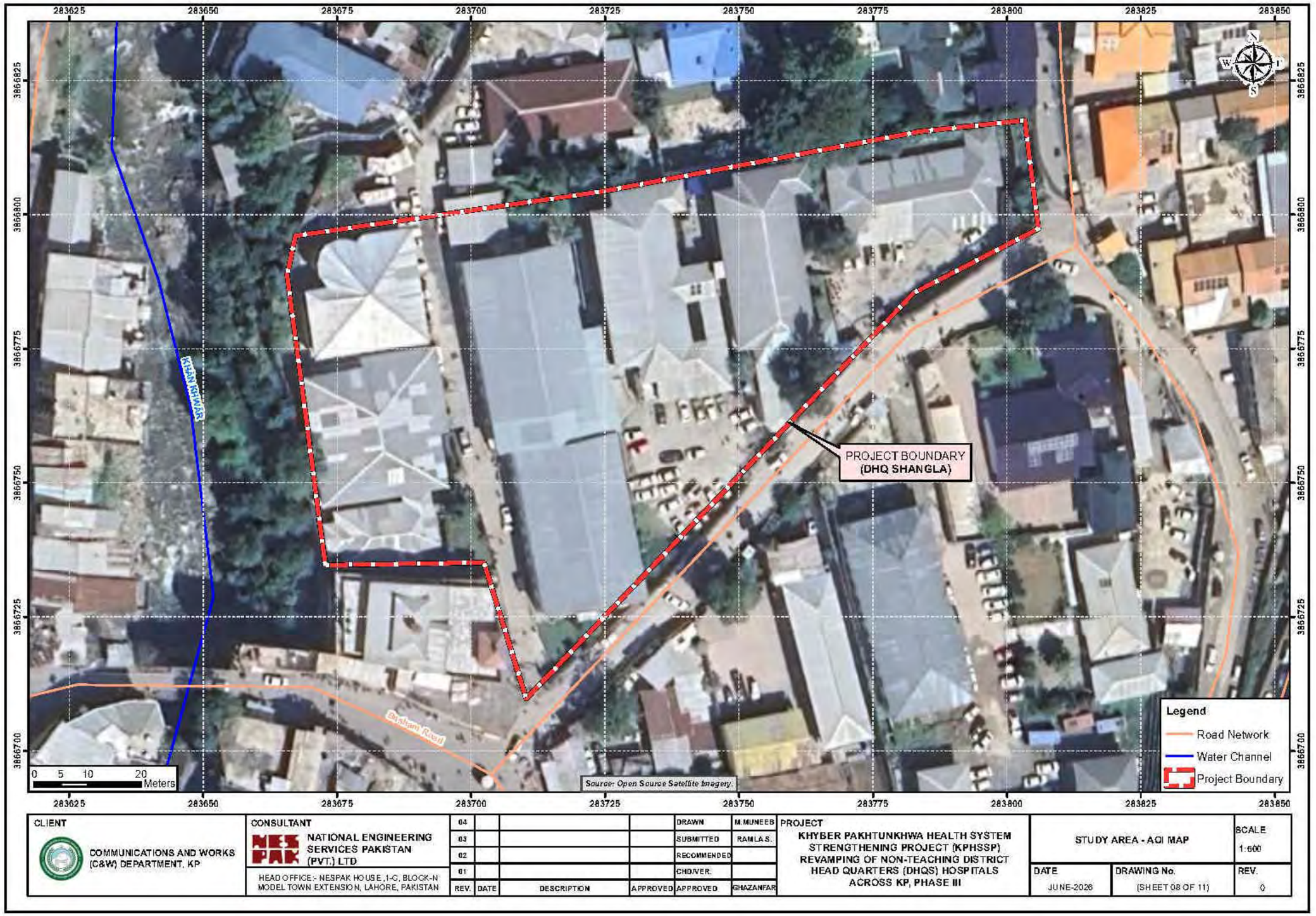


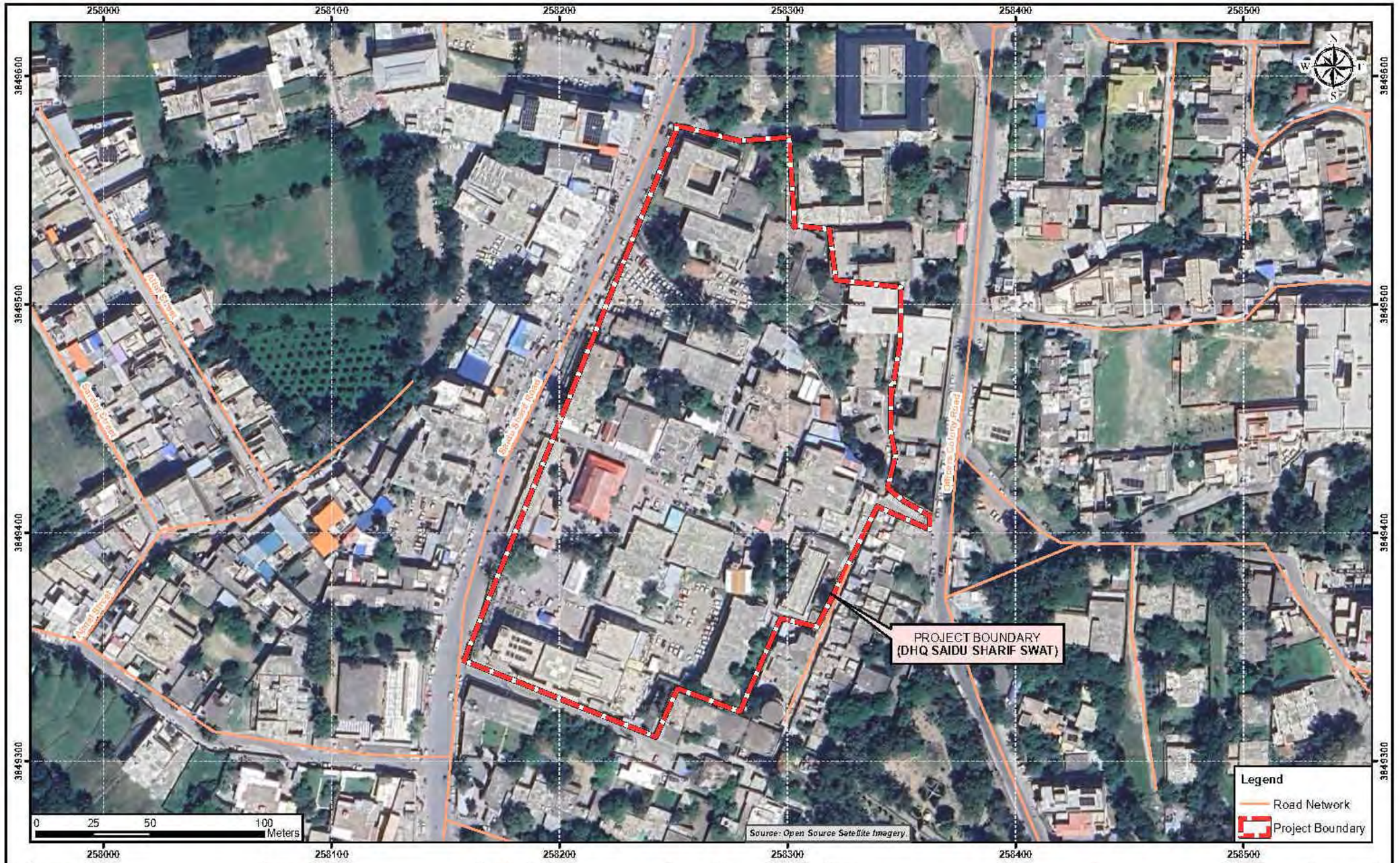
CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	M.MUNEEB	PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III	STUDY AREA - AOI MAP	SCALE 1:1,200
		03				SUBMITTED	RAMLA S.			
		02				RECOMMENDED				
		01				CHD/VER.			DATE: JUNE-2026	DRAWING No.: (SHEET 09 OF 11)
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	GHAZANFAR			REV.: 0



CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	M.MUNEEB	PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III
		03				SUBMITTED	RAMLA S.	
		02				RECOMMENDED		
		01				CHD/VER.		
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	GHAZANFAR	

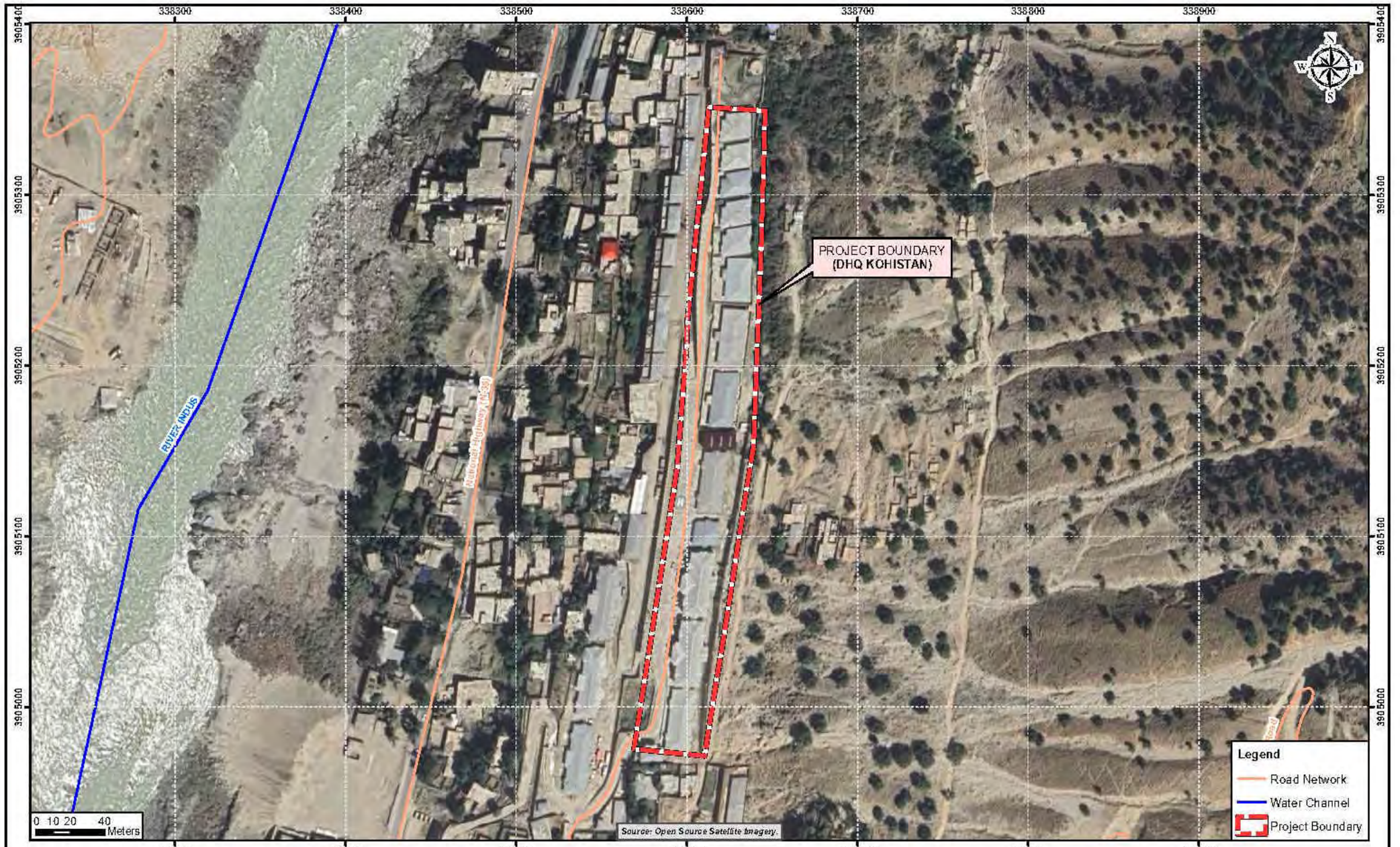
STUDY AREA - AOI MAP		SCALE: 1:1,200
DATE: JUNE-2026	DRAWING No.: (SHEET 07 OF 11)	REV.: 0


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3866800
3866775
3866750
3866725
3866700
KHAN KHWAR
Bisham Road
PROJECT BOUNDARY
(DHQ SHANGLA)
0 5 10 20
Meters
Source: Open Source Satellite Imagery.
Legend
Road Network
Water Channel
Project Boundary
CLIENT
COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP
CONSULTANT
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD
HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN
04
03
02
01
REV.
DATE
DESCRIPTION
APPROVED
DRAWN
M.MUNEEB
SUBMITTED
RAMLA S.
RECOMMENDED
CHD/VER.
APPROVED
GHAZANFAR
PROJECT
KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP)
REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III
STUDY AREA - AOI MAP
SCALE
1:600
DATE
JUNE-2026
DRAWING No.
(SHEET 08 OF 11)
REV.
0



CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	M.MUNEEB	PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III
		03				SUBMITTED	RAMLA S.	
		02				RECOMMENDED		
		01				CHD/VER.		
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	GHAZANFAR	

STUDY AREA - AOI MAP		SCALE: 1:1,500
DATE: JUNE-2026	DRAWING No.: (SHEET 02 OF 11)	REV.: 0



CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	M.MUNEEB	PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III	STUDY AREA - AOI MAP	SCALE 1:2,000
		03				SUBMITTED	RAMLA S.			
		02				RECOMMENDED				
		01				CHD/VER.			DATE: JUNE-2026	DRAWING No.: (SHEET 11 OF 11)
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	GHAZANFAR			REV.: 0

ANNEXURE-III: ENVIRONMENTAL MONITORING REPORT

PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.
(Environmental Laboratories Division)
ISO/IEC 17025:2017 Accredited Testing Lab, ISO 9001:2015, ISO 14001:2015, ISO 45001:2018
Head Office: 46-M, Gulberg III, Lahore-Pakistan. Ph: +92-42-35441444 Cell: 0303-4442334
Peshawar Office: H. #. 4B, Railway Road, University Town, Peshawar - Pakistan. Ph: +92-91-5710744 Cell: 0308-4440895
EPA Certified

TEST REPORT

Ref. #: KPGL/LAB/2026-628/AA

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name:	Phase-III: 21012)- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Sampling Location:	DHQ Hospital Batkhela
Coordinates:	34.612034°N 71.95999°E
Name of Sampling Person:	Farman Ullah
Nature of Monitoring:	Ambient Air
Monitoring By:	Pak Green Laboratories
Monitoring Instrument:	AQMS
Monitoring Duration:	24 hours
Monitoring Date:	14-Mar-26 to 15-Mar-26

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	O_3	PM_{10}	$PM_{2.5}$	SPM	Lead (Pb)
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
1.	9:00 AM	1.59	11.48	29.42	34.79					
2.	10:00 AM	1.61	13.64	33.33	36.56					
3.	11:00 AM	1.64	13.52	34.11	37.55					
4.	12:00 PM	1.66	8.71	27.12	40.51					
5.	1:00 PM	1.69	9.61	29.23	40.93					
6.	2:00 PM	1.79	11.78	34.10	34.79					
7.	3:00 PM	1.81	13.94	32.30	32.87					
8.	4:00 PM	1.75	11.06	27.69	31.71					
9.	5:00 PM	2.64	9.34	32.91	42.57					
10.	6:00 PM	1.39	9.90	34.09	43.81					
11.	7:00 PM	1.32	8.89	38.15	44.37					
12.	8:00 PM	1.30	8.92	27.81	45.61					
13.	9:00 PM	1.27	13.04	29.84	53.46	60.2	143.9	46.4*	452.3	0.03
14.	10:00 PM	1.43	13.50	37.55	49.00					
15.	11:00 PM	2.33	13.79	29.54	44.36					
16.	12:00 AM	2.57	13.95	31.41	64.53					
17.	1:00 AM	1.41	14.97	35.19	46.29					
18.	2:00 AM	1.54	14.74	34.48	46.46					
19.	3:00 AM	1.99	8.03	34.01	46.94					
20.	4:00 AM	1.72	10.22	33.56	47.98					
21.	5:00 AM	2.67	8.66	39.55	52.55					
22.	6:00 AM	2.18	8.85	33.01	36.22					
23.	7:00 AM	1.29	9.37	34.88	35.43					
24.	8:00 AM	1.28	11.56	29.77	35.18					
Average (24 Hours)		1.75	11.31	32.74	42.68					
NEQS		5 8hours	40 24hours	80 24hours	120 24hours	130 1 hour	150 24hours	35 24hours	500 24hours	1.5 24 hour

End of Report

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Ref. #: KPGL/LAB/2026-628/AA **Issue date:** 03-Apr-26

NEQS: National Environmental Quality Standards
Remarks: Parameters with * are not in compliance with NEQS Limits.
Note: $PM_{2.5}$ results are not in compliance with the NEQS standard due to background air pollution, mostly due to natural surroundings and regional influences, such as dust carried by wind from open areas, dry weather conditions, traffic emissions from nearby roads.
Terms & Conditions:

- Analysis was conducted on the request of project proponent for his own use or NEQS compliance.
- 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 report is not valid for any negotiations.
- Dually calibrated instrument was used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar Pakistan

info@pakgreen.pk www.pakgreen.pk

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TEST REPORT

Ref. #: KPGL/LAB/2026-629/NL — Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Nature of Monitoring:	Noise Level (24 Hours)
Sampling Location:	DHQ Hospital Batkhela
Monitoring By:	Pak Green Laboratories
Coordinates:	34.612034°N 71.95999°E
Name of Sampling Person:	Farman Ullah
Monitoring Time:	Real Time
Monitoring Instrument:	Smart Sensor
Monitoring Date:	10-Mar-26 to 11-Mar-26

Results:

Sr. No.	Day Time	Equivalent Noise dB (A)
1.	6:00 – 7:00 AM	54.2
2.	7:00 -8:00 AM	55.0
3.	8:00- 9:00 AM	55.3
4.	9:00- 10:00 AM	56.5
5.	10:00 -11:00 AM	57.0
6.	11:00- 12:00 AM	62.6
7.	12:00 -1:00 PM	61.7
8.	1:00- 2:00 PM	63.2
9.	2:00- 3:00 PM	60.1
10.	3:00 4:00 PM	62.7
11.	4:00 5:00 PM	58.9
12.	5:00 6:00 PM	56.2
13.	6:00 7:00 PM	53.9
14.	7:00 8:00 PM	58.6
15.	8:00 9:00 PM	55.3
16.	9:00 10:00 PM	54.8
	Average	57.9

Sr. No.	Night Time	Equivalent Noise dB (A)
17.	10:00 PM - 11:00 PM	57.8
18.	11:00 -12:00 AM	53.6
19.	12:00 -1:00 AM	52.8
20.	1:00 -2:00 AM	51.9
21.	2:00 -3:00 AM	51.1
22.	3:00 -4:00 AM	47.0
23.	4:00- 5:00 AM	49.4
24.	5:00-6:00 AM	55.9
	Average	52.4

End of Report

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Ref. #: KPGL/LAB/2026-629/NL

Issue date: 03-Apr-26

NEQS: National Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1.	Silence Zone (D)	dB (A) Leq	50	45

Terms & Conditions:

- Analysis was conducted on the request of project proponent for his own use/NEQS Compliance.
- Report cannot be used regarding compliance of any complaint, EPO or any other court case.
- This report should be reproduced as a whole and not in parts.
- The responsibility of the ethical use of the results reported in this report lies with the client. Consequently, the laboratory is absolved of its responsibility for any claim that may result through the use by the client or others of the results appearing in this report.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar, Pakistan

info@pakgreen.pk www.pakgreen.pk

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TEST REPORT

Ref #: KPGL/LAB/2026-631/WW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-Iii: 210121-Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Batkhela	
Coordinates:	34.612053° N 71.95997° E	
Sample source:	Final Drain	
Sample Code:	K-WW-107	
Date of sampling:	14-Mar-26	
Sample Receiving Date:	14-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	14-Mar-26 to 27-Mar-26	
Env. Conditions during Analysis:	Temp=22.4-23.9°C	RH=55.4-60.4%

Summary of Test Result:

Remarks: All Parameters are in compliance with the NEQS Limit

Terms & Conditions:

- This report should be reproduced as a whole and not in parts.
- The Sampling was done as per the sampling and preservation protocol method APHA 1060-B&C.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Mu[illegible]

Pak Green Enviro-Engineering (Pvt.) Ltd. Peshawar, Pakistan

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Ref #: KPGL/LAB/2026-631/WW

Issue date: 03-Apr-26

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	24.3	APHA-2550 B
2.	pH^	-	6-9	0.001	7.250 at 24.3°C	APHA-4500-H^+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_5 at 20 °C) ^	mg/L	80	1	34	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	56	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	130	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	1100	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	235	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	1.4	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	0.210	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	140	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	BDL	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	7.9	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	BDL	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	BDL	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Mercury (Hg)	mg/L	0.01	0.0001	BDL	APHA-3112 B
20.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
21.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
22.	Silver (Ag)	mg/L	1.0	0.0100	BDL	APHA-3111 B
23.	Zinc (Zn)^	mg/L	5.0	0.0001	0.0916	APHA-3111 B
24.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
25.	Barium (Ba)	mg/L	1.5	0.0001	BDL	APHA-3111 D
26.	Iron (Fe)^	mg/L	8.0	0.0010	0.4688	APHA-3111 B
27.	Manganese (Mn)^	mg/L	1.5	0.0010	0.0629	APHA-3111 B
28.	Boron (B)	mg/L	6.0	0.0001	BDL	APHA-3111 D
29.	Chlorine (Cl_2)	mg/L	1.0	0.0001	BDL	APHA-4500 Cl B
30.	Total Toxic Metals (Cd, Cr, Cu, Pb, Hg, Se, Ni, Ag, As, Ba, B)	mg/L	2.0	0.0001	BDL	APHA-3111
31.	Cyanide (as CN^-) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	0.15	0.001	BDL	APHA-6630 B

Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar, Pakistan

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EPA Certified

Ref #: KPGL/LAB/2026-631/WW

Issue date: 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
33.	*E. coli*	-	-	Nil	111.4	APHA-9221 F
34.	*Total Coli-form*	-	-	Nil	1010.4	APHA-9221 D
35.	*Fecal Coliform*	-	-	Nil	BDL	APHA-9221 E

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar Pakistan

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TEST REPORT

Ref #: KPGL/LAB/2026-630/DW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Drinking water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Batkhela	
Coordinates:	34.61197°N 71.95991°E	
Sample Source:	Tap Water	
Sample Code:	K-DW-108	
Date of sampling:	14-Mar-26	
Sample Receiving Date:	14-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	14-Mar-26 to 27-Mar-26	
Env. Conditions during Analysis:	Temp=22.4-23.6°C	RH=55.4-60.4%

Summary of Test Result:

Remarks:
All Parameters are in compliance with the NEQS Limit.

Terms & Conditions:

- This report should be reproduced as a whole and not in parts.
- The Sampling was done as per the sampling and preservation protocol method APHA 1060-B&C.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

Pak Green Enviro-Engineering (Pvt.) Ltd. Peshawar Pakistan

PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.
(Environmental Laboratories Division)
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Ref #: KPGL/LAB/2026-630/DW
Issue date: 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.546 at 22.5°C	APHA-4500-H+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.24	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	430	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	260	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^-) ^	mg/L	< 250	0.1	35	APHA-4500-Cl^- B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	BDL	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	BDL	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	0.009	APHA-4500-NO_3^--E

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Ref #: KPGL/LAB/2026-630/DW
Issue date: 03-Apr-26

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤ 3	0.001	0.124	APHA-4500-NO_2^{-1}-B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	0.0507	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Iron (Fe)^	mg/L	-	0.0010	BDL	APHA-3111 B
32.	Cyanide (as CN^{-1}) Total	mg/L	≤ 0.05	0.001	BDL	APHA-4500-CN E
33.	Pesticides	mg/L	NGVS	0.001	BDL	APHA-6630 B

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits
With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref. #: KPGL/LAB/2026-632/AA

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name:	Phase-III 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Sampling Location:	DHQ Hospital Saidu Sharif
Coordinates:	34.74948°N 72.3568°E
Name of Sampling Person:	Farman Ullah
Nature of Monitoring:	Ambient Air
Monitoring By:	Pak Green Laboratories
Monitoring Instrument:	AQM5
Monitoring Duration:	24 hours
Monitoring Date:	17-Mar-26 to 18-Mar-26

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	O_3	PM_{10}	$PM_{2.5}$	SPM	Lead (Pb)
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m3
1.	9:00 AM	1.75	10.10	36.72	43.73					
2.	10:00 AM	1.34	10.55	39.35	41.36					
3.	11:00 AM	1.33	10.81	41.55	41.56					
4.	12:00 PM	1.30	13.25	36.09	44.10					
5.	1:00 PM	1.35	12.85	40.09	48.10					
6.	2:00 PM	1.37	10.48	37.35	46.36					
7.	3:00 PM	1.38	12.82	38.05	50.06					
8.	4:00 PM	1.40	9.57	35.16	49.05					
9.	5:00 PM	1.47	10.74	36.73	38.76					
10.	6:00 PM	1.51	10.00	40.44	46.20					
11.	7:00 PM	1.61	10.13	39.25	45.01					
12.	8:00 PM	1.76	13.57	35.81	41.57					
13.	9:00 PM	1.85	11.57	35.00	45.17	58.4	142.8	51.6*	467.4	0.01
14.	10:00 PM	1.88	11.96	37.82	47.99					
15.	11:00 PM	2.06	9.84	38.48	45.65					
16.	12:00 AM	2.10	9.70	37.28	45.45					
17.	1:00 AM	2.17	10.84	36.09	52.10					
18.	2:00 AM	2.31	11.70	35.04	36.06					
19.	3:00 AM	2.15	12.57	33.18	44.13					
20.	4:00 AM	2.11	12.97	31.66	42.61					
21.	5:00 AM	1.82	13.23	32.02	42.97					
22.	6:00 AM	1.53	17.75	39.13	39.24					
23.	7:00 AM	1.47	16.22	33.98	44.09					
24.	8:00 AM	1.71	15.69	38.15	37.16					
Average (24 Hours)		1.70	12.04	36.85	44.10					
NEQS		5 8hours	40 24hours	80 24hours	120 24hours	130 1 hour	150 24hours	35 24hours	500 24hours	1.5 24 hours

End of Report

EPA PNAC LAB 180 17025

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Issue date: 03-Apr-26

NEQS: National Environmental Quality Standards
Remarks: Parameters with * are not in compliance with NEQS Limits.
Note: $PM_{2.5}$ results are not in compliance with the NEQS standard due to background air pollution, mostly due to natural surroundings and regional influences, such as dust carried by wind from open areas, dry weather conditions, traffic emissions from nearby roads.
Terms & Conditions:

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- The report is not valid for any negotiations.
- Dually calibrated instrument was used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

Pak Green Enviro Engineering (Pvt) Ltd. Peshawar Pakistan

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TEST REPORT

Ref. #: KPGL/LAB/2026-633/NL
Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/ Any Future Pandemic) In Khyber Pakhtunkhwa
Nature of Monitoring:	Noise Level (24 Hours)
Sampling Location:	DHQ Hospital Saidu Sharif
Monitoring By:	Pak Green Laboratories
Coordinates:	34.74948°N 72.3568°E
Name of Sampling Person:	Farman Ullah
Monitoring Time:	Real Time
Monitoring Instrument:	Smart Sensor
Monitoring Date:	17-Mar-26 to 18-Mar-26

Results:

Sr. No.	Day Time	Equivalent Noise dB (A)
1.	6:00 – 7:00 AM	55.3
2.	7:00 -8:00 AM	56.1
3.	8:00- 9:00 AM	56.4
4.	9:00- 10:00 AM	57.6
5.	10:00 -11:00 AM	58.1
6.	11:00- 12:00 AM	63.7
7.	12:00 -1:00 PM	62.8
8.	1:00- 2:00 PM	64.3
9.	2:00- 3:00 PM	61.2
10.	3:00 4:00 PM	63.8
11.	4:00 5:00 PM	60.0
12.	5:00 6:00 PM	57.3
13.	6:00 7:00 PM	55.0
14.	7:00 8:00 PM	59.7
15.	8:00 9:00 PM	56.4
16.	9:00 10:00 PM	55.9
	Average	59.2

Sr. No.	Night Time	Equivalent Noise dB (A)
17.	10:00 PM - 11:00 PM	57.2
18.	11:00 -12:00 AM	53.0
19.	12:00 -1:00 AM	52.2
20.	1:00 -2:00 AM	51.3
21.	2:00 -3:00 AM	50.5
22.	3:00 -4:00 AM	46.4
23.	4:00- 5:00 AM	48.8
24.	5:00-6:00 AM	55.3
	Average	51.8

End of Report

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Ref. #: KPGL/LAB/2026-633/NL

Issue date: 03-Apr-26

NEQS: National Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1.	Silence Zone (D)	dB (A) Leq	50	45

Terms & Conditions:

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

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TEST REPORT

Ref #: KPGL/LAB/2026-634/DW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Drinking Water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Saidu Sharif	
Coordinates:	34.74948°N 72.3568°E	
Sample Source:	Dispensor Water	
Sample Code:	K-DW-119	
Date of sampling:	17-Mar-26	
Sample Receiving Date:	17-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	17-Mar-26 to 31-Mar-26	
Env. Conditions during Analysis:	Temp=22.4-23.9°C	RH=55.4-60.4%

Summary of Test Result:

Remarks:
All Parameters are in compliance with the NEQS Limit.

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Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Engr. Mian Bukhat Ahmed

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Ref #: KPGL/LAB/2026-634/DW

Issue date: 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.309 at 23.0°C	APHA-4500-H^+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.20	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	450	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	310	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^-) ^	mg/L	< 250	0.1	30	APHA-4500-Cl^- B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	0.0173	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	0.5	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	BDL	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	BDL	APHA-4500-NO_3^--E

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Ref #: KPGL/LAB/2026-634/DW
Issue date: 03-Apr-26

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤ 3	0.001	BDL	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	0.0934	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Iron (Fe)^	mg/L	-	0.0010	BDL	APHA-3111 B
32.	Cyanide (as CN^-) Total	mg/L	≤ 0.05	0.001	BDL	APHA-4500-CN E
33.	Pesticides	mg/L	NGVS	0.001	BDL	APHA-6630 B

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits
With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref #: KPGL/LAB/2026-635/WW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/ Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Saidu Sharif	
Coordinates:	34.74948° N 72.3568° E	
Sample source:	Main Drain	
Sample Code:	K-WW-118	
Date of sampling:	17-Mar-26	
Sample Receiving Date:	17-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	17-Mar-26 to 31-Mar-26	
Env. Conditions during Analysis:	Temp=22.4-23.9°C	RH=55.4-60.4%

Summary of Test Result:

Remarks:
Parameters with * are not in compliance with the NEQS Limit
Discussion: High Values are likely resulting from the discharge of untreated domestic wastewater, Hospital effluents containing organic and chemical constituents, nitrogenous waste

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
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Ref #: KPGL/LAB/2026-635/WW

Issue date: 03-Apr-26

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	24.0	APHA-2550 B
2.	pH^	-	6-9	0.001	6.891 at 24.0°C	APHA-4500-H^+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_5 at 20 °C) ^	mg/L	80	1	2588*	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	4176*	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	2480*	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	1120	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	100	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	1.2	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	4.068	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	108	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	BDL	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	96.8*	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	0.2547	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	0.4713	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Mercury (Hg)	mg/L	0.01	0.0001	BDL	APHA-3112 B
20.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
21.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
22.	Silver (Ag)	mg/L	1.0	0.0100	0.0374	APHA-3111 B
23.	Zinc (Zn)^	mg/L	5.0	0.0001	2.1423	APHA-3111 B
24.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
25.	Barium (Ba)	mg/L	1.5	0.0001	BDL	APHA-3111 D
26.	Iron (Fe)^	mg/L	8.0	0.0010	132.9055*	APHA-3111 B
27.	Manganese (Mn)^	mg/L	1.5	0.0010	4.0417*	APHA-3111 B
28.	Boron (B)	mg/L	6.0	0.0001	BDL	APHA-3111 D
29.	Chlorine (Cl_2)	mg/L	1.0	0.0001	BDL	APHA-4500 Cl B
30.	Total Toxic Metals (Cd, Cr, Cu, Pb, Hg, Se, Ni, Ag, As, Ba, B)	mg/L	2.0	0.0001	0.7634	APHA-3111
31.	Cyanide (as CN^-) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	0.15	0.001	BDL	APHA-6630 B

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Ref #: KPGL/LAB/2026-635/WW

Issue date: 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
33.	*E. coli*	-	-	Nil	955.0	APHA-9221 F
34.	*Total Coli-form*	-	-	Nil	18173.0	APHA-9221 D
35.	*Fecal Coliform*	-	-	Nil	10140.0	APHA-9221 E

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref. #: KPGL/LAB/2026-640/AA

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Sampling Location:	DHQ Hospital Battagram
Coordinates:	34.675415°N 73.0313067°E
Name of Sampling Person:	Arsalan Haider
Nature of Monitoring:	Ambient Air
Monitoring By:	Pak Green Laboratories
Monitoring Instrument:	AQMS
Monitoring Duration:	24 hours
Monitoring Date:	02-Mar-26 to 03-Mar-26

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	O_3	PM_{10}	$PM_{2.5}$	SPM	Lead (Pb)
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m3
1.	9:00 AM	1.67	13.80	37.76	44.72					
2.	10:00 AM	1.69	14.59	34.63	46.41					
3.	11:00 AM	1.72	14.46	32.53	44.94					
4.	12:00 PM	1.74	13.80	29.09	43.98					
5.	1:00 PM	1.77	12.55	34.76	43.82					
6.	2:00 PM	1.87	14.27	30.57	40.35					
7.	3:00 PM	1.89	15.36	32.00	40.94					
8.	4:00 PM	1.83	14.97	32.03	35.15					
9.	5:00 PM	2.72	14.84	31.62	40.95					
10.	6:00 PM	1.47	15.02	30.81	40.33					
11.	7:00 PM	1.40	13.87	28.98	40.98					
12.	8:00 PM	1.38	12.59	31.17	40.44					
13.	9:00 PM	1.35	14.53	31.11	38.55	63.6	146.3	41.7*	449.1	0.02
14.	10:00 PM	1.51	12.42	29.56	39.50					
15.	11:00 PM	2.41	17.89	27.85	39.98					
16.	12:00 AM	2.65	17.57	41.24	42.52					
17.	1:00 AM	1.49	13.87	39.80	43.14					
18.	2:00 AM	1.62	15.45	40.23	44.72					
19.	3:00 AM	2.07	12.82	38.15	41.53					
20.	4:00 AM	1.80	15.59	42.68	41.39					
21.	5:00 AM	2.75	15.85	40.85	43.70					
22.	6:00 AM	2.26	14.27	39.48	43.62					
23.	7:00 AM	1.37	16.91	41.51	40.60					
24.	8:00 AM	1.36	10.80	44.64	42.46					
Average (24 Hours)		1.82	14.50	35.13	41.86					
NEQS		5 8hours	40 24hours	80 24hours	120 24hours	130 1 hour	150 24hours	35 24hours	500 24hours	1.5 24 hours

End of Report

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Ref. #: KPGL/LAB/2026-640/AA

Issue date: 03-Apr-26

NEQS: National Environmental Quality Standards
Remarks: Parameters with * are not in compliance with NEQS Limits
Note: $PM_{2.5}$ results are not in compliance with the NEQS standard due to background air pollution, mostly due to natural surroundings and regional influences, such as dust carried by wind from open areas, dry weather conditions, traffic emissions from nearby roads.
Terms & Conditions:

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- The report is not valid for any negotiations.
- Dually calibrated instrument was used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

Pak Green Enviro-Engineering (Pvt.) Ltd. Peshawar Pakistan

EPA PNAC LAB 160 17025

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TEST REPORT

Ref. #: KPGL/LAB/2026-641/NL

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Nature of Monitoring:	Noise Level (24 Hours)
Sampling Location:	DHQ Hospital Battagram
Monitoring By:	Pak Green Laboratories
Coordinates:	34.675415°N 73.0313067°E
Name of Sampling Person:	Arsalan Haider
Monitoring Time:	Real Time
Monitoring Instrument:	Smart Sensor
Monitoring Date:	02-Mar-26 to 03-Mar-26

Results:

Sr. No.	Day Time	Equivalent Noise
		dB (A)
1.	6:00 – 7:00 AM	57.2
2.	7:00 -8:00 AM	58.0
3.	8:00- 9:00 AM	58.3
4.	9:00- 10:00 AM	59.5
5.	10:00 -11:00 AM	60.0
6.	11:00- 12:00 AM	65.6
7.	12:00 -1:00 PM	64.7
8.	1:00- 2:00 PM	66.2
9.	2:00- 3:00 PM	63.1
10.	3:00 4:00 PM	65.7
11.	4:00 5:00 PM	61.9
12.	5:00 6:00 PM	59.2
13.	6:00 7:00 PM	56.9
14.	7:00 8:00 PM	61.6
15.	8:00 9:00 PM	58.3
16.	9:00 10:00 PM	54.6
	Average	61.2

Sr. No.	Night Time	Equivalent Noise
		dB (A)
17.	10:00 PM - 11:00 PM	59.9
18.	11:00 -12:00 AM	55.7
19.	12:00 -1:00 AM	54.9
20.	1:00 -2:00 AM	54.0
21.	2:00 -3:00 AM	53.2
22.	3:00 -4:00 AM	49.1
23.	4:00- 5:00 AM	51.5
24.	5:00-6:00 AM	58.0
	Average	54.5

End of Report

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Issue date: 03-Apr-26

NEQS: National Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1.	Silence Zone (D)	dB (A) Leq	50	45

Terms & Conditions:

- Analysis was conducted on the request of project proponent for his own use/NEQS Compliance.
- Report cannot be used regarding compliance of any complaint, EPO or any other court case.
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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

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TEST REPORT

Ref #: KPGL/LAB/2026-643/WW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Battagram	
Coordinates:	34.675415° N 73.0313067° E	
Sample source:	Main Drain	
Sample Code:	K-WW-065	
Date of sampling:	02-Mar-26	
Sample Receiving Date:	02-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	02-Mar-26 to 10-Mar-26	
Env. Conditions during Analysis:	Temp=22.8-23.9°C	RH=53.4-58.4%

Summary of Test Result:

Remarks: All Parameters are in compliance with the NEQS Limit

Terms & Conditions:

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- The Sampling was done as per the sampling and preservation protocol method APHA 1060-B&C.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Fakher Alam

Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar, Pakistan

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Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	23.5	APHA-2550 B
2.	pH^	-	6-9	0.001	7.294 at 23.5°C	APHA-4500-H^+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_5 at 20 °C) ^	mg/L	80	1	56	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	88	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	30	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	210	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	20	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	0.2	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	0.010	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	25	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	BDL	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	1.6	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	BDL	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	BDL	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Mercury (Hg)	mg/L	0.01	0.0001	BDL	APHA-3112 B
20.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
21.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
22.	Silver (Ag)	mg/L	1.0	0.0100	BDL	APHA-3111 B
23.	Zinc (Zn)^	mg/L	5.0	0.0001	0.2199	APHA-3111 B
24.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
25.	Barium (Ba)	mg/L	1.5	0.0001	BDL	APHA-3111 D
26.	Iron (Fe)^	mg/L	8.0	0.0010	1.6509	APHA-3111 B
27.	Manganese (Mn)^	mg/L	1.5	0.0010	0.1824	APHA-3111 B
28.	Boron (B)	mg/L	6.0	0.0001	BDL	APHA-3111 D
29.	Chlorine (Cl_2)	mg/L	1.0	0.0001	BDL	APHA-4500 Cl B
30.	Total Toxic Metals (Cd, Cr, Cu, Pb, Hg, Se, Ni, Ag, As, Ba, B)	mg/L	2.0	0.0001	BDL	APHA-3111
31.	Cyanide (as CN^-) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	0.15	0.001	BDL	APHA-6630 B

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Rev-001 | Rev-date: 16-09-25

Ref #: KPGL/LAB/2026-643/WW **Issue date:** 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
33.	*E. coli*	-	-	Nil	404.0	APHA-9221 F
34.	*Total Coli-form*	-	-	Nil	1038.0	APHA-9221 D
35.	*Fecal Coliform*	-	-	Nil	950.0	APHA-9221 E

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

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Rev date: 16-06-25

TEST REPORT

Ref #: KPGL/LAB/2026-642/GW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12-DHQ Hospitals (Building Capacity To Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Ground water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Battagram	
Coordinates:	34.675415°N 73.0313067°E	
Sample Source:	Motor Pump	
Sample Code:	K-GW-064	
Date of sampling:	02-Mar-26	
Sample Receiving Date:	02-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	02-Mar-26 to 10-Mar-26	
Env. Conditions during Analysis:	Temp=22.8-23.9°C	RH=53.4-58.4%

Summary of Test Result:

Remarks:
All Parameters are in compliance with the NEQS Limit.

Terms & Conditions:

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- The Sampling was done as per the sampling and preservation protocol method APHA 1060-B&C.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmad

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EPA Certified

Ref #: KPGL/LAB/2026-642/GW

Issue date: 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.547 at 23.4°C	APHA-4500-H^+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.27	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	310	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	200	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^-) ^	mg/L	< 250	0.1	20	APHA-4500-Cl^- B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	0.3	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	BDL	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	BDL	APHA-4500-NO_3^--E

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EPA Certified

Rev date: 16-06-25

Ref #: KPGL/LAB/2026-642/GW
Issue date: 03-Apr-26

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method/Technique
26.	Nitrite^	mg/L	≤3	0.001	BDL	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	0.5136	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Iron (Fe)^	mg/L	-	0.0010	0.0281	APHA-3111 B
32.	Cyanide (as CN^-) Total	mg/L	≤0.05	0.001	BDL	APHA-4500-CN E
33.	Pesticides	mg/L	NGVS	0.001	BDL	APHA-6630 B

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits
With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref. #: KPGL/LAB/2026-644/AA

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Sampling Location:	DHQ Hospital Manshra
Coordinates:	34.32513°N 73.2017867°E
Name of Sampling Person:	Imshad Ali
Nature of Monitoring:	Ambient Air
Monitoring By:	Pak Green Laboratories
Monitoring Instrument:	AQMS
Monitoring Duration:	24 hours
Monitoring Date:	03-Mar-26 to 04-Mar-26

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	O_3	PM_{10}	$PM_{2.5}$	SPM	Lead (Pb)
		mg/m³	µg/m³	µg/m³	µg/m²	µg/m³	µg/m³	µg/m³	µg/m³	µg/m3
1.	9:00 AM	1.28	9.60	32.41	31.82					
2.	10:00 AM	1.30	11.76	36.32	33.59					
3.	11:00 AM	1.33	11.64	37.10	34.58					
4.	12:00 PM	1.35	6.83	30.11	37.54					
5.	1:00 PM	1.38	7.73	32.22	37.96					
6.	2:00 PM	1.48	9.90	37.09	31.82					
7.	3:00 PM	1.50	12.06	35.29	29.90					
8.	4:00 PM	1.44	9.18	30.68	28.74					
9.	5:00 PM	2.33	7.46	35.90	39.60					
10.	6:00 PM	1.08	8.02	37.08	40.84					
11.	7:00 PM	1.01	7.01	41.14	41.40					
12.	8:00 PM	0.99	7.04	30.80	42.64					
13.	9:00 PM	0.96	11.16	32.83	50.49					
14.	10:00 PM	1.12	11.62	40.54	46.03	59.7	140.6	38.2*	443.9	0.02
15.	11:00 PM	2.02	11.91	32.53	41.39					
16.	12:00 AM	2.26	12.07	34.40	61.56					
17.	1:00 AM	1.10	13.09	38.18	43.32					
18.	2:00 AM	1.23	12.86	37.47	43.49					
19.	3:00 AM	1.68	6.15	37.00	43.97					
20.	4:00 AM	1.41	8.34	36.55	45.01					
21.	5:00 AM	2.36	6.78	42.54	49.58					
22.	6:00 AM	1.87	6.97	36.00	33.25					
23.	7:00 AM	0.98	7.49	37.87	32.46					
24.	8:00 AM	0.97	9.68	32.76	32.21					
Average (24 Hours)		1.43	9.44	35.62	39.73					
NEQS		5 8hours	40 24hours	80 24hours	120 24hours	130 1 hour	150 24hours	35 24hours	500 24hours	1.5 24 hours

End of Report

EPA PNAC LAB 180 17025

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Ref. #: KPGL/LAB/2026-644/AA

Issue date: 03-Apr-26

NEQS: National Environmental Quality Standards
Remarks: Parameters with * are not in compliance with NEQS Limits.
Note: $PM_{2.5}$ results are not in compliance with the NEQS standard due to background air pollution, mostly due to natural surroundings and regional influences, such as dust carried by wind from open areas, dry weather conditions, traffic emissions from nearby roads.
Terms & Conditions:

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- 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 report is not valid for any negotiations.
- Dually calibrated instrument was used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

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TEST REPORT

Ref. #: KPGL/LAB/2026-645/NL

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Nature of Monitoring:	Noise Level (24 Hours)
Sampling Location:	DHQ Hospital Mansehra
Monitoring By:	Pak Green Laboratories
Coordinates:	34.32513 °N 73.2017867°E
Name of Sampling Person	Imshad Ali
Monitoring Time:	Real Time
Monitoring Instrument:	Smart Sensor
Monitoring Date:	03-Mar-26 to 04-Mar-26

Results:

Sr. No.	Day Time	Equivalent Noise dB (A)
1.	6:00 – 7:00 AM	58.6
2.	7:00 -8:00 AM	59.4
3.	8:00- 9:00 AM	59.7
4.	9:00- 10:00 AM	60.9
5.	10:00 -11:00 AM	61.4
6.	11:00- 12:00 AM	67.0
7.	12:00 -1:00 PM	66.1
8.	1:00- 2:00 PM	67.6
9.	2:00- 3:00 PM	64.5
10.	3:00 4:00 PM	67.1
11.	4:00 5:00 PM	63.3
12.	5:00 6:00 PM	60.6
13.	6:00 7:00 PM	58.3
14.	7:00 8:00 PM	63.0
15.	8:00 9:00 PM	59.7
16.	9:00 10:00 PM	56.8
	Average	62.4

Sr. No.	Night Time	Equivalent Noise dB (A)
17.	10:00 PM - 11:00 PM	56.2
18.	11:00 -12:00 AM	52.0
19.	12:00 -1:00 AM	51.2
20.	1:00 -2:00 AM	50.3
21.	2:00 -3:00 AM	49.5
22.	3:00 -4:00 AM	45.4
23.	4:00- 5:00 AM	47.8
24.	5:00-6:00 AM	54.3
	Average	51.6

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Ref. #: KPGL/LAB/2026-645/NL

Issue date: 03-Apr-26

NEQS: National Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1.	Silence Zone (D)	dB (A) Leq	50	45

Terms & Conditions:

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

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TEST REPORT

Ref #: KPGL/LAB/2026-646/GW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Ground water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	King Abdullah Hospital Mansehra	
Coordinates:	34.32513°N 73.2017867°E	
Sample Source:	Tap Water	
Sample Code:	K-GW-068	
Date of sampling:	03-Mar-26	
Sample Receiving Date:	03-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	03-Mar-26 to 10-Mar-26	
Env. Conditions during Analysis:	Temp=22.8-23.9°C	RH=53.4-58.4%

Summary of Test Result:

Remarks:
Parameters with * are not in compliance with the NEQS Limit.
Discussion: The Presence of microbes contaimination may be due to poor sanitation practices in surrounding areas, cross contaimation within the distribution system.

Terms & Conditions:

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- The Sampling was done as per the sampling and preservation protocol method APHA 1060-B&C.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

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Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	40.4*	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	114.4*	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	113.4*	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.868 at 23.2°C	APHA-4500-H^+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.28	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	480	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	300	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^-) ^	mg/L	<250	0.1	40	APHA-4500-Cl^- B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	0.4	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	0.0201	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	0.096	APHA-4500-NO_3^--E

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Ref #: KPGL/LAB/2026-646/GW
Issue date: 03-Apr-26

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤3	0.001	BDL	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	0.2834	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Iron (Fe)^	mg/L	-	0.0010	0.0286	APHA-3111 B
32.	Cyanide (as CN^-) Total	mg/L	≤0.05	0.001	BDL	APHA-4500-CN E
33.	Pesticides	mg/L	NGVS	0.001	BDL	APHA-6630 B

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits
With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref #: KPGL/LAB/2026-647/WW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	King Abdullah Hospital Mansehra	
Coordinates:	34.32513° N 73.2017867° E	
Sample source:	Main Drain	
Sample Code:	K-WW-069	
Date of sampling:	03-Mar-26	
Sample Receiving Date:	03-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	03-Mar-26 to 10-Mar-26	
Env. Conditions during Analysis:	Temp=22.8-23.9°C	RH=53.4-58.4%

Summary of Test Result:

Remarks:
Parameters with * are not in compliance with the NEQS Limit
Discussion: High Values are likely resulting from the discharge of untreated domestic wastewater, Hospital effluents containing organic and chemical constituents.

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Miaf Dilkhar Ahmad

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EPA PNAC LAB 180 17025

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Ref #: KPGL/LAB/2026-647/WW

Issue date: 03-Apr-26

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	23.4	APHA-2550 B
2.	pH^	-	6-9	0.001	7.476 at 23.4°C	APHA-4500-H+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_3 at 20 °C) ^	mg/L	80	1	158*	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	248*	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	100	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	1290	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	170	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	1.2	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	0.084	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	112	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	BDL	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	44.6*	APHA-4500NH_3 C
15	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	BDL	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	BDL	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Mercury (Hg)	mg/L	0.01	0.0001	BDL	APHA-3112 B
20.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
21.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
22.	Silver (Ag)	mg/L	1.0	0.0100	BDL	APHA-3111 B
23.	Zinc (Zn)^	mg/L	5.0	0.0001	0.0666	APHA-3111 B
24.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
25.	Barium (Ba)	mg/L	1.5	0.0001	BDL	APHA-3111 D
26.	Iron (Fe)^	mg/L	8.0	0.0010	1.7008	APHA-3111 B
27.	Manganese (Mn)^	mg/L	1.5	0.0010	0.0195	APHA-3111 B
28.	Boron (B)	mg/L	6.0	0.0001	BDL	APHA-3111 D
29.	Chlorine (Cl_2)	mg/L	1.0	0.0001	BDL	APHA-4500 Cl B
30.	Total Toxic Metals (Cd, Cr, Cu, Pb, Hg, Se, Ni, Ag, As, Ba, B)	mg/L	2.0	0.0001	BDL	APHA-3111
31.	Cyanide (as CN^-) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	0.15	0.001	BDL	APHA-6630 B

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Ref #: KPGL/LAB/2026-647/WW

Issue date: 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
33.	*E. coli*	-	-	Nil	359.0	APHA-9221 F
34.	*Total Coli-form*	-	-	Nil	1144.0	APHA-9221 D
35.	*Fecal Coliform*	-	-	Nil	1047.0	APHA-9221 E

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref. #: KPGL/LAB/2026-636/AA

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name:	Phase-III: 210121- Strengthening Of 12-DHQ Hospitals (Building Capacity to Respond Covid 19/ Any Future Pandemic) In Khyber Pakhtunkhwa
Sampling Location:	DHQ Hospital Kohistan
Coordinates:	35.2870183°N 73.2188755°E
Name of Sampling Person:	Arsalan Haider
Nature of Monitoring:	Ambient Air
Monitoring By:	Pak Green Laboratories
Monitoring Instrument:	AQMS
Monitoring Duration:	24 hours
Monitoring Date:	01-Mar-26 to 02-Mar-26

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	O_3	PM_{10}	$PM_{2.5}$	SPM	Lead (Pb)
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m3
1.	9:00 AM	1.29	8.05	31.79	39.99					
2.	10:00 AM	1.35	8.84	28.66	41.68					
3.	11:00 AM	1.20	8.71	26.56	40.21					
4.	12:00 PM	1.14	8.05	23.12	39.25					
5.	1:00 PM	1.25	6.80	28.79	39.09					
6.	2:00 PM	1.14	8.52	24.60	35.62					
7.	3:00 PM	1.18	9.61	26.03	36.21					
8.	4:00 PM	1.16	9.22	26.06	30.42					
9.	5:00 PM	1.27	9.09	25.65	36.22					
10.	6:00 PM	1.22	9.27	24.84	35.60					
11.	7:00 PM	1.08	8.12	23.01	36.25					
12.	8:00 PM	2.53	6.84	25.20	35.71					
13.	9:00 PM	1.59	8.78	25.14	33.82	48.4	141.2	32.8	420.3	0.01
14.	10:00 PM	1.73	6.67	23.59	34.77					
15.	11:00 PM	1.68	12.14	21.88	35.25					
16.	12:00 AM	1.14	11.82	35.27	37.79					
17.	1:00 AM	1.18	8.12	33.83	38.41					
18.	2:00 AM	1.20	9.70	34.26	39.99					
19.	3:00 AM	1.50	7.07	32.18	36.80					
20.	4:00 AM	1.22	9.84	36.71	36.66					
21.	5:00 AM	1.51	10.10	34.88	38.97					
22.	6:00 AM	0.98	8.52	33.51	38.89					
23.	7:00 AM	1.24	11.16	35.54	35.87					
24.	8:00 AM	1.73	5.05	38.67	36.73					
Average (24 Hours)		1.35	8.75	29.16	37.09					
NEQS		5 8hours	40 24hours	80 24hours	120 24hours	130 1 hour	150 24hours	35 24hours	500 24hours	1.5 24 hour

End of Report

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Ref. #: KPGL/LAB/2026-636/AA **Issue date:** 03-Apr-26

NEQS: National Environmental Quality Standards
Remarks: All Parameters are in compliance with NEQS Limits.
Terms & Conditions:

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- 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 report is not valid for any negotiations.
- Dually calibrated instrument was used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

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TEST REPORT

Ref. #: KPGL/LAB/2026-637/NL — Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Nature of Monitoring:	Noise Level (24 Hours)
Sampling Location:	DHQ Hospital Kohistan
Monitoring By:	Pak Green Laboratories
Coordinates:	35.2870183°N 73.2188755°E
Name of Sampling Person:	Arsalan Haider
Monitoring Time:	Real Time
Monitoring Instrument:	Smart Sensor
Monitoring Date:	01-Mar-26 to 02-Mar-26

Results:

Sr. No.	Day Time	Equivalent Noise dB (A)
1.	6:00 - 7:00 AM	48.0
2.	7:00 -8:00 AM	41.7
3.	8:00- 9:00 AM	58.7
4.	9:00- 10:00 AM	53.5
5.	10:00 -11:00 AM	53.3
6.	11:00- 12:00 AM	60.0
7.	12:00 -1:00 PM	57.6
8.	1:00- 2:00 PM	62.1
9.	2:00- 3:00 PM	54.5
10.	3:00 4:00 PM	65.3
11.	4:00 5:00 PM	62.7
12.	5:00 6:00 PM	61.8
13.	6:00 7:00 PM	65.3
14.	7:00 8:00 PM	63.2
15.	8:00 9:00 PM	66.1
16.	9:00 10:00 PM	52.8
	Average	58.3

Sr. No.	Night Time	Equivalent Noise dB (A)
17.	10:00 PM - 11:00 PM	61.3
18.	11:00 -12:00 AM	57.1
19.	12:00 -1:00 AM	56.3
20.	1:00 -2:00 AM	55.4
21.	2:00 -3:00 AM	54.6
22.	3:00 -4:00 AM	50.5
23.	4:00- 5:00 AM	52.9
24.	5:00-6:00 AM	59.4
	Average	55.9

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Ref. #: KPGL/LAB/2026-637/NL

Issue date: 03-Apr-26

NEQS: National Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1.	Silence Zone (D)	dB (A) Leq	50	45

Terms & Conditions:

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- Report cannot be used regarding compliance of any complaint, EPO or any other court case.
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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

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TEST REPORT

Ref #: KPGL/LAB/2026-638/GW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/ Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Ground water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Kohistan	
Coordinates:	35.2870183°N 73.2188755°E	
Sample Source:	Tap Water	
Sample Code:	K-GW-060	
Date of sampling:	01-Mar-26	
Sample Receiving Date:	01-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	01-Mar-26 to 10-Mar-26	
Env. Conditions during Analysis:	Temp=22.8-23.9°C	RH=53.4-58.4%

Summary of Test Result:

Remarks:
All Parameters are in compliance with the NEQS Limit.

Terms & Conditions:

- This report should be reproduced as a whole and not in parts.
- The Sampling was done as per the sampling and preservation protocol method APHA 1060-B&C.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Shahid Naveed

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Ref #: KPGL/LAB/2026-638/GW
Issue date: 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.828 at 23.0°C	APHA-4500-H+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.29	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	260	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	290	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^{-1}) ^	mg/L	< 250	0.1	05	APHA-4500-Cl^{-1} B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	0.7	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	BDL	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	BDL	APHA-4500-NO_3^{-1}-E

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Ref #: KPGL/LAB/2026-638/GW
Issue date: 03-Apr-26

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤ 3	0.001	BDL	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	BDL	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Iron (Fe)^	mg/L	-	0.0010	BDL	APHA-3111 B
32.	Cyanide (as CN^{1-}) Total	mg/L	≤ 0.05	0.001	BDL	APHA-4500-CN E
33.	Pesticides	mg/L	NGVS	0.001	BDL	APHA-6630 B

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits
With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref #: KPGL/LAB/2026-639/SW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121-Strengthening Of 12-DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Surface water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Kohistan	
Coordinates:	35.2870183°N 73.2188755°E	
Sample source:	Indus River	
Sample Code:	K-SW-061	
Date of sampling:	01-Mar-26	
Sample Receiving Date:	01-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	01-Mar-26 to 10-Mar-26	
Env. Conditions during Analysis:	Temperature: 22.8-23.9°C	Humidity: 53.4-58.4%

Summary of Test Result:

Remarks:
All Parameters are in compliance with the PEQS Limit

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Nihar Ahmed

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Issue date: 03-Apr-26

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	23.4	APHA-2550 B
2.	pH ^	-	6-9	0.001	7.905 at 23.4	APHA-4500-H+ B
3.	Total dissolved Solids (TDS) ^	mg/L	3500	10	190	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
4.	Biological Oxygen Demand (BOD_5 at 20 °C) ^	mg/L	80	1	06	APHA-5210 D
5.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	10	APHA-5220 B
6.	Total Suspended Solids (TSS) ^	mg/L	200	1	05	APHA-2540 D
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	05	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	0.1	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	0.028	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	23	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	BDL	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	0.2	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	BDL	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	BDL	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Mercury (Hg)	mg/L	0.01	0.0001	BDL	APHA-3112 B
20.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
21.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
22.	Silver (Ag)	mg/L	1.0	0.0100	BDL	APHA-3111 B
23.	Zinc (Zn)^	mg/L	5.0	0.0001	BDL	APHA-3111 B
24.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
25.	Barium (Ba)	mg/L	1.5	0.0001	BDL	APHA-3111 D
26.	Iron (Fe)^	mg/L	8.0	0.0010	0.0222	APHA-3111 B
27.	Manganese (Mn)^	mg/L	1.5	0.0010	BDL	APHA-3111 B
28.	Cyanide (as CN^-) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E
29.	Boron (B)	mg/L	6.0	0.0001	BDL	APHA-3111 D
30.	Chlorine (Cl_2)	mg/L	1.0	0.0001	BDL	APHA-4500 Cl B
31.	Total Toxic Metals (Cd, Cr, Cu, Pb, Hg, Se, Ni, Ag, As, Ba, B)	mg/L	2.0	0.0001	BDL	APHA-3111
32.	Pesticides	mg/L	0.15	0.001	BDL	APHA-6630 B

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EPA Certified

Ref #: KPGL/LAB/2026-639/SW

Issue date: 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
33.	*E. coli*	-	-	Nil	103.8	APHA-9221 F
34.	*Total Coli-form*	-	-	Nil	354.2	APHA-9221 D
35.	*Fecal Coliform*	-	-	Nil	113.4	APHA-9221 E

End of Report

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BDL: Below Detection Limits
With ^PNAC Accredited
LDL: Lowest Detection limit

Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar, Pakistan

PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.
(Environmental Laboratories Division)
ISO/IEC 17025:2017 Accredited Testing Lab, ISO 9001:2015, ISO 14001:2015, ISO 45001:2018
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EPA Certified

TEST REPORT

Ref. #: KPGL/LAB/2026-656/AA

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Sampling Location:	DHQ Hospital Shangla Alpuri
Coordinates:	34.920486°N 72.6327°E
Name of Sampling Person:	Farman Ullah
Nature of Monitoring:	Ambient Air
Monitoring By:	Pak Green Laboratories
Monitoring Instrument:	AQMS
Monitoring Duration:	24 hours
Monitoring Date:	18-Mar-26 to 19-Mar-26

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	O_3	PM_{10}	$PM_{2.5}$	SPM	Lead (Pb)
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m3
1.	9:00 AM	1.48	12.06	29.42	33.79					
2.	10:00 AM	1.50	14.22	33.33	35.56					
3.	11:00 AM	1.53	14.10	34.11	36.55					
4.	12:00 PM	1.55	9.29	27.12	39.51					
5.	1:00 PM	1.58	10.19	29.23	39.93					
6.	2:00 PM	1.68	12.36	34.10	33.79					
7.	3:00 PM	1.70	14.52	32.30	31.87					
8.	4:00 PM	1.64	11.64	27.69	30.71					
9.	5:00 PM	2.53	9.92	32.91	41.57					
10.	6:00 PM	1.28	10.48	34.09	42.81					
11.	7:00 PM	1.21	9.47	38.15	43.37					
12.	8:00 PM	1.19	9.50	27.81	44.61					
13.	9:00 PM	1.16	13.62	29.84	52.46	62.9	147.3	49.5*	458.2	0.01
14.	10:00 PM	1.32	14.08	37.55	48.00					
15.	11:00 PM	2.22	14.37	29.54	43.36					
16.	12:00 AM	2.46	14.53	31.41	63.53					
17.	1:00 AM	1.30	15.55	35.19	45.29					
18.	2:00 AM	1.43	15.32	34.48	45.46					
19.	3:00 AM	1.88	8.61	34.01	45.94					
20.	4:00 AM	1.61	10.80	33.56	46.98					
21.	5:00 AM	2.56	9.24	39.55	51.55					
22.	6:00 AM	2.07	9.43	33.01	35.22					
23.	7:00 AM	1.18	9.95	34.88	34.43					
24.	8:00 AM	0.97	12.14	29.77	34.18					
Average (24 Hours)		1.63	11.89	32.63	41.69					
NEQS		5 8hours	40 24hours	80 24hours	120 24hours	130 1 hour	150 24hours	35 24hours	500 24hours	1.5 24 hours

End of Report

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Ref. #: KPGL/LAB/2026-656/AA

Issue date: 03-Apr-26

NEQS: National Environmental Quality Standards
Remarks: Parameters with * are not in compliance with NEQS Limits.
Note: $PM_{2.5}$ results are not in compliance with the NEQS standard due to background air pollution, mostly due to natural surroundings and regional influences, such as dust carried by wind from open areas, dry weather conditions, traffic emissions from nearby roads.
Terms & Conditions:

- Analysis was conducted on the request of project proponent for his own use or NEQS compliance.
- 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 report is not valid for any negotiations.
- Dually calibrated instrument was used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar Pakistan

EPA PNAC LAB 180 17025

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TEST REPORT

Ref. #: KPGL/LAB/2026-657/NL

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Nature of Monitoring:	Noise Level (24 Hours)
Sampling Location:	DHQ Hospital Shangla Alpuri
Monitoring By:	Pak Green Laboratories
Coordinates:	34.920486°N 72.6327°E
Name of Sampling Person:	Farman Ullah
Monitoring Time:	Real Time
Monitoring Instrument:	Smart Sensor
Monitoring Date:	18-Mar-26 to 19-Mar-26

Results:

Sr. No.	Day Time	Equivalent Noise dB (A)
1.	6:00 - 7:00 AM	52.0
2.	7:00 -8:00 AM	52.8
3.	8:00- 9:00 AM	53.1
4.	9:00- 10:00 AM	54.3
5.	10:00 -11:00 AM	54.8
6.	11:00- 12:00 AM	60.4
7.	12:00 -1:00 PM	59.5
8.	1:00- 2:00 PM	61.0
9.	2:00- 3:00 PM	57.9
10.	3:00 4:00 PM	60.5
11.	4:00 5:00 PM	56.7
12.	5:00 6:00 PM	54.0
13.	6:00 7:00 PM	51.7
14.	7:00 8:00 PM	56.4
15.	8:00 9:00 PM	53.1
16.	9:00 10:00 PM	48.9
	Average	55.4
Sr. No,	Night Time	Equivalent Noise dB (A)
17.	10:00 PM - 11:00 PM	56.1
18.	11:00 -12:00 AM	51.9
19.	12:00 -1:00 AM	51.1
20.	1:00 -2:00 AM	50.2
21.	2:00 -3:00 AM	49.4
22.	3:00 -4:00 AM	45.3
23.	4:00- 5:00 AM	47.7
24.	5:00-6:00 AM	54.2
	Average	50.7

End of Report

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Ref. #: KPGL/LAB/2026-637/NL

Issue date: 03-Apr-26

NEQS: National Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1.	Silence Zone (D)	dB (A) Leq	50	45

Terms & Conditions:

- Analysis was conducted on the request of project proponent for his own use/NEQS Compliance.
- Report cannot be used regarding compliance of any complaint, EPO or any other court case.
- This report should be reproduced as a whole and not in parts.
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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

Green Enviro-Engineering (Pvt) Ltd. Peshawar Pakistan

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TEST REPORT

Ref #: KPGL/LAB/2026-638/DW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12-DHQ Hospitals (Building Capacity To Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Drinking water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Shangla Alpuri	
Coordinates:	34.92059°N 72.63309°E	
Sample Source:	Bore To Feet Dept	
Sample Code:	K-DW-120	
Date of sampling:	18-Mar-26	
Sample Receiving Date:	18-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	18-Mar-26 to 03-Apr-26	
Env. Conditions during Analysis:	Temp=23.1-24.4°C	RH=52.4-58.4%

Summary of Test Result:

Remarks:
All Parameters are in compliance with the NEQS Limit.

Terms & Conditions:

- This report should be reproduced as a whole and not in parts.
- The Sampling was done as per the sampling and preservation protocol method APHA 1060-B&C.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory In-charge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

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Ref #: KPGL/LAB/2026-658/DW
Issue date: 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	8.131 at 23.8°C	APHA-4500-H^+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.0001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.25	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	290	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	190	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^-) ^	mg/L	< 250	0.1	15	APHA-4500-Cl^- B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	0.2	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	BDL	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	BDL	APHA-4500-NO_3^--E

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Rev date: 16-03-25

Ref #: KPGL/LAB/2026-658/DW
Issue date: 03-Apr-26

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤3	0.001	BDL	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	BDL	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Iron (Fe)^	mg/L	-	0.0010	BDL	APHA-3111 B
32.	Cyanide (as CN^{1-}) Total	mg/L	≤0.05	0.001	BDL	APHA-4500-CN E
33.	Pesticides	mg/L	NGVS	0.001	BDL	APHA-6630 B

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits
With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref #: KPGL/LAB/2026-659/WW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Shangla Alpuri	
Coordinates:	34.92053° N 72.6328° E	
Sample source:	Final Drain	
Sample Code:	K-WW-121	
Date of sampling:	18-Mar-26	
Sample Receiving Date:	18-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	18-Mar-26 to 03-Apr-26	
Env. Conditions during Analysis:	Temp=23.1-24.4°C	RH=52.4-58.4%

Summary of Test Result:

Remarks: All Parameters are in compliance with the NEQS Limit

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- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Gulzar Ahmed

Pak Green Enviro-Engineering (Pvt.) Ltd. Peshawar, Pakistan

EPA PNAC LAB 180 17025

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Ref #: KPGL/LAB/2026-659/WW

Issue date: 03-Apr-26

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	23.8	APHA-2550 B
2.	pH^	-	6-9	0.001	8.274 at 23.8°C	APHA-4500-H+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_5 at 20 °C) ^	mg/L	80	1	48	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	72	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	30	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	80	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	05	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	0.1	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	0.075	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	10	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	BDL	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	2.5	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	0.1576	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	0.0195	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Mercury (Hg)	mg/L	0.01	0.0001	BDL	APHA-3112 B
20.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
21.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
22.	Silver (Ag)	mg/L	1.0	0.0100	0.1309	APHA-3111 B
23.	Zinc (Zn)^	mg/L	5.0	0.0001	0.0609	APHA-3111 B
24.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
25.	Barium (Ba)	mg/L	1.5	0.0001	BDL	APHA-3111 D
26.	Iron (Fe)^	mg/L	8.0	0.0010	2.5251	APHA-3111 B
27.	Manganese (Mn)^	mg/L	1.5	0.0010	0.0875	APHA-3111 B
28.	Boron (B)	mg/L	6.0	0.0001	BDL	APHA-3111 D
29.	Chlorine (Cl_2)	mg/L	1.0	0.0001	BDL	APHA-4500 Cl B
30.	Total Toxic Metals (Cd, Cr, Cu, Pb, Hg, Se, Ni, Ag, As, Ba, B)	mg/L	2.0	0.0001	0.3080	APHA-3111
31.	Cyanide (as CN^-) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	0.15	0.001	BDL	APHA-6630 B

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Ref #: KPGL/LAB/2026-659/WW

Issue date: 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
33.	*E. coli*	-	-	Nil	35.9	APHA-9221 F
34.	*Total Coli-form*	-	-	Nil	105.0	APHA-9221 D
35.	*Fecal Coliform*	-	-	Nil	95.0	APHA-9221 E

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

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EPA Certified

TEST REPORT

Ref. #: KPGL/LAB/2026-1033/AA

Issue date: 08-Jun-26

Name of Client: NESPAK JV TES
Project Name: Phase-III: 210121- Strengthening Of 12-DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Sampling Location: DHQ Hospital Chitral
Coordinates: 35.85232°N 71.78833°E
Name of Sampling Person: Mr. Saghir
Nature of Monitoring: Ambient Air
Monitoring By: Pak Green Laboratories
Monitoring Instrument: AQMS
Monitoring Duration: 24 hours
Monitoring Date: 18-Apr-26 to 19-Apr-26

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	O_3	PM_{10}	$PM_{2.5}$	SPM	Lead (Pb)
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m3
1.	9:00 AM	1.34	11.19	32.41	29.33					
2.	10:00 AM	1.40	11.98	29.28	31.10					
3.	11:00 AM	1.25	11.85	27.18	32.09					
4.	12:00 PM	1.19	11.19	23.74	35.05					
5.	1:00 PM	1.30	9.94	29.41	35.47					
6.	2:00 PM	1.19	11.66	25.22	29.33					
7.	3:00 PM	1.23	12.75	26.65	27.41					
8.	4:00 PM	1.21	12.36	26.68	26.25					
9.	5:00 PM	1.32	12.23	26.27	37.11					
10.	6:00 PM	1.27	12.41	25.46	38.35					
11.	7:00 PM	1.13	11.26	23.63	38.91					
12.	8:00 PM	2.58	9.98	25.82	40.15					
13.	9:00 PM	1.64	11.92	25.76	48.00	59.8	142.5	26.8	420.6	0.01
14.	10:00 PM	1.78	9.81	24.21	43.54					
15.	11:00 PM	1.73	15.28	22.50	38.90					
16.	12:00 AM	1.19	14.96	35.89	59.07					
17.	1:00 AM	1.23	11.26	34.45	40.83					
18.	2:00 AM	1.25	12.84	34.88	41.00					
19.	3:00 AM	1.55	10.21	32.80	41.48					
20.	4:00 AM	1.27	12.98	37.33	42.52					
21.	5:00 AM	1.56	13.24	35.50	47.09					
22.	6:00 AM	1.03	11.66	34.13	30.76					
23.	7:00 AM	1.29	14.30	36.16	29.97					
24.	8:00 AM	1.78	8.19	39.29	29.72					
Average (24 Hours)		1.40	11.89	29.78	37.23					
NEQS		5 8hours	40 24hours	80 24hours	120 24hours	130 1 hour	150 24hours	35 24hours	500 24hours	1.5 24 hours

End of Report

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Ref. #: KPGL/LAB/2026-1033/AA

Issue date: 08-Jun-26

NEQS: National Environmental Quality Standards
Remarks: All Parameters are in compliance with NEQS Limits.
Terms & Conditions:

- Analysis was conducted on the request of project proponent for his own use or NEQS compliance.
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- The report is not valid for any negotiations.
- Dually calibrated instrument was used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar Pakistan

EPA PNAC LAB 180 17025

PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.
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TEST REPORT

Ref. #: KPGL/LAB/2026-1034/NL
Issue date: 08-Jun-26

Name of Client: NESPAK JV TES
Project Name: Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Nature of Monitoring: Noise Level (24 Hours)
Sampling Location: DHQ Hospital Chitral
Monitoring By: Pak Green Laboratories
Coordinates: 35.85232° N 71.78833°E
Name of Sampling Person: Mr. Saghir
Monitoring Time: Real Time
Monitoring Instrument: Smart Sensor
Monitoring Date: 18-Apr-26 to 19-Apr-26

Results:

Sr. No.	Day Time	Equivalent Noise dB (A)
1.	6:00 – 7:00 AM	54.5
2.	7:00 -8:00 AM	55.5
3.	8:00- 9:00 AM	52.0
4.	9:00- 10:00 AM	55.7
5.	10:00 -11:00 AM	51.7
6.	11:00- 12:00 AM	53.1
7.	12:00 -1:00 PM	54.4
8.	1:00- 2:00 PM	55.3
9.	2:00- 3:00 PM	57.5
10.	3:00 4:00 PM	54.9
11.	4:00 5:00 PM	52.7
12.	5:00 6:00 PM	51.6
13.	6:00 7:00 PM	50.7
14.	7:00 8:00 PM	51.5
15.	8:00 9:00 PM	47.2
16.	9:00 10:00 PM	48.1
	Average	52.9

Sr. No.	Night Time	Equivalent Noise dB (A)
17.	10:00 PM - 11:00 PM	45.0
18.	11:00 -12:00 AM	46.8
19.	12:00 -1:00 AM	49.6
20.	1:00 -2:00 AM	45.3
21.	2:00 -3:00 AM	47.0
22.	3:00 -4:00 AM	45.4
23.	4:00- 5:00 AM	44.9
24.	5:00-6:00 AM	49.7
	Average	46.7

End of Report

Page 1 of 1

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Ref. #: KPGL/LAB/2026-1034/NL

Issue date: 08-Jun-26

NEQS: National Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
I.	Silence Zone (D)	dB (A) Leq	50	45

Terms & Conditions:

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- Report cannot be used regarding compliance of any complaint, EPO or any other court case.
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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

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TEST REPORT

Ref #: KPGL/LAB/2026-1035/DW

Issue date: 08-Jun-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/ Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Drinking water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Chitral	
Coordinates:	35.852074°N, 71.78853°E	
Sample Source:	Well Near Admin Block	
Sample Code:	K-DW-193	
Date of sampling:	18-Apr-26	
Sample Receiving Date:	18-Apr-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	18-Apr-26 to 19-May-26	
Env. Conditions during Analysis:	Temp=22.0-24.6°C	RH=53.4-59.4%

Summary of Test Result:

Remarks: All Parameters are in compliance with the NEQS Limit.

Terms & Conditions:

- This report should be reproduced as a whole and not in parts.
- The Sampling was done as per the sampling and preservation protocol method APHA 1060-B&C.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Mukhar Ahmad

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Ref #: KPGL/LAB/2026-1035/DW

Issue date: 08-Jun-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.816 at 24.7°C	APHA-4500-H+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.0001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.35	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	425	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	230	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^-) ^	mg/L	< 250	0.1	60	APHA-4500-Cl^- B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	1.0	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	0.0133	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	BDL	APHA-4500-NO_3^--E

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Ref #: KPGL/LAB/2026-1035/DW
Issue date: 08-Jun-26

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤ 3	0.001	BDL	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	BDL	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Iron (Fe)^	mg/L	-	0.0010	BDL	APHA-3111 B
32.	Cyanide (as CN^{1-}) Total	mg/L	≤ 0.05	0.001	BDL	APHA-4500-CN E
33.	Pesticides	mg/L	NGVS	0.001	BDL	APHA-6630 B

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits
With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref #: KPGL/LAB/2026-1036/WW

Issue date: 08-Jun-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-Iii: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Chitral	
Coordinates:	35.852997° N 71.790375° E	
Sample source:	Final Drain	
Sample Code:	K-WW-194	
Date of sampling:	18-Apr-26	
Sample Receiving Date:	18-Apr-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	18-Apr-26 to 19-May-26	
Env. Conditions during Analysis:	Temp=22.0-24.6°C	RH=53.4-59.4%

Summary of Test Result:

Remarks: All Parameters are in compliance with the NEQS Limit

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Waqar Ahmed

Pak Green Engineering (Pvt) Ltd. Peshawar, Pakistan

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Issue date: 08-Jun-26

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	23.4	APHA-2550 B
2.	pH^	-	6-9	0.001	7.409 at 23.4°C	APHA-4500-H+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_5 at 20 °C) ^	mg/L	80	1	28	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	48	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	15	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	410	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	30	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	0.4	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	0.038	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	25	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	BDL	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	3.9	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	0.1385	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	BDL	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Mercury (Hg)	mg/L	0.01	0.0001	BDL	APHA-3112 B
20.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
21.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
22.	Silver (Ag)	mg/L	1.0	0.0100	BDL	APHA-3111 B
23.	Zinc (Zn)^	mg/L	5.0	0.0001	0.0325	APHA-3111 B
24.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
25.	Barium (Ba)	mg/L	1.5	0.0001	BDL	APHA-3111 D
26.	Iron (Fe)^	mg/L	8.0	0.0010	1.3011	APHA-3111 B
27.	Manganese (Mn)^	mg/L	1.5	0.0010	0.1182	APHA-3111 B
28.	Boron (B)	mg/L	6.0	0.0001	BDL	APHA-3111 D
29.	Chlorine (Cl_2)	mg/L	1.0	0.0001	BDL	APHA-4500 Cl B
30.	Total Toxic Metals (Cd, Cr, Cu, Pb, Hg, Se, Ni, Ag, As, Ba, B)	mg/L	2.0	0.0001	0.1385	APHA-3111
31.	Cyanide (as CN^-) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	0.15	0.001	BDL	APHA-6630 B

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Ref #: KPGL/LAB/2026-1036/WW

Issue date: 08-Jun-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
33.	*E. coli*	-	-	Nil	Nil	APHA-9221 F
34.	*Total Coli-form*	-	-	Nil	105.0	APHA-9221 D
35.	*Fecal Coliform*	-	-	Nil	40.4	APHA-9221 E

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref. #: KPGL/LAB/2026-652/AA

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name:	Phase-III: 210121- Strengthening Of 12-DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Sampling Location:	DHQ Hospital Mardan
Coordinates:	34.191216°N 72.04644°E
Name of Sampling Person:	Farman Ullah
Nature of Monitoring:	Ambient Air
Monitoring By:	Pak Green Laboratories
Monitoring Instrument:	AQMS
Monitoring Duration:	24 hours
Monitoring Date:	13-Mar-26 to 14-Mar-26

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	O_3	PM_{10}	$PM_{2.5}$	SPM	Lead (Pb)
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
1.	9:00 AM	1.68	12.75	36.70	35.69					
2.	10:00 AM	1.74	13.54	33.57	37.46					
3.	11:00 AM	1.59	13.41	31.47	38.45					
4.	12:00 PM	1.53	12.75	28.03	41.41					
5.	1:00 PM	1.64	11.50	33.70	41.83					
6.	2:00 PM	1.53	13.22	29.51	35.69					
7.	3:00 PM	1.57	14.31	30.94	33.77					
8.	4:00 PM	1.55	13.92	30.97	32.61					
9.	5:00 PM	1.66	13.79	30.56	43.47					
10.	6:00 PM	1.61	13.97	29.75	44.71					
11.	7:00 PM	1.47	12.82	27.92	45.27					
12.	8:00 PM	2.92	11.54	30.11	46.51					
13.	9:00 PM	1.98	13.48	30.05	54.36	63.2	146.8	42.6*	439.5	0.01
14.	10:00 PM	2.12	11.37	28.50	49.90					
15.	11:00 PM	2.07	16.84	26.79	45.26					
16.	12:00 AM	1.53	16.52	40.18	65.43					
17.	1:00 AM	1.57	12.82	38.74	47.19					
18.	2:00 AM	1.59	14.40	39.17	47.36					
19.	3:00 AM	1.89	11.77	37.09	47.84					
20.	4:00 AM	1.61	14.54	41.62	48.88					
21.	5:00 AM	1.90	14.80	39.79	53.45					
22.	6:00 AM	1.37	13.22	38.42	37.12					
23.	7:00 AM	1.63	15.86	40.45	36.33					
24.	8:00 AM	2.12	9.75	43.58	36.08					
Average (24 Hours)		1.74	13.45	34.07	43.59					
NEQS		5 8hours	40 24hours	80 24hours	120 24hours	130 1 hour	150 24hours	35 24hours	500 24hours	1.5 24 hours

End of Report

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PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.
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EPA Certified

Ref. #: KPGL/LAB/2026-652/AA

Issue date: 03-Apr-26

NEQS: National Environmental Quality Standards
Remarks: Parameters with * are not in compliance with NEQS Limits.
Note: $PM_{2.5}$ results are not in compliance with the NEQS standard due to background air pollution, mostly due to natural surroundings and regional influences, such as dust carried by wind from open areas, dry weather conditions, traffic emissions from nearby roads.
Terms & Conditions:

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- The report is not valid for any negotiations.
- Dually calibrated instrument was used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

Pak Green Enviro Engineering (Pvt) Ltd. Peshawar. Pakistan

EPA PNAC LAB 160 17025

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TEST REPORT

Ref. #: KPGL/LAB/2026-653/NL

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Nature of Monitoring:	Noise Level (24 Hours)
Sampling Location:	DHQ Hospital Mardan
Monitoring By:	Pak Green Laboratories
Coordinates:	34.191216 °N 72.04644°E
Name of Sampling Person:	Farman Ullah
Monitoring Time:	Real Time
Monitoring Instrument:	Smart Sensor
Monitoring Date:	13-Mar-26 to 14-Mar-26

Results:

Sr. No.	Day Time	Equivalent Noise dB (A)
1.	6:00 – 7:00 AM	69.7
2.	7:00 -8:00 AM	70.7
3.	8:00- 9:00 AM	67.2
4.	9:00- 10:00 AM	70.9
5.	10:00 -11:00 AM	66.9
6.	11:00- 12:00 AM	68.3
7.	12:00 -1:00 PM	69.6
8.	1:00- 2:00 PM	70.5
9.	2:00- 3:00 PM	72.7
10.	3:00 4:00 PM	70.1
11.	4:00 5:00 PM	67.9
12.	5:00 6:00 PM	66.8
13.	6:00 7:00 PM	65.9
14.	7:00 8:00 PM	66.7
15.	8:00 9:00 PM	62.4
16.	9:00 10:00 PM	63.3
	Average	68.1

Sr. No.	Night Time	Equivalent Noise dB (A)
17.	10:00 PM - 11:00 PM	54.7
18.	11:00 -12:00 AM	56.5
19.	12:00 -1:00 AM	59.3
20.	1:00 -2:00 AM	55.0
21.	2:00 -3:00 AM	56.7
22.	3:00 -4:00 AM	55.1
23.	4:00- 5:00 AM	54.6
24.	5:00-6:00 AM	59.4
	Average	56.4

End of Report

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Ref. #: KPGL/LAB/2026-653/NL

Issue date: 03-Apr-26

NEQS: National Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1.	Silence Zone (D)	dB (A) Leq	50	45

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- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

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TEST REPORT

Ref #: KPGL/LAB/2026-653/WW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12-DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Mardan	
Coordinates:	34.1918° N 72.04452° E	
Sample source:	Final Drain	
Sample Code:	K-WW-106	
Date of sampling:	13-Mar-26	
Sample Receiving Date:	13-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	13-Mar-26 to 27-Mar-26	
Env. Conditions during Analysis:	Temp=22.4-23.9°C	RH=55.4-60.4%

Summary of Test Result:

Remarks:
Parameters with * are not in compliance with the NEQS Limit
Discussion: High Values are likely resulting from the discharge of untreated domestic wastewater, Hospital effluents containing organic and chemical constituents, nitrogenous waste.

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- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar-Engineering

Pak Green Enviro-Engineering (Pvt.) Ltd. Peshawar, Pakistan

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Ref #: KPGL/LAB/2026-655/WW

Issue date: 03-Apr-26

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	23.8	APHA-2550 B
2.	pH^	-	6-9	0.001	7.356 at 23.8°C	APHA-4500-H+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_3 at 20 °C) ^	mg/L	80	1	739.4*	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	1192*	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	550*	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	540	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	30	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	0.4	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	0.110	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	65	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	BDL	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	88.6*	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	0.0995	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	1.3058*	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Mercury (Hg)	mg/L	0.01	0.0001	BDL	APHA-3112 B
20.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
21.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
22.	Silver (Ag)	mg/L	1.0	0.0100	BDL	APHA-3111 B
23.	Zinc (Zn)^	mg/L	5.0	0.0001	4.6051	APHA-3111 B
24.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
25.	Barium (Ba)	mg/L	1.5	0.0001	BDL	APHA-3111 D
26.	Iron (Fe)^	mg/L	8.0	0.0010	65.6616*	APHA-3111 B
27.	Manganese (Mn)^	mg/L	1.5	0.0010	0.7342	APHA-3111 B
28.	Boron (B)	mg/L	6.0	0.0001	BDL	APHA-3111 D
29.	Chlorine (Cl_2)	mg/L	1.0	0.0001	BDL	APHA-4500 Cl B
30.	Total Toxic Metals (Cd, Cr, Cu, Pb, Hg, Se, Ni, Ag, As, Ba, B)	mg/L	2.0	0.0001	1.4053	APHA-3111
31.	Cyanide (as CN^-) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	0.15	0.001	BDL	APHA-6630

Page 3 of 3

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Ref #: KPGL/LAB/2026-655/WW

Issue date: 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
33.	*E. coli*	-	-	Nil	1819.3	APHA-9221 F
34.	*Total Coli-form*	-	-	Nil	986.5	APHA-9221 D
35.	*Fecal Coliform*	-	-	Nil	BDL	APHA-9221 E

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref #: KPGL/LAB/2026-654/DW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Drinking water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Mardaan	
Coordinates:	34.1918°N 72.04452°E	
Sample Source:	Tap Water	
Sample Code:	K-DW-105	
Date of sampling:	13-Mar-26	
Sample Receiving Date:	13-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	13-Mar-26 to 27-Mar-26	
Env. Conditions during Analysis:	Temp=22.4-23.9°C	RH=55.4-60.4%

Summary of Test Result:

Remarks:
All Parameters are in compliance with the NEQS Limit.

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Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Ishtiaq Ahmed

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Ref #: KPGL/LAB/2026-654/DW

Issue date: 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.873 at 20.5°C	APHA-4500-H+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.0001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.30	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	430	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	230	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^{-1}) ^	mg/L	< 250	0.1	25	APHA-4500-Cl^{-1} B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	BDL	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	BDL	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	0.006	APHA-4500-NO_3^{-1}-E

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Ref #: KPGL/LAB/2026-654/DW
Issue date: 03-Apr-26

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤ 3	0.001	0.124	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	BDL	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Iron (Fe)^	mg/L	-	0.0010	BDL	APHA-3111 B
32.	Cyanide (as CN^-) Total	mg/L	≤ 0.05	0.001	BDL	APHA-4500-CN E
33.	Pesticides	mg/L	NGVS	0.001	BDL	APHA-6630 B

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits
With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref. #: KPGL/LAB/2026-1037/AA

Issue date: 08-Jun-26

Name of Client:	**NESPAK JV TES**
Project Name:	Phase-III 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/ Any Future Pandemic) in Khyber Pakhtunkhwa
Sampling Location:	DHQ Hospital Hangu
Coordinates:	33.504124°N 71.03896°E
Name of Sampling Person:	Hameed Ullah
Nature of Monitoring:	Ambient Air
Monitoring By:	Pak Green Laboratories
Monitoring Instrument:	AQMS
Monitoring Duration:	24 hours
Monitoring Date:	22-Apr-26 to 23-Apr-26

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	O_3	PM_{10}	$PM_{2.5}$	SPM	Lead (Pb)
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m3
1.	9:00 AM	1.39	9.80	32.05	40.05					
2.	10:00 AM	1.41	11.96	36.27	39.34					
3.	11:00 AM	1.44	12.86	37.07	40.33					
4.	12:00 PM	1.46	9.03	30.06	43.29					
5.	1:00 PM	1.49	10.94	32.17	34.35					
6.	2:00 PM	1.59	15.10	37.04	37.57					
7.	3:00 PM	1.61	20.26	35.24	38.13					
8.	4:00 PM	1.55	14.14	27.83	36.97					
9.	5:00 PM	2.44	11.42	32.52	47.83					
10.	6:00 PM	1.19	9.18	34.23	40.91					
11.	7:00 PM	1.12	7.17	38.29	43.47					
12.	8:00 PM	1.10	11.20	38.70	38.71					
13.	9:00 PM	1.07	10.62	40.76	36.56	57.3	141.5	39.4*	435.2	0.03
14.	10:00 PM	1.23	10.02	39.33	42.10					
15.	11:00 PM	2.13	9.31	31.32	37.46					
16.	12:00 AM	2.37	8.47	33.19	44.63					
17.	1:00 AM	1.21	13.49	36.97	35.03					
18.	2:00 AM	1.34	11.26	36.26	35.20					
19.	3:00 AM	1.79	14.41	35.79	33.68					
20.	4:00 AM	1.52	14.60	35.29	34.72					
21.	5:00 AM	2.47	14.04	39.37	37.65					
22.	6:00 AM	1.98	14.99	32.83	36.32					
23.	7:00 AM	1.09	12.51	26.72	41.39					
24.	8:00 AM	1.08	12.22	28.81	45.29					
Average (24 Hours)		1.53	12.04	34.50	39.21					
NEQS		5 8hours	40 24hours	80 24hours	120 24hours	130 1 hour	150 24hours	35 24hours	500 24hours	1.5 24 hour

End of Report

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EPA Certified

Ref. #: KPGL/LAB/2026-1037/AA **Issue date:** 08-Jun-26

NEQS: National Environmental Quality Standards
Remarks: Parameters with * are not in compliance with NEQS Limits.
Note: $PM_{2.5}$ results are not in compliance with the NEQS standard due to background air pollution, mostly due to natural surroundings and regional influences, such as dust carried by wind from open areas, dry weather conditions, traffic emissions from nearby roads.
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- The report is not valid for any negotiations.
- Dually calibrated instrument was used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar, Pakistan

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TEST REPORT

Ref. #: KPGL/LAB/2026-1038/NL — **Issue date:** 08-Jun-26

Name of Client:	NESPAK JV TES
Project Name	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Nature of Monitoring:	Noise Level (24 Hours)
Sampling Location:	DHQ Hospital Hangu
Monitoring By:	Pak Green Laboratories
Coordinates:	33.503006°N 71.03774°E
Name of Sampling Person	Hameed Ullah
Monitoring Time:	Real Time
Monitoring Instrument:	Smart Sensor
Monitoring Date:	22-Apr-26 to 23-Apr-26

Results:

Sr. No.	Day Time	Equivalent Noise dB (A)
1.	6:00 – 7:00 AM	54.8
2.	7:00 -8:00 AM	55.6
3.	8:00- 9:00 AM	55.9
4.	9:00- 10:00 AM	57.1
5.	10:00 -11:00 AM	57.6
6.	11:00- 12:00 AM	63.2
7.	12:00 -1:00 PM	62.3
8.	1:00- 2:00 PM	63.8
9.	2:00- 3:00 PM	60.7
10.	3:00 4:00 PM	63.3
11.	4:00 5:00 PM	59.5
12.	5:00 6:00 PM	56.8
13.	6:00 7:00 PM	54.5
14.	7:00 8:00 PM	59.2
15.	8:00 9:00 PM	55.9
16.	9:00 10:00 PM	52.4
	Average	58.3

Sr. No.	Night Time	Equivalent Noise dB (A)
17.	10:00 PM - 11:00 PM	52.1
18.	11:00 -12:00 AM	47.9
19.	12:00 -1:00 AM	47.1
20.	1:00 -2:00 AM	46.2
21.	2:00 -3:00 AM	45.4
22.	3:00 -4:00 AM	41.3
23.	4:00- 5:00 AM	43.7
24.	5:00-6:00 AM	50.2
	Average	46.7

End of Report

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Ref. #: KPGL/LAB/2026-1038/NL
NEQS: National Environmental Quality Standards

Issue date: 08-Jun-26

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1.	Silence Zone (D)	dB (A) Leq	50	45

Terms & Conditions:

- Analysis was conducted on the request of project proponent for his own use/ NEQS Compliance.
- Report cannot be used regarding compliance of any complaint, EPO or any other court case.
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- 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 report is not valid for any negotiations.
- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge
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TEST REPORT

Ref #: KPGL/LAB/2026-1039/DW

Issue date: 08-Jun-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Drinking water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Hangu	
Coordinates:	35.504307°N 71.039085°E	
Sample Source:	Tap Water	
Sample Code:	K-DW-199	
Date of sampling:	22-Apr-26	
Sample Receiving Date:	22-Apr-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	22-Apr-26 to 19-May-26	
Env. Conditions during Analysis:	Temp=22.0-24.6°C	RH=53.4-59.4%

Summary of Test Result:

Remarks: All Parameters are in compliance with the NEQS Limit

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- The Sampling was done as per the sampling and preservation protocol method APHA 1060-B&C.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmad

Pak Green Enviro-Engineering (Pvt.) Ltd. Peshawar Pakistan

EPA PNAC LAB 180 17025

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Ref #: KPGL/LAB/2026-1039/DW
Issue date: 08-Jun-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.790 at 24.0°C	APHA-4500-H^+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.0001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.40	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	595	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	210	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^-) ^	mg/L	< 250	0.1	85	APHA-4500-Cl^- B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	0.6	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	0.0243	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	0.028	APHA-4500-NO_3^--E

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Ref #: KPGL/LAB/2026-1039/DW
Issue date: 08-Jun-26

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤ 3	0.001	BDL	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	BDL	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Iron (Fe)^	mg/L	-	0.0010	BDL	APHA-3111 B
32.	Cyanide (as CN^{-1}) Total	mg/L	≤ 0.05	0.001	BDL	APHA-4500-CN E
33.	Pesticides	mg/L	NGVS	0.001	BDL	APHA-6630 B

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits
With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref #: KPGL/LAB/2026-1040/WW

Issue date: 08-Jun-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Hangu	
Coordinates:	33.504314° N 71.03907° E	
Sample source:	Final Drain	
Sample Code:	K-WW-200	
Date of sampling:	22-Apr-26	
Sample Receiving Date:	22-Apr-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	22-Apr-26 to 19-May-26	
Env. Conditions during Analysis:	Temp=22.0-24.6°C	RH=53.4-59.4%

Summary of Test Result:

Remarks: Parameters with * are not in compliance with the NEQS Limit

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Intizar Ahmad

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Ref #: KPGL/LAB/2026-1040/WW

Issue date: 08-Jun-26

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	23.4	APHA-2550 B
2.	pH^	-	6-9	0.001	7.593 at 23.4°C	APHA-4500-H^+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_5 at 20 °C) ^	mg/L	80	1	108*	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	168*	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	100	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	1160	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	195	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	1.0	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	0.095	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	134	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	BDL	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	14.8	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	0.1503	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	0.0305	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Mercury (Hg)	mg/L	0.01	0.0001	BDL	APHA-3112 B
20.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
21.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
22.	Silver (Ag)	mg/L	1.0	0.0100	BDL	APHA-3111 B
23.	Zinc (Zn)^	mg/L	5.0	0.0001	0.1372	APHA-3111 B
24.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
25.	Barium (Ba)	mg/L	1.5	0.0001	BDL	APHA-3111 D
26.	Iron (Fe)^	mg/L	8.0	0.0010	5.5080	APHA-3111 B
27.	Manganese (Mn)^	mg/L	1.5	0.0010	0.2398	APHA-3111 B
28.	Boron (B)	mg/L	6.0	0.0001	BDL	APHA-3111 D
29.	Chlorine (Cl_2)	mg/L	1.0	0.0001	BDL	APHA-4500 Cl B
30.	Total Toxic Metals (Cd, Cr, Cu, Pb, Hg, Se, Ni, Ag, As, Ba, B)	mg/L	2.0	0.0001	0.1808	APHA-3111
31.	Cyanide (as CN^{1-}) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	0.15	0.001	BDL	APHA-6630 B

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Ref #: KPGL/LAB/2026-1040/WW

Issue date: 08-Jun-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
33.	*E. coli*	-	-	Nil	105.6	APHA-9221 F
34.	*Total Coli-form*	-	-	Nil	363.4	APHA-9221 D
35.	*Fecal Coliform*	-	-	Nil	286.2	APHA-9221 E

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref. #: KPGL/LAB/2026-648/AA

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Sampling Location:	DHQ Hospital Lakki Marwat
Coordinates:	32.622272°N 70.79695°E
Name of Sampling Person:	Imshad Ali
Nature of Monitoring:	Ambient Air
Monitoring By:	Pak Green Laboratories
Monitoring Instrument:	AQMS
Monitoring Duration:	24 hours
Monitoring Date:	01-Mar-26 to 02-Mar-26

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	O_3	PM_{10}	$PM_{2.5}$	SPM	Lead (Pb)
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m3
1.	9:00 AM	1.73	11.36	35.34	42.41					
2.	10:00 AM	1.75	13.52	39.56	41.70					
3.	11:00 AM	1.78	14.42	40.36	42.69					
4.	12:00 PM	1.80	10.59	33.35	45.65					
5.	1:00 PM	1.83	12.50	35.46	36.71					
6.	2:00 PM	1.93	16.66	40.33	39.93					
7.	3:00 PM	1.95	21.82	38.53	40.49					
8.	4:00 PM	1.89	15.70	31.12	39.33					
9.	5:00 PM	2.78	12.98	35.81	50.19					
10.	6:00 PM	1.53	10.74	37.52	43.27					
11.	7:00 PM	1.46	8.73	41.58	45.83					
12.	8:00 PM	1.44	12.76	41.99	41.07					
13.	9:00 PM	1.41	12.18	44.05	38.92	61.5	143.8	43.5*	462.6	0.02
14.	10:00 PM	1.57	11.58	42.62	44.46					
15.	11:00 PM	2.47	10.87	34.61	39.82					
16.	12:00 AM	2.71	10.03	36.48	46.99					
17.	1:00 AM	1.55	15.05	40.26	37.39					
18.	2:00 AM	1.68	12.82	39.55	37.56					
19.	3:00 AM	2.13	15.97	39.08	36.04					
20.	4:00 AM	1.86	16.16	38.58	37.08					
21.	5:00 AM	2.81	15.60	42.66	40.01					
22.	6:00 AM	2.32	16.55	36.12	38.68					
23.	7:00 AM	1.43	14.07	30.01	43.75					
24.	8:00 AM	1.42	13.78	32.10	47.65					
Average (24 Hours)		1.88	13.60	37.79	41.57					
NEQS		5 8hours	40 24hours	80 24hours	120 24hours	130 1 hour	150 24hours	35 24hours	500 24hours	1.5 24 hour

End of Report

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Ref. #: KPGL/LAB/2026-648/AA

Issue date: 03-Apr-26

NEQS: National Environmental Quality Standards
Remarks: Parameters with * are not in compliance with NEQS Limits.
Note: $PM_{2.5}$ results are not in compliance with the NEQS standard due to background air pollution, mostly due to natural surroundings and regional influences, such as dust carried by wind from open areas, dry weather conditions, traffic emissions from nearby roads.
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- The report is not valid for any negotiations.
- Dually calibrated instrument was used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

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TEST REPORT

Ref. #: KPGL/LAB/2026-601/NL

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Project Name	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Nature of Monitoring:	Noise Level (24 Hours)
Sampling Location:	DHQ Hospital Lakki Marwat
Monitoring By:	Pak Green Laboratories
Coordinates:	32.621365°N 70.79695°E
Name of Sampling Person:	Imshad Ali
Monitoring Time:	Real Time
Monitoring Instrument:	Smart Sensor
Monitoring Date:	01-Mar-26 to 02-Mar-26

Results:

Sr. No.	Day Time	Equivalent Noise dB (A)
1.	6:00 – 7:00 AM	61.2
2.	7:00 -8:00 AM	62.0
3.	8:00- 9:00 AM	62.3
4.	9:00- 10:00 AM	63.5
5.	10:00 -11:00 AM	64.0
6.	11:00- 12:00 AM	69.6
7.	12:00 -1:00 PM	68.7
8.	1:00- 2:00 PM	70.2
9.	2:00- 3:00 PM	67.1
10.	3:00 4:00 PM	69.7
11.	4:00 5:00 PM	65.9
12.	5:00 6:00 PM	63.2
13.	6:00 7:00 PM	60.9
14.	7:00 8:00 PM	65.6
15.	8:00 9:00 PM	62.3
16.	9:00 10:00 PM	58.8
	Average	64.7

Sr. No.	Night Time	Equivalent Noise dB (A)
17.	10:00 PM - 11:00 PM	58.6
18.	11:00 -12:00 AM	54.4
19.	12:00 -1:00 AM	53.6
20.	1:00 -2:00 AM	52.7
21.	2:00 -3:00 AM	51.9
22.	3:00 -4:00 AM	47.8
23.	4:00- 5:00 AM	50.2
24.	5:00-6:00 AM	56.7
	Average	53.2

End of Report

Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar, Pakistan

PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.
[Environmental Laboratories Division]
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Ref. #: KPGL/LAB/2026-/NL

Issue date: 03-Apr-26

NEQS: National Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1	Silence Zone (D)	dB (A) Leq	50	45

Terms & Conditions:

- Analysis was conducted on the request of project proponent for his own use/NEQS Compliance.
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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

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Rev 00 | Rev date 16-06-25

TEST REPORT

Ref #: KPGL/LAB/2026-650/GW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Ground water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Lakki Marwat	
Coordinates:	32.621365°N 70.79695°E	
Sample Source:	Pressure Pump	
Sample Code:	K-GW-058	
Date of sampling:	01-Mar-26	
Sample Receiving Date:	01-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	01-Mar-26 to 10-Mar-26	
Env. Conditions during Analysis:	Temp=22.8-23.9°C	RH=53.4-58.4%

Summary of Test Result:

Remarks:
Parameters with * are not in compliance with the NEQS Limit.
Discussion: The Presence of microbes contaimination may be due to poor sanitation practices in surrounding areas, cross contaimation within the distribution system.

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- The Sampling was done as per the sampling and preservation protocol method APHA 1060-B&C.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Muhammad Naveed

Pak Green Enviro-Engineering (Pvt.) Ltd. Peshawar Pakistan

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Ref #: KPGL/LAB/2026-650/GW

Issue date: 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	38.6*	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	105.7*	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	110.9*	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.770 at 23.9°C	APHA-4500-H+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.30	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	630	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	180	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^-) ^	mg/L	< 250	0.1	60	APHA-4500-Cl^- B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	0.8	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	BDL	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	0.684	APHA-4500-NO_3^--E

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Ref #: KPGL/LAB/2026-650/GW
Chemical Parameters Analysis Results:
Issue date: 03-Apr-26

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤3	0.001	0.244	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	BDL	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Iron (Fe)^	mg/L	-	0.0010	BDL	APHA-3111 B
32.	Cyanide (as CN^-) Total	mg/L	≤0.05	0.001	BDL	APHA-4500-CN E
33.	Pesticides	mg/L	NGVS	0.001	BDL	APHA-6630 B

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits
With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref #: KPGL/LAB/2026-651/WW

Issue date: 03-Apr-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/ Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Lakki Marwat	
Coordinates:	32.620465° N 70.794933° E	
Sample source:	Final Drain	
Sample Code:	K-WW-059	
Date of sampling:	01-Mar-26	
Sample Receiving Date:	01-Mar-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	01-Mar-26 to 10-Mar-26	
Env. Conditions during Analysis:	Temp=22.8-23.9°C	RH=53.4-58.4%

Summary of Test Result:

Remarks:
All Parameters are in compliance with the NEQS Limit

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Ijaz Ahmad

Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar, Pakistan

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Ref #: KPGL/LAB/2026-651/WW

Issue date: 03-Apr-26

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	23.8	APHA-2550 B
2.	pH^	-	6-9	0.001	7.438 at 23.8°C	APHA-4500-H+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_5 at 20 °C) ^	mg/L	80	1	18	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	28	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	10	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	890	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	125	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	0.9	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	0.038	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	110	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	BDL	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	1.1	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	BDL	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	0.0219	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Mercury (Hg)	mg/L	0.01	0.0001	BDL	APHA-3112 B
20.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
21.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
22.	Silver (Ag)	mg/L	1.0	0.0100	BDL	APHA-3111 B
23.	Zinc (Zn)^	mg/L	5.0	0.0001	0.0855	APHA-3111 B
24.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
25.	Barium (Ba)	mg/L	1.5	0.0001	BDL	APHA-3111 D
26.	Iron (Fe)^	mg/L	8.0	0.0010	1.6671	APHA-3111 B
27.	Manganese (Mn)^	mg/L	1.5	0.0010	0.0997	APHA-3111 B
28.	Boron (B)	mg/L	6.0	0.0001	BDL	APHA-3111 D
29.	Chlorine (Cl_2)	mg/L	1.0	0.0001	BDL	APHA-4500 Cl B
30.	Total Toxic Metals (Cd, Cr, Cu, Pb, Hg, Se, Ni, Ag, As, Ba, B)	mg/L	2.0	0.0001	0.0219	APHA-3111
31.	Cyanide (as CN^-) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	0.15	0.001	BDL	APHA-6630 B

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Ref #: KPGG/LAB/2026-651/WW

Issue date: 03-Apr-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
33.	*E. coli*	-	-	Nil	103.8	APHA-9221 F
34.	*Total Coli-form*	-	-	Nil	354.2	APHA-9221 D
35.	*Fecal Coliform*	-	-	Nil	113.4	APHA-9221 E

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref. #: KPGL/LAB/2026-832/AA

Issue date: 18-May-26

Name of Client: NESPAK JV TES
Project Name: Phase-III: 210121- Strengthening Of 12-DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Nature of Monitoring: Ambient Air
Monitoring By: Pak Green Laboratories
Sampling Location: DHQ Hospital Tank
Name of Sampling Person: Farman Ullah
Monitoring Instrument: AQMS
Monitoring Duration: 24 hours
Monitoring Date: 17-May-26 to 18-May-26

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	O_3	PM_{10}	$PM_{2.5}$	SPM	Lead (Pb)
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m3
1.	9:00 AM	1.86	9.17	31.42	43.53					
2.	10:00 AM	1.92	9.96	28.29	45.22					
3.	11:00 AM	1.77	9.83	26.19	43.75					
4.	12:00 PM	1.71	9.17	22.75	42.79					
5.	1:00 PM	1.82	7.92	28.42	42.63					
6.	2:00 PM	1.71	9.64	24.23	39.16					
7.	3:00 PM	1.75	10.73	25.66	39.75					
8.	4:00 PM	1.73	10.34	25.69	33.96					
9.	5:00 PM	1.84	10.21	25.28	39.76					
10.	6:00 PM	1.79	10.39	24.47	39.14					
11.	7:00 PM	1.65	9.24	22.64	39.79					
12.	8:00 PM	3.10	7.96	24.83	39.25					
13.	9:00 PM	2.16	9.90	24.77	37.36	56.2	148.5	60.1*	452.6	0.02
14.	10:00 PM	2.30	7.79	23.22	38.31					
15.	11:00 PM	2.25	13.26	21.51	38.79					
16.	12:00 AM	1.71	12.94	34.90	41.33					
17.	1:00 AM	1.75	9.24	33.46	41.95					
18.	2:00 AM	1.77	10.82	33.89	43.53					
19.	3:00 AM	2.07	8.19	31.81	40.34					
20.	4:00 AM	1.79	10.96	36.34	40.20					
21.	5:00 AM	2.08	11.22	34.51	42.51					
22.	6:00 AM	1.55	9.64	33.14	42.43					
23.	7:00 AM	1.81	12.28	35.17	39.41					
24.	8:00 AM	2.30	6.17	38.30	41.27					
Average (24 Hours)		1.92	9.87	28.79	40.67					
NEQS		5 8hours	40 24hours	80 24hours	120 24hours	130 1 hour	150 24hours	35 24hours	500 24hours	1.5 24hour

End of Report

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Ref. #: KPGL/LAB/2026-832/AA

Issue date: 18-May-26

NEQS: National Environmental Quality Standards
Remarks: Parameters with * are not in compliance with NEQS Limits.
Note: $PM_{2.5}$ results are not in compliance with the NEQS standard due to background air pollution, mostly due to natural surroundings and regional influences, such as dust carried by wind from open areas, dry weather conditions, traffic emissions from nearby roads.
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- The report is not valid for any negotiations.
- Dually calibrated instrument was used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

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TEST REPORT

Ref. #: KPGL/LAB/2026-833/NL
Issue date: 18-May-26

Name of Client:	NESPAK JV TES
Project Name:	Phase-III: 210121-Strengthening Of 12-DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Nature of Monitoring:	Noise Level (24 Hours)
Sampling Location:	DHQ Hospital Tank
Monitoring By:	Pak Green Laboratories
Name of Sampling Person:	Farman Ullah
Monitoring Time:	Real Time
Monitoring Instrument:	Smart Sensor
Monitoring Date:	17-May-26 to 18-May-26

Results:

Sr. No.	Day Time	Equivalent Noise dB (A)
1.	6:00 - 7:00 AM	66.0
2.	7:00 -8:00 AM	69.3
3.	8:00- 9:00 AM	65.1
4.	9:00- 10:00 AM	63.2
5.	10:00 -11:00 AM	62.1
6.	11:00- 12:00 AM	62.7
7.	12:00 -1:00 PM	58.0
8.	1:00- 2:00 PM	60.2
9.	2:00- 3:00 PM	65.1
10.	3:00 4:00 PM	64.8
11.	4:00 5:00 PM	67.0
12.	5:00 6:00 PM	61.3
13.	6:00 7:00 PM	59.0
14.	7:00 8:00 PM	63.7
15.	8:00 9:00 PM	60.4
16.	9:00 10:00 PM	57.3
	Average	62.7

Sr. No.	Night Time	Equivalent Noise dB (A)
17.	10:00 PM - 11:00 PM	51.0
18.	11:00 -12:00 AM	55.7
19.	12:00 -1:00 AM	57.2
20.	1:00 -2:00 AM	49.3
21.	2:00 -3:00 AM	48.5
22.	3:00 -4:00 AM	44.4
23.	4:00- 5:00 AM	46.8
24.	5:00-6:00 AM	51.0
	Average	50.4

End of Report

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Ref. #: KPGL/LAB/2026-833/NL
Issue date: 18-May-26

NEQS: National Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1.	Silence Zone (D)	dB (A) Leq	50	45

Terms & Conditions:

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar. Pakistan

EPA PNAC LAB 180 17025

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TEST REPORT

Ref #: KPGL/LAB/2026-834/DW

Issue date: 18-May-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/ Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Drinking water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Tank	
Sample Source:	Tap Water	
Date of sampling:	17-May-26	
Sample Receiving Date:	17-May-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	17-May-26 to 24-May-26	
Env. Conditions during Analysis:	Temp=22.4-23.9°C	RH=55.4-60.4%

Summary of Test Result:

Remarks:
All Parameters are in compliance with the NEQS Limit.

Terms & Conditions:

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Hasnain Ahmed

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Issue date: 18-May-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.825 at 23.0°C	APHA-4500-H^+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.26	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	316	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	257	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^-) ^	mg/L	< 250	0.1	36	APHA-4500-Cl^- B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	BDL	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	BDL	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	BDL	APHA-4500-NO_3^--E

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Ref #: KPGL/LAB/2026-834/DW
Issue date: 18-May-26

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤3	0.001	BDL	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	0.0173	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Iron (Fe)^	mg/L	-	0.0010	0.0391	APHA-3111 B
32.	Cyanide (as CN^-) Total	mg/L	≤ 0.05	0.001	BDL	APHA-4500-CN E
33.	Pesticides	mg/L	NGVS	0.001	BDL	APHA-6630 B

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits
With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref #: KPGL/LAB/2026-835/WW

Issue date: 18-May-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Hospital Tank	
Sample source:	Main Drain	
Date of sampling:	17-May-26	
Sample Receiving Date:	17-May-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	17-May-26 to 24-May-26	
Env. Conditions during Analysis:	Temperature: 23.0-24.5°C	Humidity: 52.7-57.4%

Summary of Test Result:

Remarks: All Parameters are in compliance with the NEQS Limit

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Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

Pak Green Enviro Engineering (Pvt) Ltd. Peshawar Pakistan

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Ref #: KPGL/LAB/2026-835/WW

Issue date: 18-May-26

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	25.0	APHA-2550 B
2.	pH^	-	6-9	0.001	8.321 at 25.0	APHA-4500-H+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_5 at 20 °C) ^	mg/L	80	1	73	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	125	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	62	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	839	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	80	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	0.5	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	0.087	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	93	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	BDL	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	7.6	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	0.2096	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	0.0291	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Mercury (Hg)	mg/L	0.01	0.0001	BDL	APHA-3112 B
20.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
21.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
22.	Silver (Ag)	mg/L	1.0	0.0100	BDL	APHA-3111 B
23.	Zinc (Zn)^	mg/L	5.0	0.0001	0.0634	APHA-3111 B
24.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
25.	Barium (Ba)	mg/L	1.5	0.0001	BDL	APHA-3111 D
26.	Iron (Fe)^	mg/L	8.0	0.0010	3.2160	APHA-3111 B
27.	Manganese (Mn)^	mg/L	1.5	0.0010	0.1674	APHA-3111 B
28.	Boron (B)	mg/L	6.0	0.0001	BDL	APHA-3111 D
29.	Chlorine (Cl_2)	mg/L	1.0	0.0001	BDL	APHA-4500 Cl B
30.	Total Toxic Metals (Cd, Cr, Cu, Pb, Hg, Se, Ni, Ag, As, Ba, B)	mg/L	2.0	0.0001	0.2387	APHA-3111
31.	Cyanide (as CN^-) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	0.15	0.001	BDL	APHA-6630 B

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Rev date: 19-08-25

Ref #: KPGL/LAB/2026-835/WW
Issue date: 18-May-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
33.	*E. coli*	-	-	Nil	Nil	APHA-9221 F
34.	*Total Coli-form*	-	-	Nil	134.0	APHA-9221 D
35.	*Fecal Coliform*	-	-	Nil	105.0	APHA-9221 E

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

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TEST REPORT

Ref. #: KPGL/LAB/2026-852/AA

Issue date: 08-Jun-26

Name of Client: NESPAK JV TES
Project Name: Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Sampling Location: DHQ Hospital Buner
Nature of Monitoring: Ambient Air
Monitoring By: Pak Green Laboratories
Monitoring Instrument: AQMS
Monitoring Duration: 24 hours
Monitoring Date: 19-May-26 to 20-May-26

Results:

Sr. No.	Time	CO	NO	NO_2	SO_2	O_3	PM_{10}	$PM_{2.5}$	SPM	Lead (Pb)
		mg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m3
1.	9:00 AM	1.21	10.82	34.80	42.02					
2.	10:00 AM	1.67	12.10	28.59	42.82					
3.	11:00 AM	1.62	11.90	31.42	42.22					
4.	12:00 PM	1.72	12.51	33.63	44.82					
5.	1:00 PM	1.75	12.71	40.50	45.12					
6.	2:00 PM	1.86	15.32	36.76	45.62					
7.	3:00 PM	1.43	13.48	36.03	41.42					
8.	4:00 PM	1.61	12.09	30.49	42.52					
9.	5:00 PM	1.67	12.10	22.82	42.12					
10.	6:00 PM	1.50	10.69	25.25	49.52					
11.	7:00 PM	1.43	9.90	28.79	42.52					
12.	8:00 PM	1.37	9.68	32.29	40.52					
13.	9:00 PM	1.39	11.88	24.99	39.12	60.5	144.8	30.4	416.3	0.01
14.	10:00 PM	1.56	12.49	36.68	42.22					
15	11:00 PM	3.15	12.29	36.30	42.82					
16.	12:00 AM	3.41	14.93	29.96	45.42					
17.	1:00 AM	3.33	12.49	33.29	43.12					
18.	2:00 AM	3.22	12.90	32.02	49.22					
19.	3:00 AM	1.48	15.30	36.54	42.82					
20.	4:00 AM	1.38	12.49	35.50	41.72					
21.	5:00 AM	1.45	13.10	33.83	42.52					
22.	6:00 AM	1.65	13.91	36.96	48.32					
23.	7:00 AM	1.69	14.38	30.73	44.22					
24.	8:00 AM	1.29	20.41	36.52	45.32					
Average (24 Hours)		1.83	12.91	32.70	43.67					
NEQS		5 8hours	40 24hours	80 24hours	120 24hours	130 1 hour	150 24hours	35 24hours	500 24hours	1.5 24 hours

End of Report

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Ref. #: KPGL/LAB/2026-1033/AA

Issue date: 08-Jun-26

NEQS: National Environmental Quality Standards
Remarks: All Parameters are in compliance with NEQS Limits.
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- Dually calibrated instrument was used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

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TEST REPORT

Ref. #: KPGL/LAB/2026-853/NL
Issue date: 08-Jun-26

Name of Client:	NESPAK JV TES
Project Name	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity to Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa
Nature of Monitoring:	Noise Level (24 Hours)
Sampling Location:	DHQ Hospital Bunner
Monitoring By:	Pak Green Laboratories
Monitoring Time:	Real Time
Monitoring Instrument:	Smart Sensor
Monitoring Date:	19-May-26 to 20-May-26

Results:

Sr. No.	Day Time	Equivalent Noise dB (A)
1.	6:00 – 7:00 AM	56.6
2.	7:00 -8:00 AM	57.6
3.	8:00- 9:00 AM	54.1
4.	9:00- 10:00 AM	57.8
5.	10:00 -11:00 AM	53.8
6.	11:00- 12:00 AM	55.2
7.	12:00 -1:00 PM	56.5
8.	1:00- 2:00 PM	57.4
9.	2:00- 3:00 PM	59.6
10.	3:00 4:00 PM	57.0
11.	4:00 5:00 PM	54.8
12	5:00 6:00 PM	53.7
13.	6:00 7:00 PM	52.8
14.	7:00 8:00 PM	53.6
15.	8:00 9:00 PM	49.3
16.	9:00 10:00 PM	50.2
	Average	55.6

Sr. No.	Night Time	Equivalent Noise dB (A)
17.	10:00 PM - 11:00 PM	47.4
18.	11:00 -12:00 AM	49.2
19.	12:00 -1:00 AM	52.0
20.	1:00 -2:00 AM	47.7
21.	2:00 -3:00 AM	49.4
22	3:00 -4:00 AM	47.8
23.	4:00- 5:00 AM	47.3
24.	5:00-6:00 AM	52.1
	Average	49.1

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Ref. #: KPGL/LAB/2026-853/NL

Issue date: 08-Jun-26

NEQS: National Environmental Quality Standards

Sr. No.	Category of area/Zone	Units	Day Time	Night Time
1.	Silence Zone (D)	dB (A) Leq	50	45

Terms & Conditions:

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- The report is not valid for any negotiations.
- Dually calibrated instruments were used during monitoring.

Field Analyst	Chief Analyst	Laboratory Incharge

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EPA Certified

	Rev #01	Rev date: 16-06-25

TEST REPORT

Ref #: KPGL/LAB/2026-855/GW **Issue date:** 08-Jun-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Ground water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Buner	
Sample source:	Pressure Pump	
Date of sampling:	19-May-26	
Sample Receiving Date:	19-May-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	19-May-26 to 08-Jun-26	
Env. Conditions during Analysis:	Temp=22.8-23.6°C	RH=53.4-58.7%

Summary of Test Result:

Remarks: All Parameters are in compliance with the NEQS Limit.

Terms & Conditions:

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- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Iftikhar Ahmed

Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar Pakistan

EPA PNAC LAB 180 17025 PAK-EPA

CamScanner

PAK GREEN ENVIRO-ENGINEERING (Pvt.) Ltd.
(Environmental Laboratories Division)
ISO/IEC 17025:2017 Accredited Testing Lab, ISO 9001:2015, ISO 14001:2015, ISO 45001:2018
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EPA Certified

Rev #0 | Rev date: 16-06-25

Ref #: KPGL/LAB/2026-855/GW — Issue date: 08-Jun-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	*E. coli*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 F
2.	*Total Coli-form*	-	Must not be detectable in any 100 ml sample	Nil	Nil	APHA-9221 D
3.	*Fecal Coliform*	-	-	Nil	Nil	APHA-9221 E

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
4.	pH ^	-	6.5-8.5	0.001	7.342 at 24.3°C	APHA-4500-H^+ B
5.	Taste	-	Non-Objectionable	-	Non-Objectionable	APHA-2160 C
6.	Color	TCU	≤ 15	0.001	0.000	APHA-2120 C
7.	Odor	-	Non-Objectionable	-	Non-Objectionable	APHA-2150 B
8.	Turbidity	NTU	<5	0.01	0.34	APHA-2130 B
9.	Total dissolved Solids (TDS) ^	mg/L	< 1000	10	608	APHA-2540 C

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
10.	Total Hardness ^	mg/L	<500	0.1	438	APHA-2340 C
11.	Aluminum (Al)	mg/L	≤ 0.2	0.0010	BDL	APHA-3111 D
12.	Antimony (Sb)	mg/L	≤0.005	0.0010	BDL	APHA-3111 B
13.	Arsenic (As)	mg/L	≤ 0.05	0.0001	BDL	APHA-3114 B
14.	Barium (Ba)	mg/L	0.7	0.0500	BDL	APHA-3111 D
15.	Boron (B)	mg/L	0.3	0.0100	BDL	APHA-3111 D
16.	Cadmium (Cd) ^	mg/L	0.01	0.0010	BDL	APHA-3111 B
17.	Chloride (Cl^-) ^	mg/L	< 250	0.1	54	APHA-4500-Cl^- B
18.	Chromium (Cr) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111-Cr B
19.	Copper (Cu) ^	mg/L	2	0.0001	BDL	APHA-3111 B
20.	Fluoride (F)	mg/L	≤ 1.5	0.1	0.5	APHA-4500-F D
21.	Lead (Pb) ^	mg/L	≤ 0.05	0.0010	BDL	APHA-3111 B
22.	Manganese (Mn^{2+}) ^	mg/L	≤ 0.5	0.0010	BDL	APHA-3111 B
23.	Mercury (Hg)	mg/L	≤ 0.001	0.0001	BDL	APHA-3112 B
24.	Nickle	mg/L	≤ 0.02	0.0010	BDL	APHA-3111 B
25.	Nitrate^	mg/L	≤ 50	0.001	BDL	APHA-4500-NO_3^--E

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EPA Certified

	Rev #01	Rev date: 16-06-25

Ref #: KPGL/LAB/2026-855/GW **Issue date:** 08-Jun-26

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
26.	Nitrite^	mg/L	≤ 3	0.001	0.102	APHA-4500-NO_2^--B
27.	Selenium	mg/L	0.01	0.0001	BDL	APHA-3114 C
28.	Residual Chlorine	mg/L	0.2-0.5 at consumer end 0.5-1.5 at source	0.01	BDL	APHA-4500-Cl B
29.	Zinc (Zn^{+2}) ^	mg/L	5.0	0.0001	0.0028	APHA-3111 B
30.	Phenolic Compound (As Phenol)	mg/L	-	0.0005	BDL	APHA-5530 D
31.	Iron (Fe)^	mg/L	-	0.0010	0.0248	APHA-3111 B
32.	Cyanide (as CN^-) Total	mg/L	≤ 0.05	0.001	BDL	APHA-4500-CN E
33.	Pesticides	mg/L	NGVS	0.001	BDL	APHA-6630 B

End of Report

NEQS: National Environmental Quality Standard
BDL: Below Detection Limits

With ^PNAC Accredited
LDL: Lowest Detection limit

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EPA Certified

Doc. #01 | Rev. date: 16-06-25

TEST REPORT

Ref #: KPGL/LAB/2026-856/WW

Issue date: 08-Jun-26

Name of Client:	NESPAK JV TES
Executing Agency:	C&W Department, Govt. of Khyber Pakhtunkhwa
Project Name:	Phase-III: 210121- Strengthening Of 12 -DHQ Hospitals (Building Capacity To Respond Covid 19/ Any Future Pandemic) In Khyber Pakhtunkhwa

Sample Description:

Nature of sample:	Waste water	
Sampling By:	Pak Green Laboratories	
Sampling Location:	DHQ Buner	
Sample source:	Main Drain	
Date of sampling:	19-May-26	
Sample Receiving Date:	19-May-26	
Testing Facility:	Pak Green Laboratories	
Date of Completion of Analysis:	19-May-26 to 08-Jun-26	
Env. Conditions during Analysis:	**Temp**=22.8-23.9°C	**RH**=53.4-58.4%

Summary of Test Result:

Remarks: All Parameters are in compliance with the NEQS Limit

Terms & Conditions:

- This report should be reproduced as a whole and not in parts.
- The Sampling was done as per the sampling and preservation protocol method APHA 1060-B&C.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- The leftover sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Dually calibrated instruments were used during testing activities and monitoring.

Lab Analyst	Chief Analyst	Laboratory Incharge
	Muhammad Raza Ullah	Mian Ihtikhar Ahmed

Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar Pakistan

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Rev: 001 | Rev date: 16-06-25

Ref #: KPGL/LAB/2026-856/WW

Issue date: 08-Jun-26

Physical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
1.	Temperature	°C	-	0.1	23.5	APHA-2550 B
2.	pH^	-	6-9	0.001	7.534 at 23.5°C	APHA-4500-H+ B

Chemical Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
3.	Biological Oxygen Demand (BOD_5 at 20 °C) ^	mg/L	80	1	37	APHA-5210 D
4.	Chemical Oxygen Demand (COD) ^	mg/L	150	0.4	55	APHA-5220 B
5.	Total Suspended Solids (TSS) ^	mg/L	200	1	19	APHA-2540 D
6.	Total Dissolved Solids (TDS) ^	mg/L	3500	10	724	APHA-2540 C
7.	Greases & Oil	mg/L	10	0.1	BDL	APHA-5520 B
8.	Phenolic Compound (As Phenol)	mg/L	0.1	0.005	BDL	APHA-5530 D
9.	Chloride (as Cl^-) ^	mg/L	1000	0.1	196	APHA-4500-Cl^- B
10.	Fluoride (F^-)	mg/L	10	0.1	0.6	APHA-4500-F-D
11.	An Ionic detergent as MBAs	mg/L	20	0.001	0.049	APHA 5540 C
12.	Sulphate (SO_4^{2-}) ^	mg/L	600	1	87	APHA-4500-SO_4 C
13.	Sulphide (S^{2-})	mg/L	1.0	0.1	BDL	APHA-4500-S^{2-} F
14.	Ammonia (NH_3) ^	mg/L	40	0.1	4.4	APHA-4500NH_3 C
15.	Cadmium (Cd)^	mg/L	0.1	0.0010	BDL	APHA-3111 B
16.	Chromium^ (Trivalent & Hexavalent)	mg/L	1.0	0.0010	BDL	APHA-3111 B
17.	Copper (Cu)^	mg/L	1.0	0.0001	BDL	APHA-3111 B
18.	Lead (Pb)^	mg/L	0.5	0.0010	BDL	APHA-3111 B
19.	Mercury (Hg)	mg/L	0.01	0.0001	BDL	APHA-3112 B
20.	Selenium (Se)	mg/L	0.5	0.0001	BDL	APHA-3114 C
21.	Nickel (Ni)	mg/L	1.0	0.0010	BDL	APHA-3111 B
22.	Silver (Ag)	mg/L	1.0	0.0100	BDL	APHA-3111 B
23.	Zinc (Zn)^	mg/L	5.0	0.0001	0.0851	APHA-3111 B
24.	Arsenic (As)	mg/L	1.0	0.0001	BDL	APHA-3114 B
25.	Barium (Ba)	mg/L	1.5	0.0001	BDL	APHA-3111 D
26.	Iron (Fe)^	mg/L	8.0	0.0010	1.7049	APHA-3111 B
27.	Manganese (Mn)^	mg/L	1.5	0.0010	0.098	APHA-3111 B
28.	Boron (B)	mg/L	6.0	0.0001	BDL	APHA-3111 D
29.	Chlorine (Cl_2)	mg/L	1.0	0.0001	BDL	APHA-4500 Cl B
30.	Total Toxic Metals (Cd, Cr, Cu, Pb, Hg, Se, Ni, Ag, As, Ba, B)	mg/L	2.0	0.0001	BDL	APHA-3111
31.	Cyanide (as CN^{1-}) Total	mg/L	1.0	0.001	BDL	APHA-4500-CN E
32.	Pesticide	mg/L	0.15	0.001	BDL	APHA-6630 B

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EPA Certified

	Rev: #01	Rev date: 16-06-25

Ref #: KPGL/LAB/2026-856/WW **Issue date:** 08-Jun-26

Biological Parameters Analysis Results:

Sr. No.	Parameters	Unit	NEQS	LDL	Results	Method / Technique
33.	*E. coli*	-	-	Nil	35.4	APHA-9221 F
34.	*Total Coli-form*	-	-	Nil	506.3	APHA-9221 D
35.	*Fecal Coliform*	-	-	Nil	112.5	APHA-9221 E

End of Report

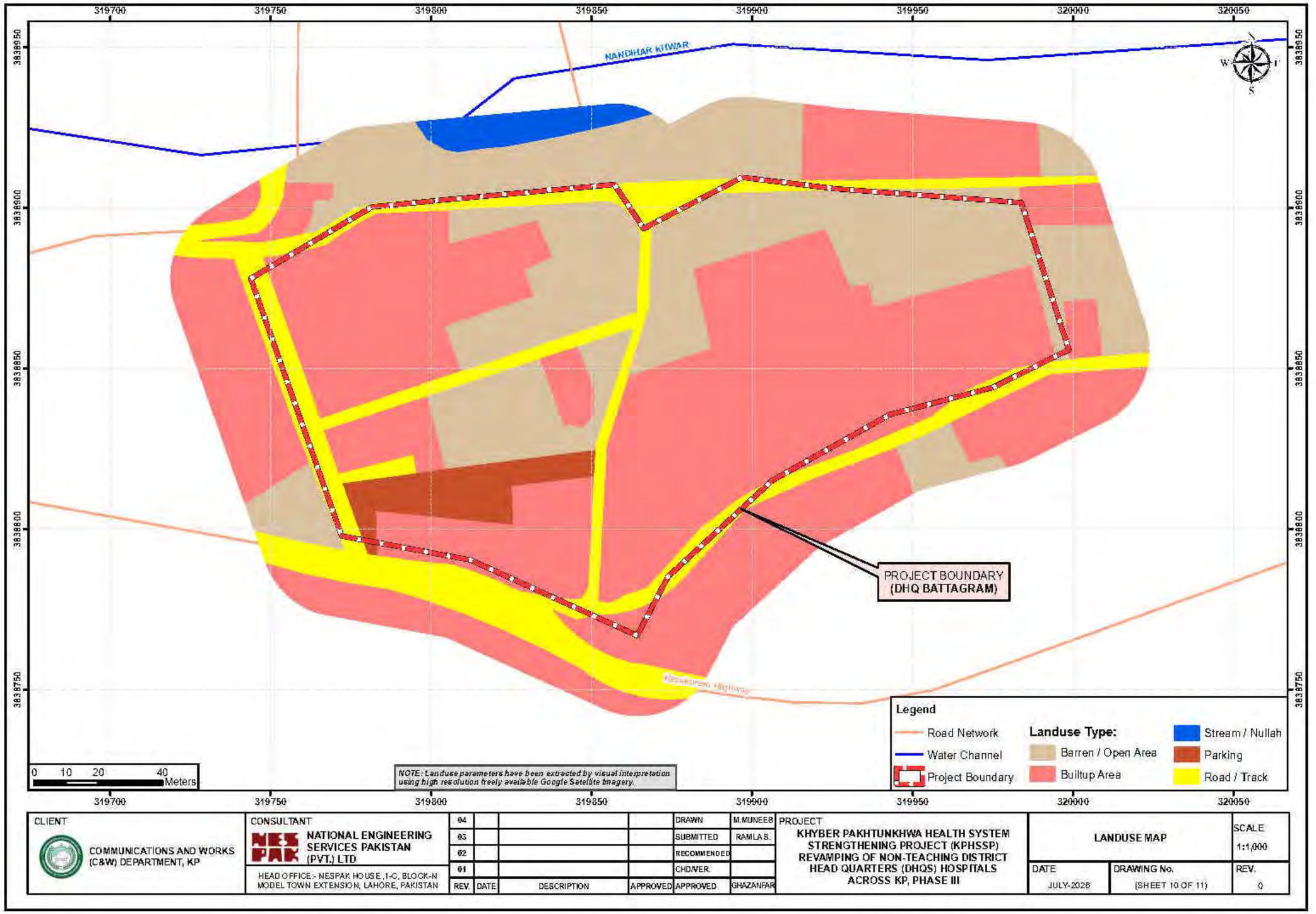
NEQS: National Environmental Quality Standard
BDL: Below Detection Limits
With ^PNAC Accredited
LDL: Lowest Detection limit

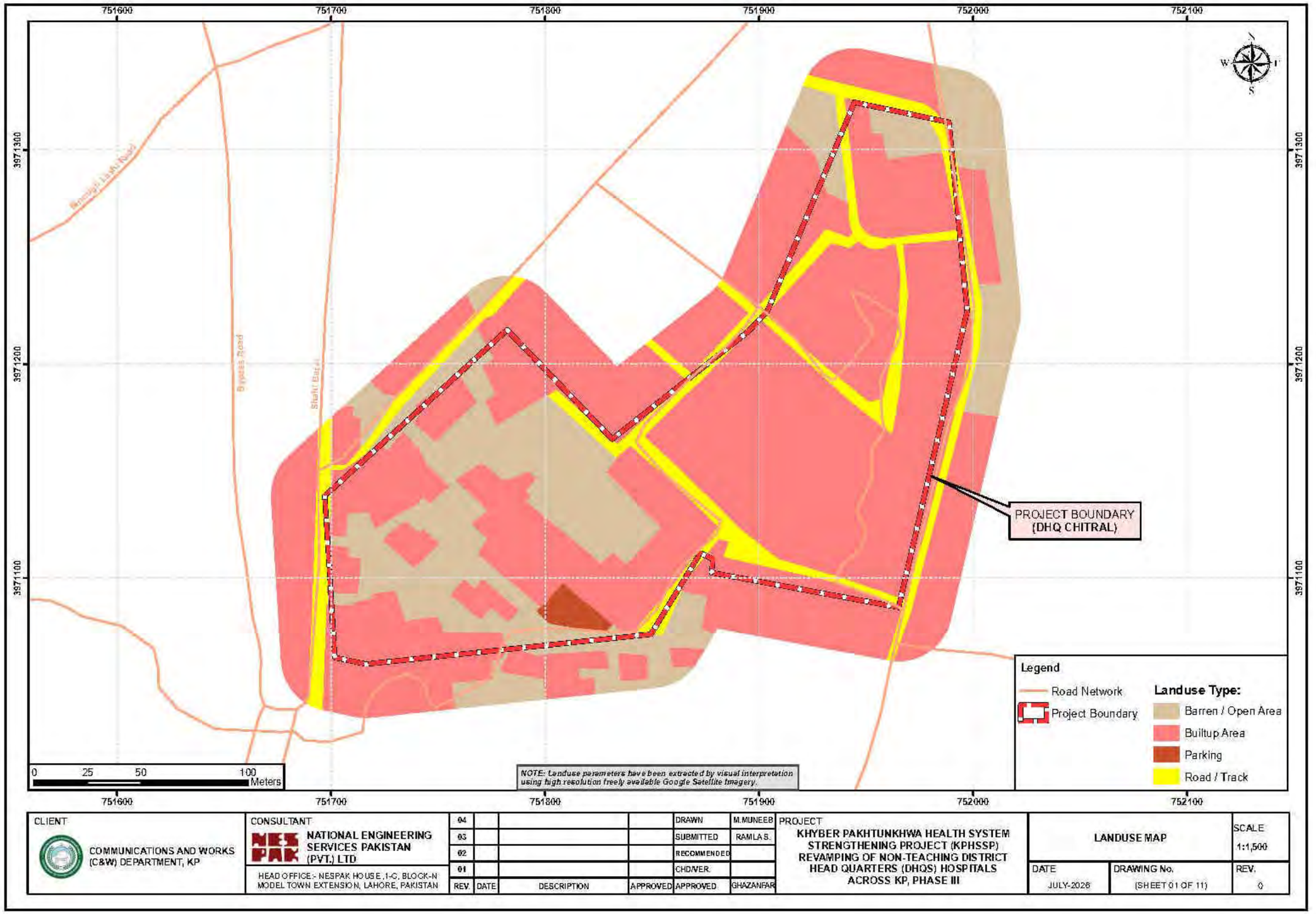
Pak Green Enviro-Engineering (Pvt) Ltd. Peshawar, Pakistan

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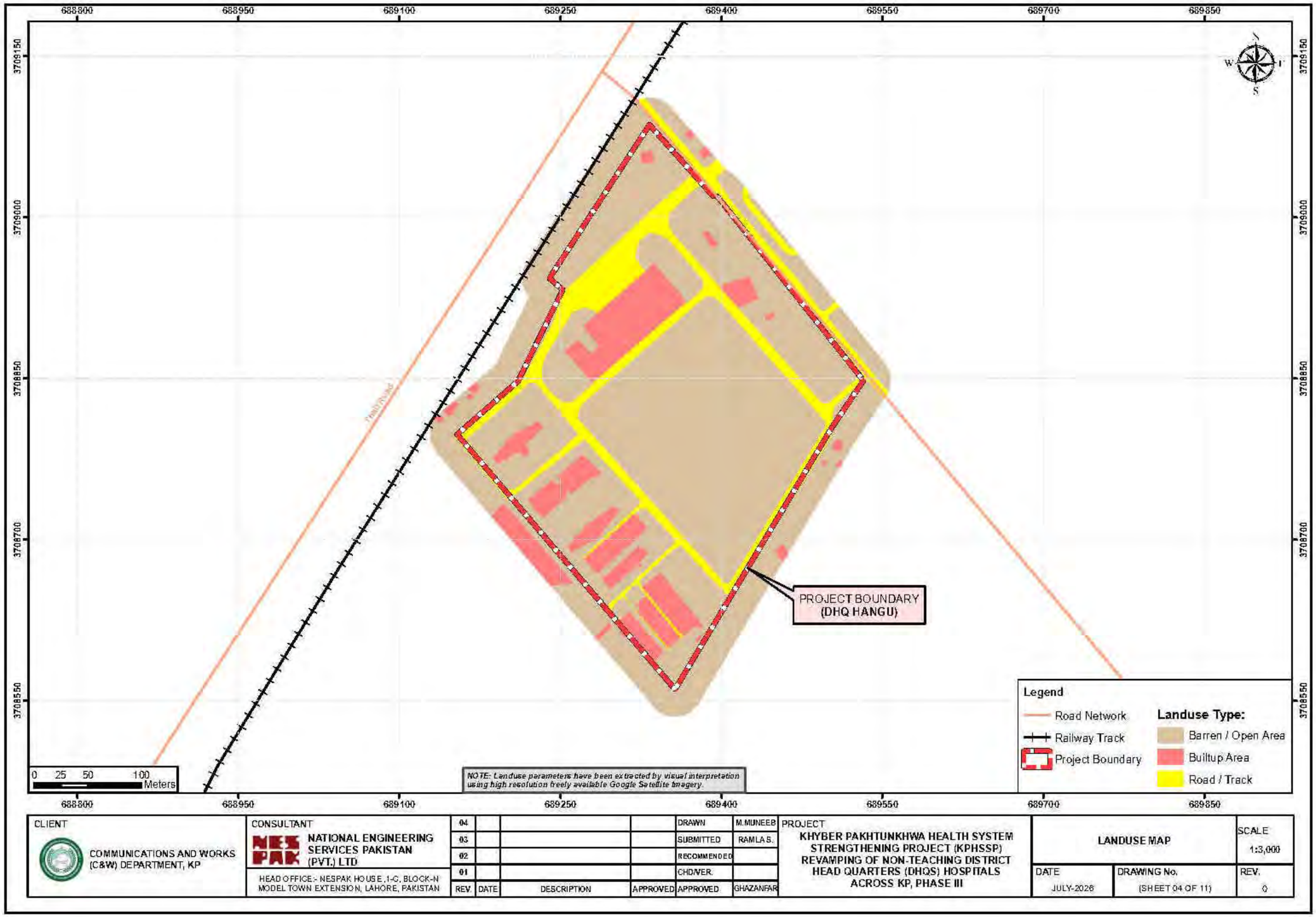
CamScanner

ANNEXURE-IV: LAND USE AND SENSITIVE RECEPTORS


319700
319750
319800
319850
319900
319950
320000
320050
3838950
3838900
3838850
3838800
3838750
NANDIHAR KHWAR
N
W
E
S
PROJECT BOUNDARY
(DHQ BATTAGRAM)
Legend
Road Network
Water Channel
Project Boundary
Landuse Type:
Barren / Open Area
Builtup Area
Stream / Nullah
Parking
Road / Track
0 10 20 40 Meters
NOTE: Landuse parameters have been extracted by visual interpretation using high resolution freely available Google Satellite Imagery.
CLIENT
COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP
CONSULTANT
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD
HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN
04
03
02
01
REV. DATE DESCRIPTION APPROVED
DRAWN M.MUNEEB
SUBMITTED RAMLA S.
RECOMMENDED
CHD/VER.
APPROVED GHAZANFAR
PROJECT
KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP)
REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III
LANDUSE MAP
SCALE 1:1,000
DATE JULY-2026
DRAWING No. (SHEET 10 OF 11)
REV. 0

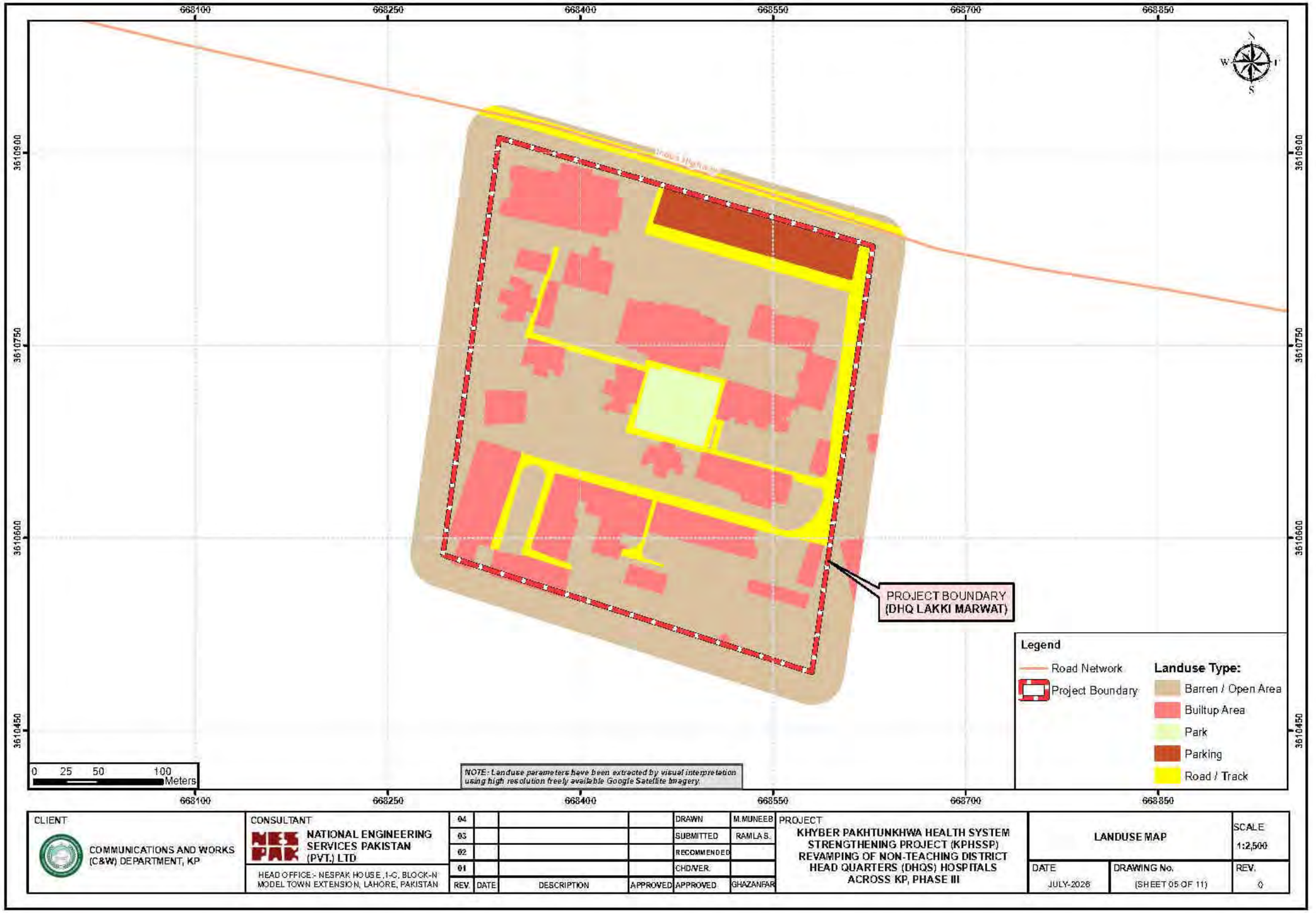


CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	M.MUNEEB	PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III	LANDUSE MAP	SCALE 1:1,500
		03				SUBMITTED	RAMLA S.			
		02				RECOMMENDED				
		01				CHD/VER.			DATE: JULY-2026	DRAWING No.: (SHEET 01 OF 11)
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	GHAZANFAR			REV.: 0

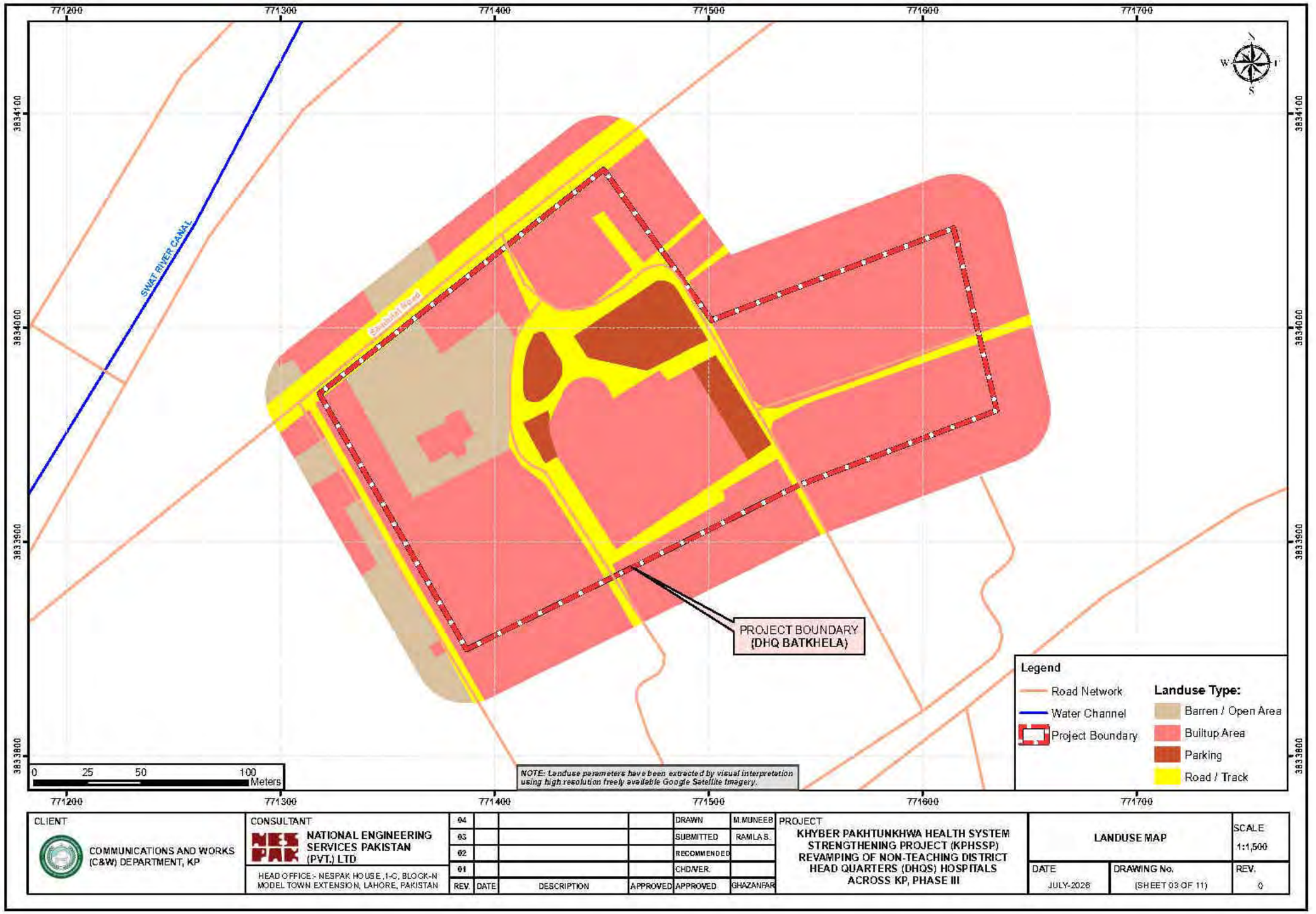


CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	M.MUNEEB	PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III
		03				SUBMITTED	RAMLA S.	
		02				RECOMMENDED		
		01				CHD/VER.		
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	GHAZANFAR	

LANDUSE MAP		SCALE: 1:3,000
DATE: JULY-2026	DRAWING No.: (SHEET 04 OF 11)	REV.: 0



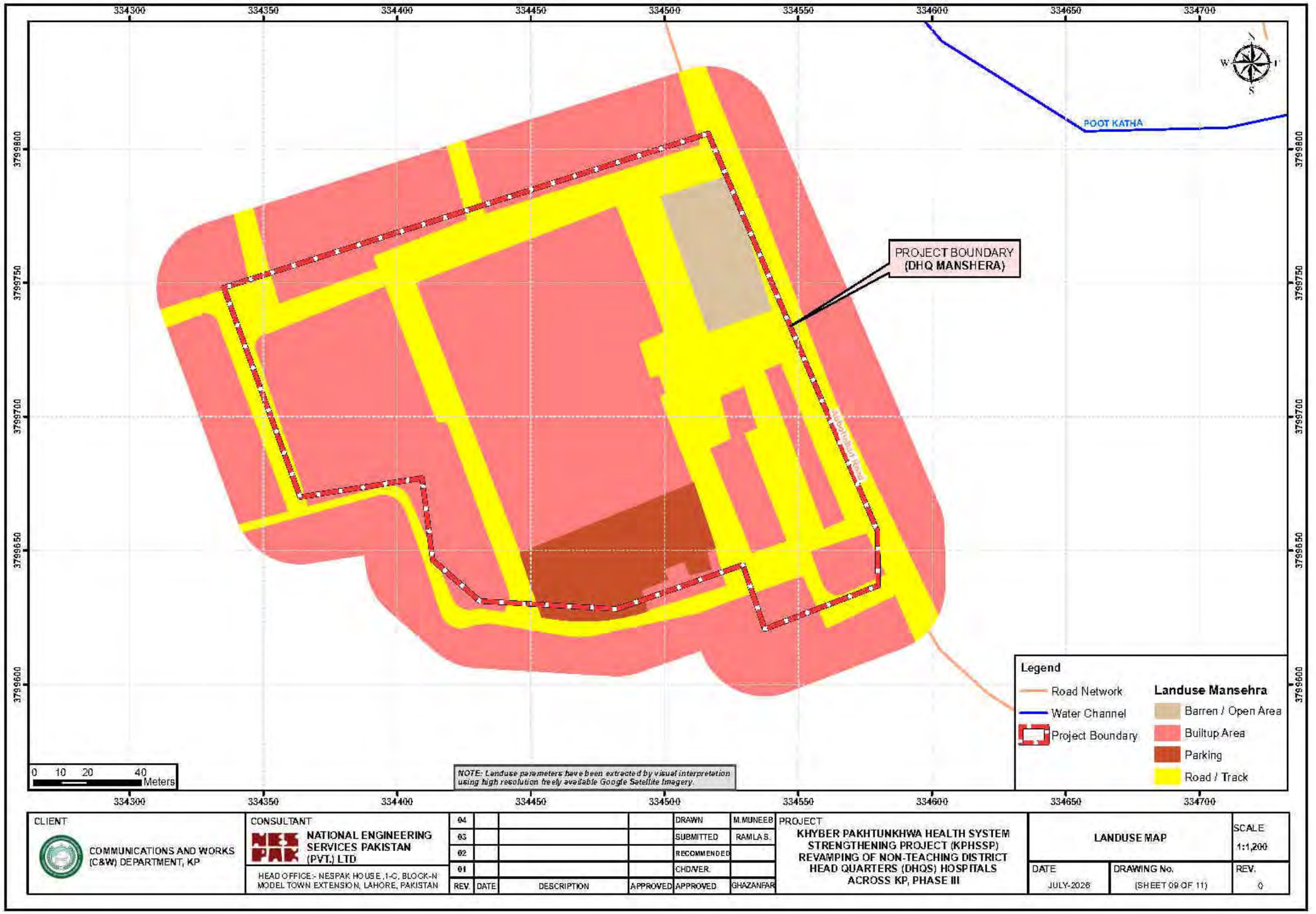
CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	M.MUNEEB	PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III	LANDUSE MAP	SCALE: 1:2,500
		03				SUBMITTED	RAMLA S.			
		02				RECOMMENDED				
		01				CHD/VER.			DATE: JULY-2026	DRAWING No.: (SHEET 05 OF 11)
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	GHAZANFAR			REV.: 0

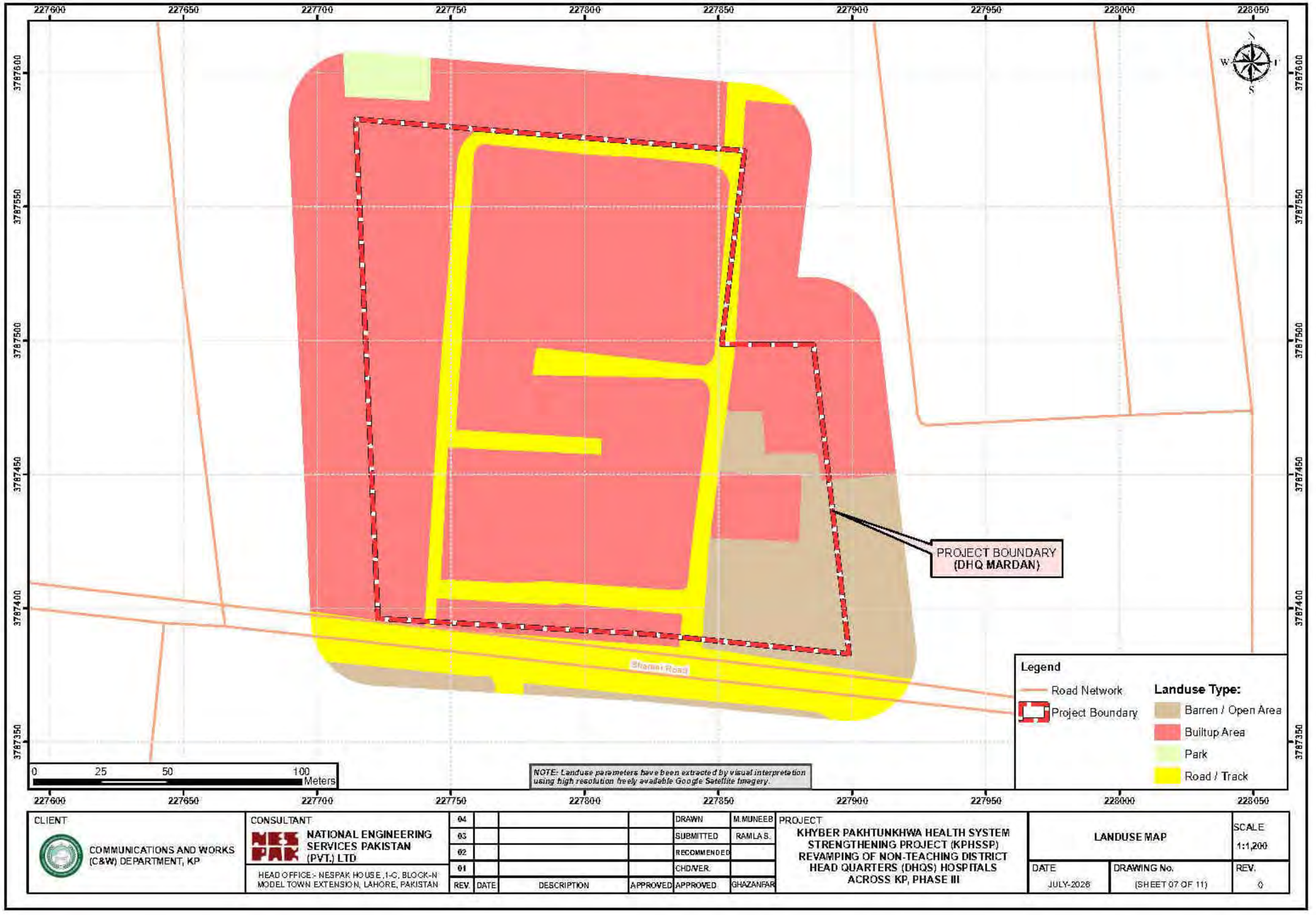


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		03				SUBMITTED	RAMLA S.
		02				RECOMMENDED	
		01				CHD/VER.	
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	GHAZANFAR

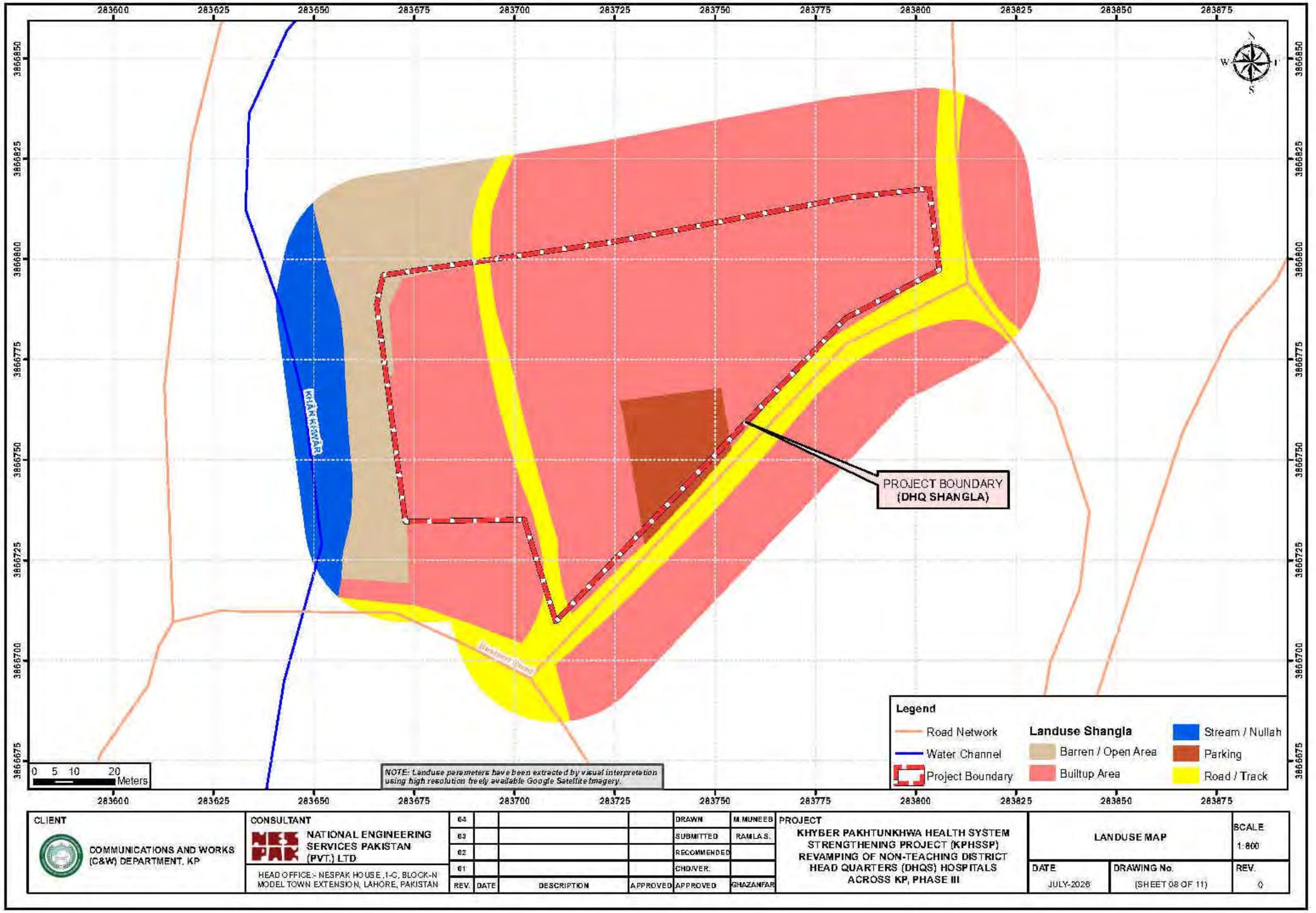
PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III

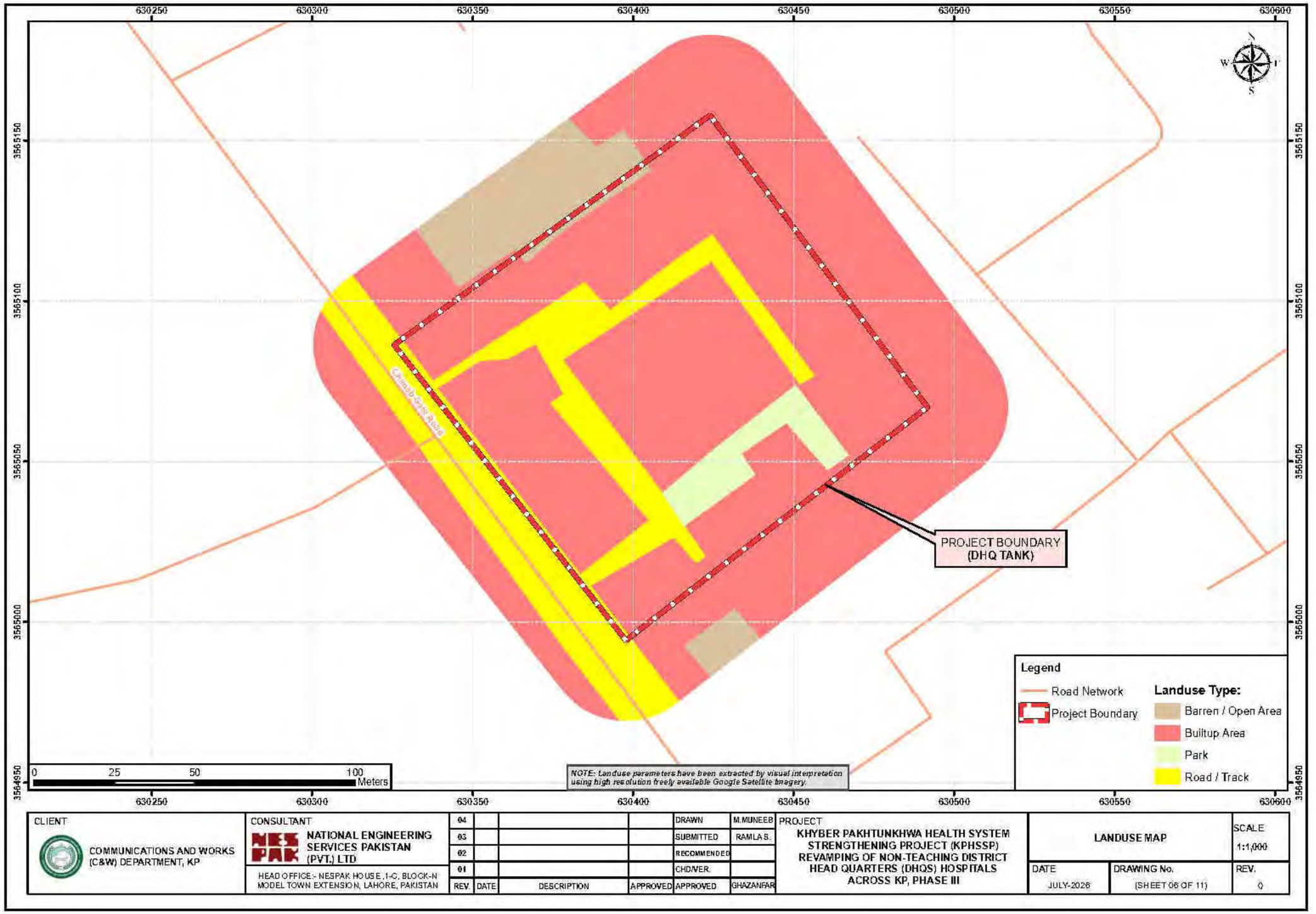
LANDUSE MAP | SCALE 1:1,500 | DATE JULY-2026 | DRAWING No. (SHEET 03 OF 11) | REV. 0


334300
334350
334400
334450
334500
334550
334600
334650
334700
3799800
3799750
3799700
3799650
3799600
N
W
E
S
POOT KATHA
PROJECT BOUNDARY
(DHQ MANSHERA)
0 10 20 40
Meters
NOTE: Landuse parameters have been extracted by visual interpretation using high resolution freely available Google Satellite Imagery.
Legend
Road Network
Water Channel
Project Boundary
Landuse Mansehra
Barren / Open Area
Builtup Area
Parking
Road / Track
CLIENT
COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP
CONSULTANT
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD
HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN
REV. DATE DESCRIPTION APPROVED
04
03
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PROJECT
KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP)
REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III
LANDUSE MAP
SCALE
1:1,200
DATE
JULY-2026
DRAWING No.
(SHEET 09 OF 11)
REV.
0



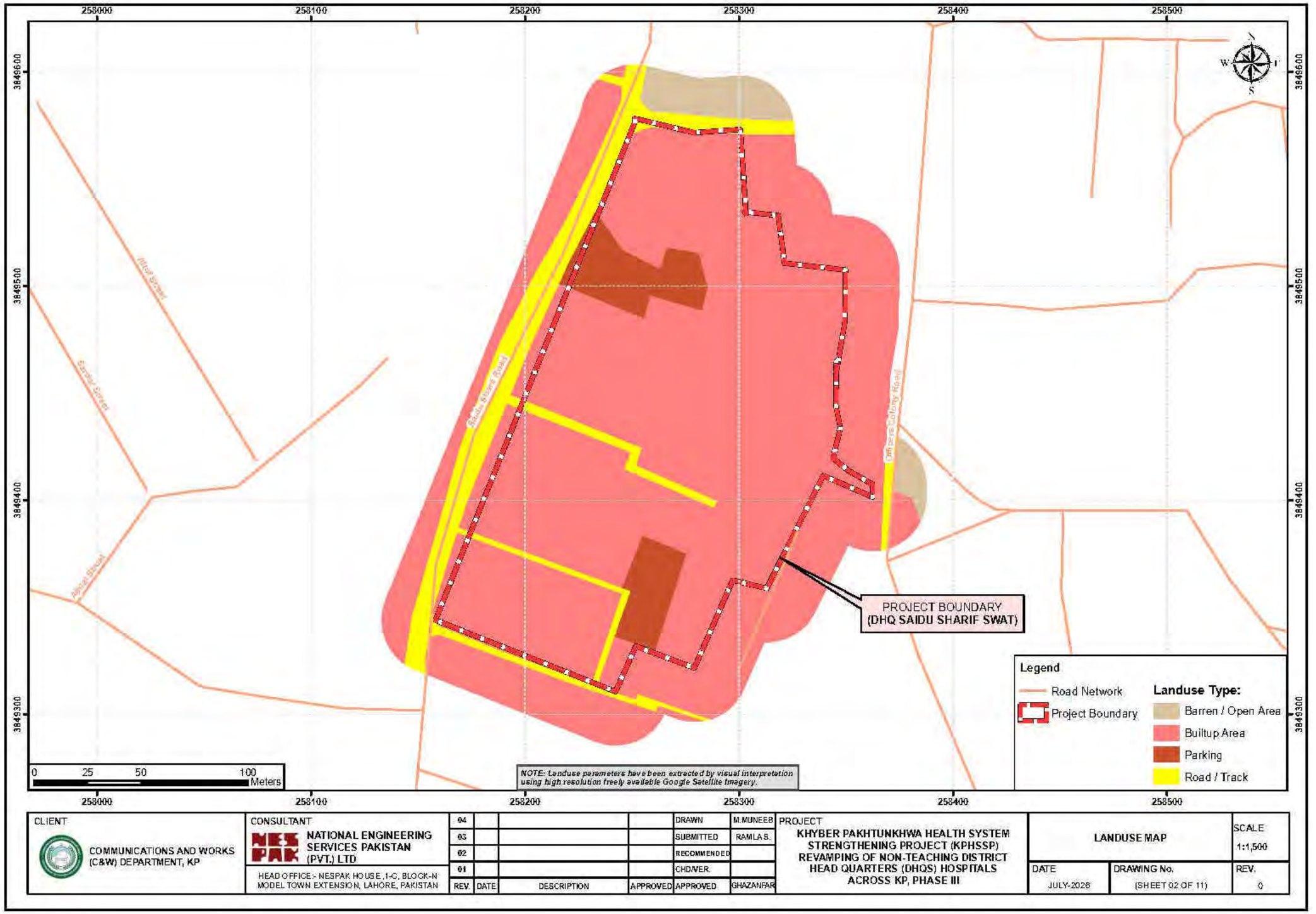
CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	M.MUNEEB	PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III	LANDUSE MAP	SCALE: 1:1,200
		03				SUBMITTED	RAMLA S.			
		02				RECOMMENDED				
		01				CHD/VER.			DATE: JULY-2026	DRAWING No.: (SHEET 07 OF 11)
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	GHAZANFAR			REV.: 0


283600
283625
283650
283675
283700
283725
283750
283775
283800
283825
283850
283875
3866850
3866825
3866800
3866775
3866750
3866725
3866700
3866675
KHAN KHWAR
Bankwari Road
PROJECT BOUNDARY
(DHQ SHANGLA)
N
W
E
S
0 5 10 20
Meters
NOTE: Landuse parameters have been extracted by visual interpretation using high resolution freely available Google Satellite Imagery.
Legend
Road Network
Water Channel
Project Boundary
Landuse Shangla
Barren / Open Area
Builtup Area
Stream / Nullah
Parking
Road / Track
CLIENT
COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP
CONSULTANT
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD
HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN
04
03
02
01
REV.
DATE
DESCRIPTION
APPROVED
DRAWN
M.MUNEEB
SUBMITTED
RAMLA S.
RECOMMENDED
CHD/VER.
APPROVED
GHAZANFAR
PROJECT
KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP)
REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III
LANDUSE MAP
SCALE
1:800
DATE
JULY-2026
DRAWING No.
(SHEET 08 OF 11)
REV.
0

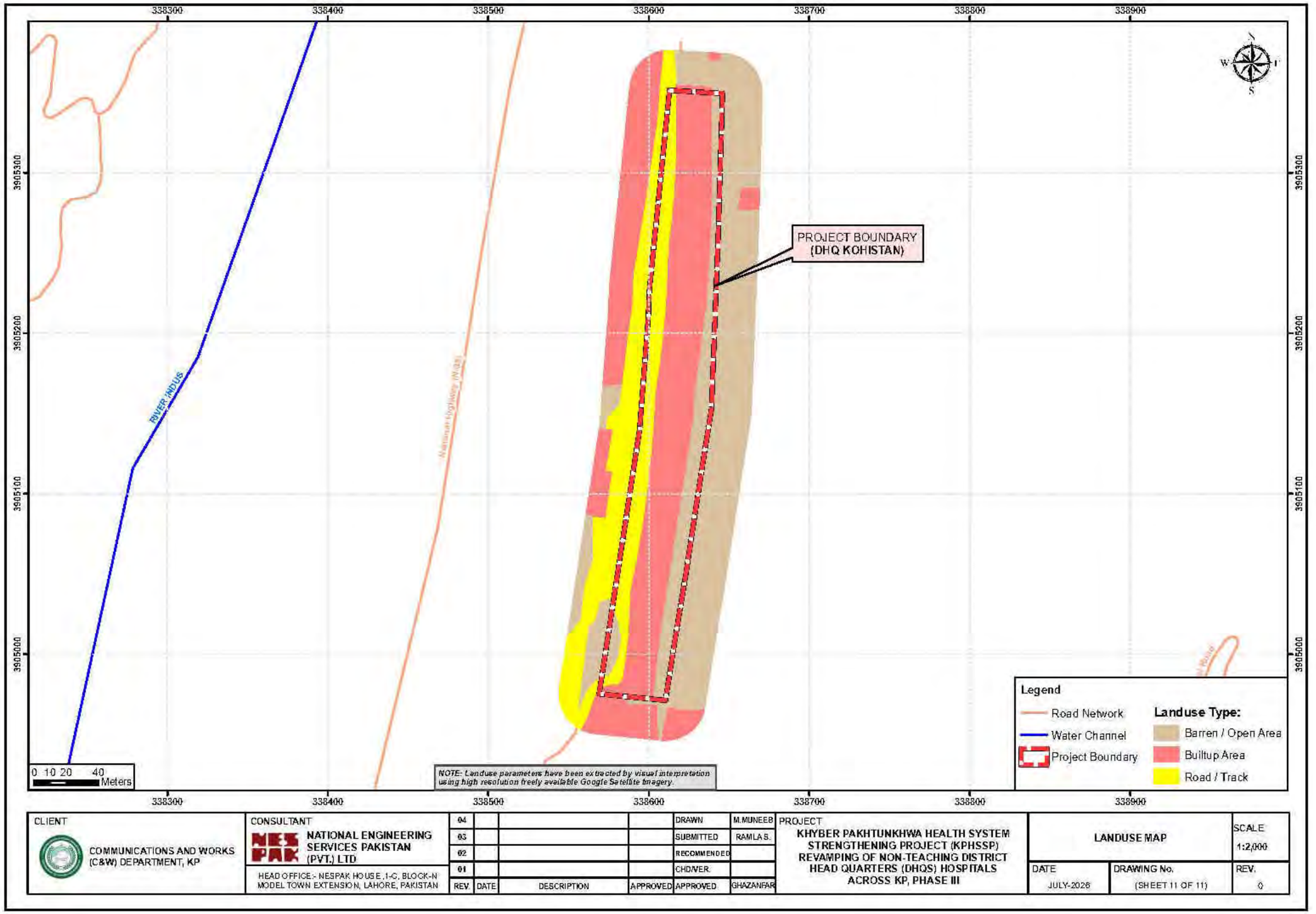


CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	M.MUNEEB	PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III
		03				SUBMITTED	RAMLA S.	
		02				RECOMMENDED		
		01				CHD/VER.		
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	GHAZANFAR	

LANDUSE MAP	SCALE
	1:1,000
DATE: JULY-2026	DRAWING No.: (SHEET 06 OF 11)
	REV.: 0



CLIENT: COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	M.MUNEEB	PROJECT: KHYBER PAKHTUNKHWA HEALTH SYSTEM STRENGTHENING PROJECT (KPHSSP) REVAMPING OF NON-TEACHING DISTRICT HEAD QUARTERS (DHQS) HOSPITALS ACROSS KP, PHASE III	LANDUSE MAP	SCALE 1:1,500
		03				SUBMITTED	RAMLA S.			
		02				RECOMMENDED				
		01				CHD/VER.			DATE: JULY-2026	DRAWING No.: (SHEET 02 OF 11)
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	GHAZANFAR			REV.: 0


338300
338400
338500
338600
338700
338800
338900
3905300
3905200
3905100
3905000
RIVER INDUS
National Highway (N-35)
PROJECT BOUNDARY
(DHQ KOHISTAN)
N
S
W
E
0 10 20 40
Meters
NOTE: Landuse parameters have been extracted by visual interpretation using high resolution freely available Google Satellite imagery.
Legend
Road Network
Water Channel
Project Boundary
Landuse Type:
Barren / Open Area
Builtup Area
Road / Track
CLIENT
COMMUNICATIONS AND WORKS (C&W) DEPARTMENT, KP
CONSULTANT
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PROJECT
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LANDUSE MAP
SCALE
1:2,000
DATE
JULY-2026
DRAWING No.
(SHEET 11 OF 11)
REV.
0

ANNEXURE-V: SOCIAL SURVERY TOOLS

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED (NESPAK)

KHYBER PAKHTUNKHWA HEALTH SYSTEMS STRENGTHENING PROGRAM

QUESTIONNAIRE FOR SOCIOECONOMIC SURVEY

A. GENERAL INFORMATION

Date: _____ District: _____

Village/Settlement: _____ Tehsil: _____

B. RESPONDENT IDENTIFICATION

Respondent Category:

☐ Hospital Staff (medical/paramedical/admin/support) ☐ Patient

☐ Nearby Resident/Community Member ☐ Patient Attendant / Visitor

Name of Respondent: _____ Father's/Spouse's Name: _____

Contact No.: _____

Age (Years): _____ Religion: _____

Caste/Ethnic Group: _____ Mother Tongue: _____

Marital Status: ☐ Married ☐ Unmarried ☐ Widow/Widower ☐ Divorced

C. EDUCATION & HOUSEHOLD PROFILE

Highest Level of Education Completed:

☐ Illiterate ☐ Primary ☐ Middle ☐ Matric

☐ Intermediate ☐ Graduation ☐ Post-Graduation ☐ Other: _____

Family System: ☐ Nuclear ☐ Joint

Household Members: Males _____ Females ____

Children (under 10 years) Males _____ Females ____ Total _____

D. LIVELIHOOD & ECONOMIC STATUS

Main Occupation:

☐ Government Job ☐ Private Job ☐ Business ☐ Labor

☐ Agriculture ☐ Livestock ☐ Unemployed ☐ Other: _____

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED (NESPAK)

Average Monthly Household Income (PKR): _____

Average Monthly Household Expenditure (PKR): _____

E. HOUSING & BASIC SERVICES (HOUSEHOLD LEVEL)

House Ownership: ☐ Owner ☐ Rented ☐ Other: _____

House Construction Type: ☐ Pacca ☐ Semi-Pacca ☐ Katcha ☐ Hut

Source of Drinking Water: ☐ Public Supply ☐ Hand pump ☐ Filtration Plant ☐ Other: _____

Satisfied with Drinking water quality? ☐ Yes ☐ No

In case of No, specify: _____

F. TRANSPORT & CONNECTIVITY

Primary Mode of Transport to DHQ/City: ☐ Public ☐ Private ☐ Both

Average Travel Time to Hospital: ☐ <15 min ☐ 15–30 min ☐ 30–60 min ☐ >60 min

G. DHQ HOSPITAL SERVICES & FACILITIES

Available Health Services at DHQ: ☐ OPD ☐ Emergency ☐ Maternity

☐ Child Health ☐ Diagnostic Services ☐ Pharmacy/Medicines ☐ Ambulance

Any Other: _____

Is the medical staff available on daily basis? _____

H. DRINKING WATER WITHIN HOSPITAL

Availability of Safe Drinking Water at Hospital:

Category	Yes	No	Source
For Patients			
For Attendants			
For Staff			
Available only through canteen/tuck shop (paid bottled water)			

H. SANITATION, HYGIENE & INFECTION CONTROL

Availability of Toilets in Hospital: ☐ Sufficient ☐ Insufficient ☐ Not Available

Separate Toilets Available For: ☐ General Public ☐ Persons with Disabilities ☐ None

Cleanliness of Wards & Toilets: ☐ Satisfactory ☐ Unsatisfactory

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED (NESPAK)

I. PERSONS WITH DISABILITIES & INCLUSIVE ACCESS

Any household member with disability? ☐ Yes ☐ No

If Yes, type: ☐ Physical / Mobility ☐ Visual ☐ Hearing ☐ Intellectual ☐ Chronic illness

Accessibility Features at DHQ Hospital:

Wheelchair ramps ☐ Yes ☐ No ☐ Don't know

Elevators / lifts ☐ Yes ☐ No ☐ Don't know

Wheelchairs at entry ☐ Yes ☐ No ☐ Don't know

Accessible toilets ☐ Yes ☐ No ☐ Don't know

Handrails / clear signage ☐ Yes ☐ No ☐ Don't know

Overall Ease of Access for Persons with Disabilities: _____

J. PROJECT PERCEPTION & IMPACT

Do you know about the project? _____

Expected Positive Impacts:

☐ Improved healthcare quality ☐ Improved drinking water & sanitation

☐ Improved accessibility for PwDs ☐ Employment opportunities ☐ Reduced travel to other cities

Others (Please specify): _____

_____

Possible Negative Impacts during Construction: _____

_____

Suggested mitigation measures: _____

General Remarks of Respondent: _____

_____

General Observations of Interviewer: _____

Name of Interviewer: _____ Signature: _____

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED (NESPAK)

KHYBER PAKHTUNKHWA HEALTH SYSTEMS STRENGTHENING PROGRAM

GENDER SURVEY

1. Location & Respondent Profile

Settlement: _____ Tehsil: _____ District: _____

Gender: ☐ Female ☐ Male ☐ Transgender ☐ Prefer not to say

Age: ☐ <18 ☐ 18–25 ☐ 26–35 ☐ 36–45 ☐ 46+

Respondent Type:

☐ Patient ☐ Visitor/Attendant ☐ Hospital Staff ☐ Community Member

If staff, designation: _____

Education: ☐ Illiterate ☐ Primary ☐ Middle ☐ Matric

☐ Intermediate ☐ Graduation ☐ Post Graduation

Marital status: ☐ Married ☐ Unmarried

Family size (M/F): ___ / ___

2: Household Roles & Decision-Making (Community Only)

Main role of women (tick all):

☐ Household care ☐ Income generation ☐ Both ☐ Other _____

Who usually decides? (Men=1, Women=2, Both=3)

- Children's education _____ - Women working outside home _____
- Choice of health facility _____ - Major household purchases _____

3: Access to Education & Skills (Community)

Are girls facing barriers to education? ☐ Yes ☐ No

If yes, key reasons: _____

Are skills/vocational centers available for women? ☐ Yes ☐ No

If yes, type of training: _____

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED (NESPAK)

4: Access to Health Services (Community)

Nearest health facility: _____ Distance (km): _____

Do women access pre/post-natal care? ☐ Yes ☐ No

If no, main constraint: _____

Major health issues in area (incl. water-borne): _____

5: Hospital Access, Safety & Privacy (Patients / Visitors / Staff)

Is the hospital easy to access? ☐ Yes ☐ No

Main barrier (if any): _____

Do women require permission/accompaniment to visit? ☐ Always ☐ Sometimes ☐ No

Do you feel safe within hospital premises? ☐ Yes ☐ No ☐ Sometimes

Are the following adequate?

- Separate female toilets ☐ Yes ☐ No -
- Clean toilets ☐ Yes ☐ No
- Lighting ☐ Yes ☐ No
- Privacy during examination ☐ Yes ☐ No

Female doctor/nurse available when needed? ☐ Yes ☐ No ☐ N/A

6: Workplace Environment (Hospital Staff Only)

Equal opportunities for male/female staff? ☐ Yes ☐ No ☐ Don't know

Facilities for female staff available?

☐ Toilets ☐ Rest area ☐ Breastfeeding space ☐ Safe night duty

Harassment reporting mechanism exists? ☐ Yes ☐ No ☐ Don't know

7: Water & Basic Services (Community)

Main drinking water source: _____

Do women collect water? ☐ Yes ☐ No Distance/time (if yes): _____

Key water-related issue: _____

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED (NESPAK)

8: Finance, Assets & Livelihoods (Community / Staff)

Are women engaged in income-generating work? ☐ Yes ☐ No

Type: ☐ Job ☐ Livestock ☐ Stitching/Embroidery ☐ Other _____

Do families support women's employment? ☐ Yes ☐ No ☐ Sometimes

Can women save income independently? ☐ Yes ☐ No

Main use of women's income (tick):

☐ Household needs ☐ Education ☐ Marriage ☐ Other _____

Key opportunity to increase women's income: _____

9: Vulnerability & GBV (Ask sensitively)

Key vulnerable groups present (tick):

☐ Financially ☐ Elderly ☐ Disabled ☐ Widows ☐ Minorities

Are support/social protection programs available? ☐ Yes ☐ No

Have you faced or witnessed violence against women? ☐ Yes ☐ No

If yes, type: ☐ Physical ☐ Psychological ☐ Economic

10: Project / Hospital Revamp Feedback

What design or service improvement would benefit women most?

_____

How can women's participation be ensured in the project?

_____

Any potential negative impact on women? _____

Top priority need of women in this area: _____

Interviewers Notes

Name: _____ Date: _____ Signature_____

ANNEXURE-VI: IMPACT EVALUATION MATRIX

IMPACT EVALUATION MATRIX - DHQ BATTAGRAM																	
Project Component	Physical Environment					Ecological Environment		Social Environment									
	Soil	Air Quality	Noise	Water Quality	Waste Generation	Vegetation	Urban Fauna	Community Health and Safety	Patient Safety and Infection Risk	Healthcare Service Continuity	Access and Mobility	Labor and Working Conditions	Gender and Vulnerable Groups	Traffic Management and parking	Employment	Security	Health Service Quality
A. Pre-Construction Phase																	
Topographic Survey	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Utility Mapping	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Site Clearance	0	0	1	0	0	0	2	4	4	2	2	0	2	0	2	4	0
B. Construction Phase																	
Construction Camps & Workshops	8	4	6	4	6	2	4	2	6	6	4	6	6	6	6	4	2
Demolition Works	5	4	12	4	8	0	0	0	8	6	4	6	6	6	6	4	2
Handling of Asbestos	4	6	2	6	6	0	0	6	6	0	0	0	0	0	0	0	0
Material Transport, Storage and Handling	6	4	9	4	6	2	0	0	6	6	4	4	2	6	6	4	2
Structural & Civil Works	6	4	9	4	8	0	0	0	8	6	4	6	4	6	6	4	3
Drainage & Utilities	6	4	6	4	6	0	0	0	4	6	4	6	2	6	6	4	4
Landscaping	0	0	2	2	4	4	2	0	0	0	0	2	2	2	2	4	3
C. Operational Phase																	
Hospital Operations	0	4	4	4	8	0	0	9	9	2	2	4	6	4	2	4	9
Waste Management (incl. biomedical)	4	4	2	6	0	2	2	2	4	0	0	4	2	4	2	4	2
Energy Systems Operation (Grid+Solar)	0	2	2	0	2	0	0	0	0	2	0	0	0	0	2	0	2
Drainage and Sanitation facilities	0	2	0	4	2	0	0	2	4	2	0	0	2	0	2	0	6
Building Maintenance	2	4	4	2	4	2	0	0	4	0	0	6	2	4	2	4	4

Positive Impact Score	Impact Significance	Adverse Impact Score
0	Negligible	0
2 to 4	Low	2 to 4
5 to 8	Medium	5 to 8
9 to 12	High	9 to 12
>12	Very High	>12

IMPACT EVALUATION MATRIX - DHQ CHITRAL																	
Project Component	Physical Environment					Ecological Environment		Social Environment									
	Soil	Air Quality	Noise	Water Quality	Waste Generation	Vegetation	Urban Fauna	Community Health and Safety	Patient Safety and Infection Risk	Healthcare Service Continuity	Access and Mobility	Labor and Working Conditions	Gender and Vulnerable Groups	Traffic Management and parking	Employment	Security	Health Service Quality
A. Pre-Construction Phase																	
Topographic Survey	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Utility Mapping	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Site Clearance	0	0	1	0	0	0	2	4	4	2	2	0	2	0	2	4	0
B. Construction Phase																	
Construction Camps & Workshops	6	4	6	4	6	2	4	2	6	4	6	8	5	8	6	4	2
Demolition Works	5	4	12	4	8	0	0	0	8	2	6	6	5	4	6	4	2
Handling of Asbestos	4	6	2	6	6	0	0	6	6	0	0	0	0	0	0	0	0
Material Transport, Storage and Handling	6	4	8	4	6	2	0	0	6	2	6	4	4	8	6	4	2
Structural & Civil Works	6	4	9	4	8	0	0	0	8	2	6	6	5	4	6	4	3
Drainage & Utilities	6	4	6	4	6	0	0	0	4	2	4	6	2	6	6	4	4
Landscaping	0	0	2	2	4	4	2	0	0	0	0	2	2	2	2	4	3
C. Operational Phase																	
Hospital Operations	0	4	4	4	8	0	0	9	9	2	2	4	6	4	2	4	9
Waste Management (incl. biomedical)	4	4	2	6	0	2	2	2	4	0	0	4	2	4	2	4	2
Energy Systems Operation (Grid+Solar)	0	2	2	0	2	0	0	0	0	2	0	0	0	0	2	0	2
Drainage and Sanitation facilities	0	2	0	4	2	0	0	2	4	2	0	2	2	0	2	0	6
Building Maintenance	2	4	4	2	4	2	0	0	4	0	0	6	2	4	2	4	4

Positive Impact Score	Impact Significance	Adverse Impact Score
0	Negligible	0
2 to 4	Low	2 to 4
5 to 8	Medium	5 to 8
9 to 12	High	9 to 12
>12	Very High	>12

IMPACT EVALUATION MATRIX - DHQ HANGU																	
Project Component	Physical Environment					Ecological Environment		Social Environment									
	Soil	Air Quality	Noise	Water Quality	Waste Generation	Vegetation	Urban Fauna	Community Health and Safety	Patient Safety and Infection Risk	Healthcare Service Continuity	Access and Mobility	Labor and Working Conditions	Gender and Vulnerable Groups	Traffic Management and parking	Employment	Security	Health Service Quality
A. Pre-Construction Phase																	
Topographic Survey	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Utility Mapping	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Site Clearance	0	0	1	0	0	0	2	4	4	2	2	0	2	0	2	9	0
B. Construction Phase																	
Construction Camps & Workshops	6	6	6	4	6	2	4	2	6	4	6	6	6	8	6	9	2
Demolition Works	8	8	12	4	8	0	0	0	8	4	6	6	6	4	6	9	2
Handling of Asbestos	4	6	2	6	6	0	0	6	6	0	0	0	0	0	0	0	0
Material Transport, Storage and Handling	8	9	8	4	6	2	0	0	6	2	6	4	2	8	6	9	2
Structural & Civil Works	6	8	9	4	8	0	0	0	8	4	6	8	6	8	6	9	3
Drainage & Utilities	6	6	6	4	6	0	0	0	4	2	6	6	2	8	6	9	4
Landscaping	0	0	2	2	4	4	2	0	0	0	0	2	2	2	2	9	3
C. Operational Phase																	
Hospital Operations	0	4	4	4	8	0	0	9	9	2	2	4	6	4	2	9	9
Waste Management (incl. biomedical)	4	4	2	6	0	2	2	2	4	0	0	4	2	4	2	9	2
Energy Systems Operation (Grid+Solar)	0	2	2	0	2	0	0	0	0	2	0	0	0	0	2	0	2
Drainage and Sanitation facilities	0	2	0	4	2	0	0	2	4	2	0	2	2	0	2	0	6
Building Maintenance	2	4	4	2	4	2	0	0	4	0	0	6	2	4	2	9	4

Positive Impact Score	Impact Significance	Adverse Impact Score
0	Negligible	0
2 to 4	Low	2 to 4
5 to 8	Medium	5 to 8
9 to 12	High	9 to 12
>12	Very High	>12

IMPACT EVALUATION MATRIX - DHQ LAKKI MARWAT																	
Project Component	Physical Environment					Ecological Environment		Social Environment									
	Soil	Air Quality	Noise	Water Quality	Waste Generation	Vegetation	Urban Fauna	Community Health and Safety	Patient Safety and Infection Risk	Healthcare Service Continuity	Access and Mobility	Labor and Working Conditions	Gender and Vulnerable Groups	Traffic Management and parking	Employment	Security	Health Service Quality
A. Pre-Construction Phase																	
Topographic Survey	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Utility Mapping	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Site Clearance	0	0	1	0	0	0	2	4	4	2	2	0	2	0	2	9	0
B. Construction Phase																	
Construction Camps & Workshops	6	6	6	4	6	2	4	2	6	4	6	6	6	8	6	9	2
Demolition Works	8	6	12	4	8	2	0	0	8	4	6	6	6	4	6	9	2
Handling of Asbestos	4	6	2	6	6	0	0	6	6	0	0	0	0	0	0	0	0
Material Transport, Storage and Handling	8	6	8	4	6	2	0	0	6	2	6	4	2	8	6	9	2
Structural & Civil Works	6	6	9	4	8	2	0	0	8	4	6	8	6	8	6	9	3
Drainage & Utilities	6	6	6	4	6	2	0	0	4	2	6	6	2	8	6	9	4
Landscaping	0	0	2	2	4	4	2	0	0	0	0	2	2	2	2	9	3
C. Operational Phase																	
Hospital Operations	0	4	4	4	8	0	0	9	9	2	2	4	6	4	2	9	9
Waste Management (incl. biomedical)	4	4	2	6	0	2	2	2	4	0	0	4	2	4	2	9	2
Energy Systems Operation (Grid+Solar)	0	2	2	0	2	0	0	0	0	2	0	0	0	0	2	0	2
Drainage and Sanitation facilities	0	2	0	4	2	0	0	2	4	2	0	2	2	0	2	0	6
Building Maintenance	2	4	4	2	4	2	0	0	4	0	0	6	2	4	2	9	4

Positive Impact Score	Impact Significance	Adverse Impact Score
0	Negligible	0
2 to 4	Low	2 to 4
5 to 8	Medium	5 to 8
9 to 12	High	9 to 12
>12	Very High	>12

IMPACT EVALUATION MATRIX - DHQ BATKHELA																	
Project Component	Physical Environment					Ecological Environment		Social Environment									
	Soil	Air Quality	Noise	Water Quality	Waste Generation	Vegetation	Urban Fauna	Community Health and Safety	Patient Safety and Infection Risk	Healthcare Service Continuity	Access and Mobility	Labor and Working Conditions	Gender and Vulnerable Groups	Traffic Management and parking	Employment	Security	Health Service Quality
A. Pre-Construction Phase																	
Topographic Survey	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Utility Mapping	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Site Clearance	0	0	1	0	0	0	2	4	4	2	2	0	2	0	2	2	0
B. Construction Phase																	
Construction Camps & Workshops	6	4	6	4	6	2	4	2	6	4	8	8	6	6	6	2	2
Demolition Works	5	4	12	4	8	0	0	0	8	2	8	6	4	6	6	2	2
Handling of Asbestos	4	6	2	6	6	0	0	6	6	0	0	0	0	0	0	0	0
Material Transport, Storage and Handling	6	4	8	4	6	2	0	0	6	2	8	4	4	6	6	2	2
Structural & Civil Works	6	4	9	4	8	0	0	0	8	2	8	8	4	6	6	2	3
Drainage & Utilities	6	4	6	4	6	0	0	0	4	2	4	6	2	6	6	2	4
Landscaping	0	0	2	2	4	4	2	0	0	0	0	2	2	6	2	2	3
C. Operational Phase																	
Hospital Operations	0	4	4	4	8	0	0	6	6	2	2	6	6	4	2	2	6
Waste Management (incl. biomedical)	4	4	2	6	0	2	2	2	4	0	0	6	2	4	2	0	2
Energy Systems Operation (Grid+Solar)	0	2	2	0	2	0	0	0	0	2	0	0	0	0	2	0	2
Drainage and Sanitation facilities	0	2	0	4	2	0	0	2	4	2	0	2	2	0	2	0	6
Building Maintenance	2	4	4	2	4	2	0	0	4	0	0	6	2	4	2	0	4

Positive Impact Score	Impact Significance	Adverse Impact Score
0	Negligible	0
2 to 4	Low	2 to 4
5 to 8	Medium	5 to 8
9 to 12	High	9 to 12
>12	Very High	>12

IMPACT EVALUATION MATRIX - KING ABDULLAH TEACHING HOSPITAL, MANSEHRA																	
Project Component	Physical Environment					Ecological Environment		Social Environment									
	Soil	Air Quality	Noise	Water Quality	Waste Generation	Vegetation	Urban Fauna	Community Health and Safety	Patient Safety and Infection Risk	Healthcare Service Continuity	Access and Mobility	Labor and Working Conditions	Gender and Vulnerable Groups	Traffic Management and parking	Employment	Security	Health Service Quality
A. Pre-Construction Phase																	
Topographic Survey	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Utility Mapping	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Site Clearance	0	0	1	0	0	0	2	4	4	2	2	0	2	0	2	2	0
B. Construction Phase																	
Construction Camps & Workshops	4	4	6	4	6	2	4	2	6	4	4	6	4	6	6	2	2
Demolition Works	5	6	12	4	8	0	0	0	8	2	4	6	2	6	6	2	2
Handling of Asbestos	4	6	2	6	6	0	0	6	6	0	0	0	0	0	0	0	0
Material Transport, Storage and Handling	4	6	8	4	6	2	0	0	6	2	4	4	2	8	6	2	2
Structural & Civil Works	6	6	9	4	8	0	0	0	8	2	4	6	4	6	6	2	3
Drainage & Utilities	6	6	6	4	6	0	0	0	4	2	4	6	2	6	6	2	4
Landscaping	0	0	2	2	4	4	2	0	0	0	0	2	2	2	2	2	3
C. Operational Phase																	
Hospital Operations	0	4	4	4	8	0	0	9	9	2	2	4	6	4	2	2	9
Waste Management (incl. biomedical)	4	4	2	6	0	2	2	2	4	0	0	4	2	4	2	0	2
Energy Systems Operation (Grid+Solar)	0	2	2	0	2	0	0	0	0	2	0	0	0	0	2	0	2
Drainage and Sanitation facilities	0	2	0	4	2	0	0	2	4	2	0	2	2	0	2	0	6
Building Maintenance	2	4	4	2	4	2	0	0	4	0	0	6	2	4	2	0	4

Positive Impact Score	Impact Significance	Adverse Impact Score
0	Negligible	0
2 to 4	Low	2 to 4
5 to 8	Medium	5 to 8
9 to 12	High	9 to 12
>12	Very High	>12

IMPACT EVALUATION MATRIX - DHQ MARDAN																	
Project Component	Physical Environment					Ecological Environment		Social Environment									
	Soil	Air Quality	Noise	Water Quality	Waste Generation	Vegetation	Urban Fauna	Community Health and Safety	Patient Safety and Infection Risk	Healthcare Service Continuity	Access and Mobility	Labor and Working Conditions	Gender and Vulnerable Groups	Traffic Management and parking	Employment	Security	Health Service Quality
A. Pre-Construction Phase																	
Topographic Survey	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Utility Mapping	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Site Clearance	0	0	1	0	0	0	2	4	4	2	2	0	2	0	2	2	0
B. Construction Phase																	
Construction Camps & Workshops	4	4	6	4	6	2	4	2	6	4	4	6	4	6	6	2	2
Demolition Works	5	8	12	4	8	0	0	0	8	2	4	6	2	6	6	2	2
Handling of Asbestos	4	6	2	6	6	0	0	6	6	0	0	0	0	0	0	0	0
Material Transport, Storage and Handling	4	8	8	4	6	2	0	0	6	2	4	4	2	8	6	2	2
Structural & Civil Works	6	8	9	4	8	0	0	0	8	2	4	6	4	6	6	2	3
Drainage & Utilities	6	6	6	4	6	0	0	0	4	2	4	6	2	6	6	2	4
Landscaping	0	0	2	2	4	4	2	0	0	0	0	2	2	2	2	2	3
C. Operational Phase																	
Hospital Operations	0	4	4	4	8	0	0	9	9	2	2	4	6	4	2	2	9
Waste Management (incl. biomedical)	4	4	2	6	0	2	2	2	4	0	0	4	2	4	2	0	2
Energy Systems Operation (Grid+Solar)	0	2	2	0	2	0	0	0	0	2	0	0	0	0	2	0	2
Drainage and Sanitation facilities	0	2	0	4	2	0	0	2	4	2	0	2	2	0	2	0	6
Building Maintenance	2	4	4	2	4	2	0	0	4	0	0	6	2	4	2	0	4

Positive Impact Score	Impact Significance	Adverse Impact Score
0	Negligible	0
2 to 4	Low	2 to 4
5 to 8	Medium	5 to 8
9 to 12	High	9 to 12
>12	Very High	>12

IMPACT EVALUATION MATRIX - DHQ ALPURAI SHANGLA																	
Project Component	Physical Environment					Ecological Environment		Social Environment									
	Soil	Air Quality	Noise	Water Quality	Waste Generation	Vegetation	Urban Fauna	Community Health and Safety	Patient Safety and Infection Risk	Healthcare Service Continuity	Access and Mobility	Labor and Working Conditions	Gender and Vulnerable Groups	Traffic Management and parking	Employment	Security	Health Service Quality
A. Pre-Construction Phase																	
Topographic Survey	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Utility Mapping	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Site Clearance	0	0	1	0	0	0	2	4	4	2	2	0	2	0	2	2	0
B. Construction Phase																	
Construction Camps & Workshops	4	4	6	4	6	2	4	2	6	4	8	6	4	6	6	2	2
Demolition Works	5	6	12	4	8	0	0	0	8	4	8	6	2	6	6	2	2
Handling of Asbestos	4	6	2	6	6	0	0	6	6	0	0	0	0	0	0	0	0
Material Transport, Storage and Handling	4	6	8	4	6	2	0	0	6	4	8	4	2	8	6	2	2
Structural & Civil Works	6	6	9	4	8	0	0	0	8	4	8	6	4	6	6	2	3
Drainage & Utilities	6	6	6	4	6	0	0	0	4	4	8	6	2	6	6	2	4
Landscaping	0	0	2	2	4	4	2	0	0	0	0	2	2	2	2	2	3
C. Operational Phase																	
Hospital Operations	0	4	4	4	8	0	0	9	9	2	2	4	6	4	2	2	9
Waste Management (incl. biomedical)	4	4	2	6	0	2	2	2	4	0	0	4	2	4	2	0	2
Energy Systems Operation (Grid+Solar)	0	2	2	0	2	0	0	0	0	2	0	0	0	0	2	0	2
Drainage and Sanitation facilities	0	2	0	4	2	0	0	2	4	2	0	2	2	0	2	0	6
Building Maintenance	2	4	4	2	4	2	0	0	4	0	0	6	2	4	2	0	4

Positive Impact Score	Impact Significance	Adverse Impact Score
0	Negligible	0
2 to 4	Low	2 to 4
5 to 8	Medium	5 to 8
9 to 12	High	9 to 12
>12	Very High	>12

IMPACT EVALUATION MATRIX - DHQ TANK																	
Project Component	Physical Environment					Ecological Environment		Social Environment									
	Soil	Air Quality	Noise	Water Quality	Waste Generation	Vegetation	Urban Fauna	Community Health and Safety	Patient Safety and Infection Risk	Healthcare Service Continuity	Access and Mobility	Labor and Working Conditions	Gender and Vulnerable Groups	Traffic Management and parking	Employment	Security	Health Service Quality
A. Pre-Construction Phase																	
Topographic Survey	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Utility Mapping	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Site Clearance	0	0	1	0	0	0	2	4	4	2	2	0	2	0	2	9	0
B. Construction Phase																	
Construction Camps & Workshops	4	4	6	4	6	2	4	2	6	4	4	6	6	6	6	9	2
Demolition Works	5	8	12	4	8	0	0	0	8	2	4	6	4	6	6	9	2
Handling of Asbestos	4	6	2	6	6	0	0	6	6	0	0	0	0	0	0	0	0
Material Transport, Storage and Handling	4	8	8	4	6	2	0	0	6	2	4	4	4	8	6	9	2
Structural & Civil Works	6	8	9	4	8	0	0	0	8	2	4	6	4	6	6	9	3
Drainage & Utilities	6	6	6	4	6	0	0	0	4	2	4	6	4	6	6	9	4
Landscaping	0	0	2	2	4	4	2	0	0	0	0	2	2	2	2	9	3
C. Operational Phase																	
Hospital Operations	0	4	4	4	8	0	0	9	9	2	2	4	6	4	2	9	9
Waste Management (incl. biomedical)	4	4	2	6	0	2	2	2	4	0	0	4	2	4	2	0	2
Energy Systems Operation (Grid+Solar)	0	2	2	0	2	0	0	0	0	2	0	0	0	0	2	0	2
Drainage and Sanitation facilities	0	2	0	4	2	0	0	2	4	2	0	2	2	0	2	0	6
Building Maintenance	2	4	4	2	4	2	0	0	4	0	0	6	2	4	2	0	4

Positive Impact Score	Impact Significance	Adverse Impact Score
0	Negligible	0
2 to 4	Low	2 to 4
5 to 8	Medium	5 to 8
9 to 12	High	9 to 12
>12	Very High	>12

IMPACT EVALUATION MATRIX - SAIDU SHARIF, SAWAT																	
Project Component	Physical Environment					Ecological Environment		Social Environment									
	Soil	Air Quality	Noise	Water Quality	Waste Generation	Vegetation	Urban Fauna	Community Health and Safety	Patient Safety and Infection Risk	Healthcare Service Continuity	Access and Mobility	Labor and Working Conditions	Gender and Vulnerable Groups	Traffic Management and parking	Employment	Security	Health Service Quality
A. Pre-Construction Phase																	
Topographic Survey	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Utility Mapping	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Site Clearance	0	0	1	0	0	0	2	4	4	2	2	0	2	0	2	2	0
B. Construction Phase																	
Construction Camps & Workshops	4	4	6	4	6	2	4	2	6	4	4	6	4	6	6	2	2
Demolition Works	5	6	12	4	8	0	0	0	8	2	4	6	4	6	6	2	2
Handling of Asbestos	4	6	2	6	6	0	0	6	6	0	0	0	0	0	0	0	0
Material Transport, Storage and Handling	4	6	8	4	6	2	0	0	6	2	4	4	4	8	6	2	2
Structural & Civil Works	6	6	9	4	8	0	0	0	8	2	4	6	4	6	6	2	3
Drainage & Utilities	6	6	6	4	6	0	0	0	4	2	4	6	4	6	6	2	4
Landscaping	0	0	2	2	4	4	2	0	0	0	0	2	2	2	6	2	3
C. Operational Phase																	
Hospital Operations	0	4	4	4	8	0	0	9	9	2	2	4	6	4	2	2	9
Waste Management (incl. biomedical)	4	4	2	6	0	2	2	2	4	0	0	4	2	4	2	0	2
Energy Systems Operation (Grid+Solar)	0	2	2	0	2	0	0	0	0	2	0	0	0	0	2	0	2
Drainage and Sanitation facilities	0	2	0	4	2	0	0	2	4	2	0	2	2	0	2	0	6
Building Maintenance	2	4	4	2	4	2	0	0	4	0	0	6	2	4	2	0	4

Positive Impact Score	Impact Significance	Adverse Impact Score
0	Negligible	0
2 to 4	Low	2 to 4
5 to 8	Medium	5 to 8
9 to 12	High	9 to 12
>12	Very High	>12

IMPACT EVALUATION MATRIX - DHQ DASSU, UPPER KOHISTAN																	
Project Component	Physical Environment					Ecological Environment		Social Environment									
	Soil	Air Quality	Noise	Water Quality	Waste Generation	Vegetation	Urban Fauna	Community Health and Safety	Patient Safety and Infection Risk	Healthcare Service Continuity	Access and Mobility	Labor and Working Conditions	Gender and Vulnerable Groups	Traffic Management and parking	Employment	Security	Health Service Quality
A. Pre-Construction Phase																	
Topographic Survey	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Utility Mapping	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0
Site Clearance	0	0	1	0	0	0	2	4	4	2	2	0	2	0	2	2	0
B. Construction Phase																	
Construction Camps & Workshops	4	4	6	4	6	2	4	2	6	4	4	6	4	6	6	2	2
Demolition Works	5	6	12	4	8	0	0	0	8	2	4	6	4	6	2	2	2
Handling of Asbestos	4	6	2	6	6	0	0	6	6	0	0	0	0	0	0	0	0
Material Transport, Storage and Handling	4	6	8	4	6	2	0	0	6	2	4	4	4	8	2	2	2
Structural & Civil Works	6	6	9	4	8	0	0	0	8	2	4	6	4	6	2	2	3
Drainage & Utilities	6	6	6	4	6	0	0	0	4	2	4	6	4	6	2	2	4
Landscaping	0	0	2	2	4	4	2	0	0	0	0	2	2	2	2	2	3
C. Operational Phase																	
Hospital Operations	0	4	4	4	8	0	0	9	9	2	2	4	6	4	2	2	9
Waste Management (incl. biomedical)	4	4	2	6	0	2	2	2	4	0	0	4	2	4	2	0	2
Energy Systems Operation (Grid+Solar)	0	2	2	0	2	0	0	0	0	2	0	0	0	0	2	0	2
Drainage and Sanitation facilities	0	2	0	4	2	0	0	2	4	2	0	2	2	0	2	0	6
Building Maintenance	2	4	4	2	4	2	0	0	4	0	0	6	2	4	2	0	4

Positive Impact Score	Impact Significance	Adverse Impact Score
0	Negligible	0
2 to 4	Low	2 to 4
5 to 8	Medium	5 to 8
9 to 12	High	9 to 12
>12	Very High	>12

ANNEXURE-VII: RESOURCE CONSERVATION PLAN

RESOURCES CONSERVATION PLAN

1. INTRODUCTION

The most of the resources in this world are finite and non-renewable in nature. We are completely dependent on these resources to fulfill all our daily requirements. Therefore, sustainable development calls for the need to conserve resources in a way that meet our needs of present generation as well as future generation, especially the non-renewable resources.

2. OBJECTIVE OF THE PLAN

The Resources Conservation Plan is intended to make an effort towards achievingsustainable development. The objective of the resources conservation plan is to:

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

3. PLANNING

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

The estimations include the following:

- Estimation of construction material required for the project;
- Estimation of fuel consumption for construction machinery, construction vehicles and generators;
- Estimations of the energy requirements during all the stages of the project; and
- Estimations of water consumption for construction activities and construction camp sites.

- Strategies shall be planned to reduce loads on the identified resources to be consumed;
- Best management practices shall be devised to control or reduce pollution resulting from theactivities during different stages of the project; and
- An inspector shall be assigned responsibility to oversee the ongoing activities to check thecompliance of the planned strategies.

4. EXECUTION OF THE PLAN

The planned strategies shall be implemented to conserve the natural resources including butnot limited to the following:

i. Material

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

ii. Energy

- Reduce trips and optimize routes to and from the construction site for all kinds of activities;

- Regular maintenance of equipment and vehicles to avoid leaks and sustain efficient fuelconsumption;
- Switch off idle equipment and vehicles to avoid wastage of fuel;
- Minimize warm up time, unnecessary acceleration and deceleration of the construction equipmentand vehicles;
- Avoid unnecessary burning of fuel for cooking in construction camps;
- Avoid unnecessary use of heating and cooling systems during extreme weathers events;
- Construction shall start in early hours of the day to avoid heat in summers and utilization of daylight; and
- Alternate energy sources shall be considered for electricity generations during construction andoperation to conserve fossil fuel as it is non-renewable resource.

iii. Water

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

iv. Pollution

- Emissions shall be reduced and controlled as far as possible and direct discharges to air shall beavoided by strictly adhering to the mitigation measures outlined in IEE report;
- Waste water shall not be discharged directly and must be managed as per the recommendationspresented in IEE; and
- Construction and demolition waste, and municipal solid waste shall not be dumped and burntopenly, and shall be handled according to the preventative measure given in IEE study.

5. CHECKING AND CORRECTIVE ACTIONS

The Proponent shall bind the construction contractor through contract agreement to comply with the strategies outlined in the Resources Conservation Plan. The Environmental Inspector shall monitor the daily onsite activities and shall report any issues and concerns raised in relation to Resources Conservation Plan. The inspector shall recommend adequate corrective actions to mitigate the issues raised

ANNEXURE-VIII: TRAFFIC MANAGEMENT PLAN

1. OBJECTIVES OF TMP AROUND THE PROPOSED PROJECT BUILDING

One of the prime objectives of this TMP is to ensure the safety of all the road users along the work sites, and to address the following issues:

- Safety of pedestrians, bicyclists, and motorists travelling through the construction sites;
- Protection of workers from hazards associated with moving traffic;
- Mitigation of the adverse impact on road capacity and delays to the road users;
- Maintenance of access to adjoining properties; and
- Addressing issues and concerns that may delay the implementation of the proposed Project.

2. OPERATING POLICIES FOR TMP

The following policies will help promote safe and efficient movement for all road users (motorists, bicyclists, and pedestrians, including persons with disabilities) through and around Project sites, while reasonably protecting workers and equipment:

- Make traffic safety and temporary traffic control an integral and high-priority element of Project from planning through design, construction, and maintenance;
- Inhibit traffic movement as little as possible;
- Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic routes;
- Inspect traffic control elements routinely, both day and night, and make modifications when necessary;
- Pay increased attention to roadside safety in the vicinity of temporary traffic routes;
- Train all persons that select, place, and maintain temporary traffic control devices;
- Keep the public well informed; and
- Make appropriate accommodation for abutting property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.

Policy steps for the TMP are shown in **Figure 1**.

3. ANALYZE THE IMPACT DUE TO STREET AND ROAD CLOSURE

Apart from the capacity analysis, final decisions to temporary close a particular street and road and divert the traffic should involve the following steps:

- Approval from the concerned authority to use the local streets and roads as detours; Consultation with businesses, community members, residents, road users and traffic police regarding the mitigation measures necessary at the detours where the road is diverted during the construction;

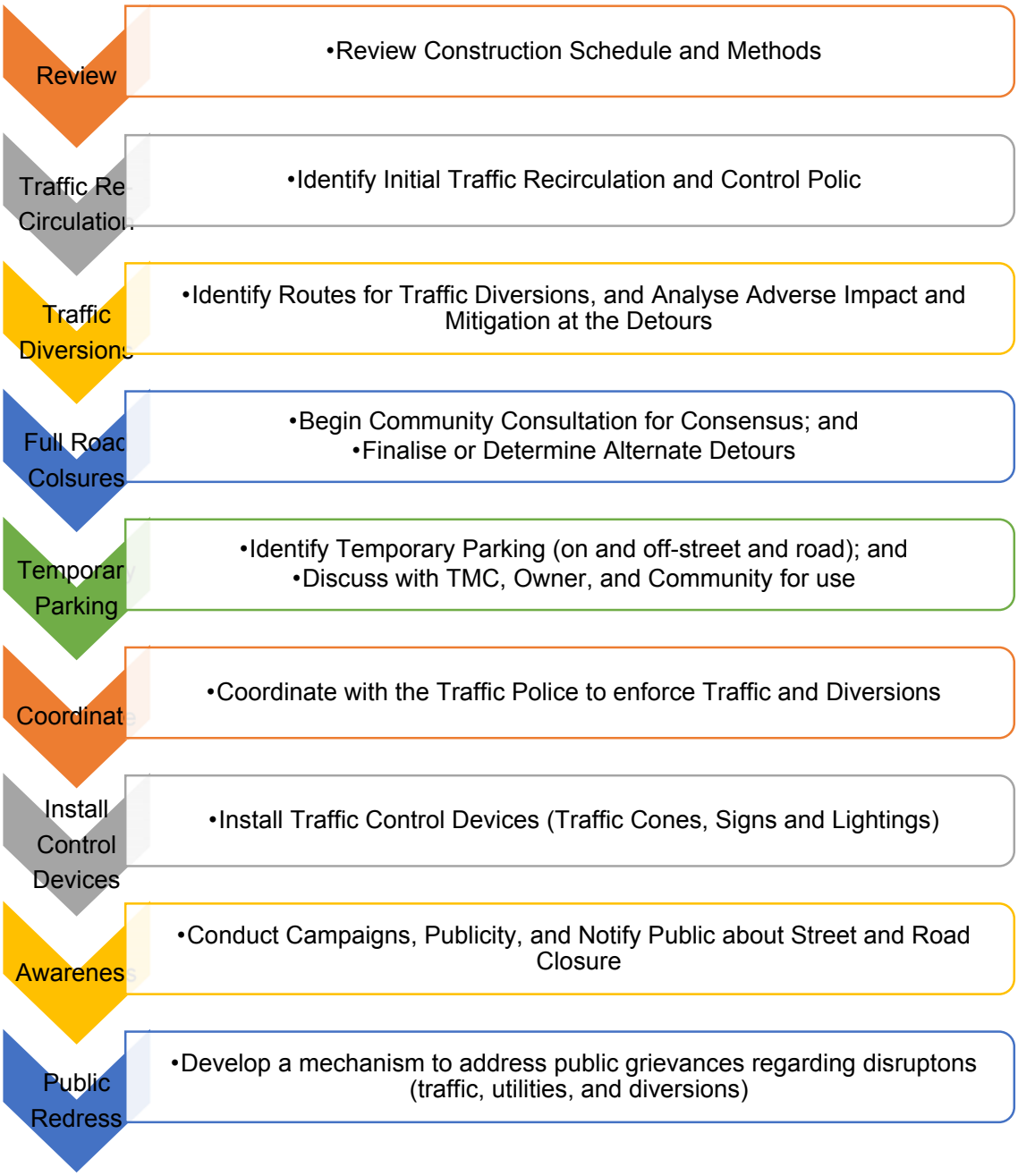


Figure 1: Policy Steps for the TMP

- Determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;
- Determining if additional traffic control or temporary improvements are needed along the detour route;
- Considering how access will be provided to the worksite;
- Contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and
- Publish a notice through print and electronic media about road closure to avoid hindrance to public. As part of this notice, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

If full road-closure of certain routes within the proposed Project area is not feasible due to inadequate capacity of the Detour Street or public opposition, the full closure can be restricted to weekends with the construction commencing on Saturday night and ending on Monday morning prior to the morning peak period.

4. PUBLIC AWARENESS AND NOTIFICATIONS

As per discussions in the previous sections, there will be travel delays during the construction, as is the case with most construction Projects, although on a reduced scale if utilities and traffic management are properly coordinated.

The awareness campaign and the prior notification for the public will be a continuous activity, which the Project will carry out to compensate for the traffic delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time, when the roadblocks or traffic diversions take place at the particular streets and roads. The reason for this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The Project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings, and area level meeting with the elected representatives.

The Project Director of proposed Project, Supervision Consultant and Contractor will also conduct an awareness campaign to educate the public about the following issues:

- Traffic control devices in place at the construction sites (signs, traffic cones, and barriers);
- Defensive driving behavior along the construction sites; and
- Reduced speeds enforced at the construction sites and traffic diversions.

It may be necessary to conduct the awareness programs and campaigns on road safety during construction.

The campaign will cater to all types of target groups i.e. children, adults, disabled and drivers. In addition, the Project will publish a brochure for public information. These brochures will be widely circulated around the proposed Project area and will also be available at the Contractor's site office. The text of the brochure should be concise to be effective, with a lot of graphics. It will serve the following purpose:

- Explain why the brochure was prepared, along with a brief description of the proposed Project;
- Advise the public to expect the unexpected delays or roadblocks;
- Educate the public about the various traffic control devices and safety measures adopted at the construction sites;
- Educate the public about the safe road user behavior to emulate at the construction sites;
- Inform the public how to stay informed or where to inquire about road safety issues at the construction sites (name, telephone and mobile number of the contact person); and
- Indicate the office hours of authorized representatives.

5. INSTALL TRAFFIC CONTROL DEVICES AT THE CONSTRUCTION SITES AND TRAFFIC DIVERSION ROUTES

The purpose of installing traffic control devices at the construction sites is to delineate these areas to warn, inform, and direct the road users about a hazard ahead, and to protect them as well as the workers. As proper delineation is a key to achieve the above objective, it is important to install good traffic signs at the construction sites. The following traffic control devices are used in construction sites:

- Signs;
- Pavement Markings;
- Channelizing Devices;
- Arrow Panels; and
- Warning Lights.

Procedures for installing traffic control devices at any construction sites vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. However, regardless of where the construction takes place, all the construction sites should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary “STOP” and “GO”).

The construction sites should take into consideration, for the space required for a buffer zone between the workers and the traffic (lateral and longitudinal), and the transition space required for delineation, as applicable. For the construction works, a 30 centimeter clearance between the traffic and the temporary STOP and GO signs should be provided. In addition, at least 60 centimeters is necessary to install the temporary traffic signs and cones.

Traffic police should regulate traffic away from the construction sites and enforce the traffic diversion outcome from full street closure in certain areas during construction. Flaggers and personnel should be equipped with reflective jackets at all times and have traffic control batons (preferably the LED type) for regulating the traffic during night time.

In addition to the delineation devices, all the construction workers should wear fluorescent safety vests and helmets in order to be visible to the motorists at all times. There should be provision for lighting beacons and illumination for night constructions.

6. SITE WORKERS TRAFFIC

Site personnel should not be permitted to park vehicles right on the road; this will lead to disruption in material deliveries. Designated parking areas with appropriate parking space will be needed for this purpose; any plain area near construction site can be used for this purpose.

7. SITE RULES

- Access to and from the site must be only via the specified entrance;
- On leaving the site, vehicles must be directed to follow the directions given;
- Drivers must adhere to the site speed limits;
- All material deliveries to site must keep allocated time limits;

- No material or rubbish should be left in the loading-unloading area;
- Develop a map for alternate routes showing material delivery services;
- Assign designated personnel on site to receive deliveries and to direct the vehicles;
- Monitor vehicle movement to reduce the likelihood of queuing or causing congestion in and around the area; and
- Project vehicles should have a unanimous badge or logo on windscreen displaying that they belong to the Project.

8. CONTRACTOR'S OBLIGATION

The traffic management plan of the Contractor should be safe enough and widening of any access roads and construction of the detours (as applicable and practical) must be completed prior to start of project construction activities so that heavy vehicular transportation for construction activities do not hinder the normal course of traffic lanes. Contractor must ensure that road closures are carried out by a competent person. The Contractor obligation must include the display of traffic signs according to the need to divert the traffic volume and to guide the road users in advance. The traffic sign, traffic light should be placed from any diverting route or road marking.

The Contractor should consider the environmental and social impacts of the traffic during construction. It will be sole responsibility of the Contractor to implement a plan, which produces minimum nuisance to the local people and to the environment. Safety of the people will be given due importance. It will be under Contractor obligation to notify the traffic management plan and its later changes to Proponent, Supervisory Consultant and Traffic Police, and publish weekly programme in the local newspaper.

ANNEXURE-IX: SANITATION PLAN

1. INTRODUCTION

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

2. PURPOSE OF THE PLAN

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

3. MANAGEMENT OF SANITATION DURING CONSTRUCTION PHASE

i) Responsibility

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

ii) Location of Camp Sites

- The accommodation and ancillary facilities for labor shall be constructed and maintained to standards and scales approved by the Resident Engineer.
- The camps must be located such that the drainage from and through the camps shall not endanger any domestic or public water supply.
- All sites must be managed to avoid ditches and depressions to minimize nuisance due to stagnant water.

iii) Water Supply

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

Potable water supply systems for labor camps occupants shall meet the drinking water quality standards of NEQS, 2000. In addition, the design of water system facilities shall be based on the suppliers Engineer's estimates of water demands. The drinking water must be monitored regularly for drinking water quality parameters.

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

iv) Toilet Facilities and Hygiene

According to health and safety guidelines OR-OSHA number of toilets required at construction site is as one (01) toilet for 20 workers. **Table 1** shows the number of toilets required in accordance with the number of employees at construction site. The total numbers of employees at construction sites are estimated to be 25 persons.

Table 1: Number of Toilets Required for Employees at Construction Site

No. of Employees	No. of Toilets and Urinals by OSHA	Total No. Toilets and Urinals Required at Construction Site
Up to 20 Employees	1 Toilet	2 Toilets
Up to 40 Employees	1 Urinal	2 Urinals

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

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

A toilet room must be located within 200 feet of the camp. No toilet may be closer than 100 feet to kitchen and sleeping area.

These toilets must be distinctly marked by signs printed in native language of the persons occupying the camp, or marked with easily understood pictures or symbols.

Urinals troughs in privies must drain freely into the pit or vault, and the construction of this drain must be such as to exclude flies and rodents from the pit.

Proper facility for hand washing and other cleaning activities to be provided as follows:

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

v) Waste Disposal

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

Garbage bins must be provided in the camps and regularly emptied and the garbage disposed of in a hygienic manner.

Unless otherwise arranged for by the local sanitary authority, arrangement for disposal of excreta should be done in the already existing sewerage system in the area.

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

vi) Maintenance of Sanitary Facility

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

All buildings, rooms and equipment and the grounds surrounding them shall be maintained in a clean and operable condition, and be protected from rubbish accumulation.

All necessary means shall be employed to eliminate and control any infestations of insects and rodents within all parts of any labor camp.

4. MANAGEMENT OF SANITATION DURING OPERATIONAL PHASE:

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

- Site Clearance;
- Sewage Pipe Clearing, and
- Solid Waste Management.

i) Site Clearance

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

ii) Solid Waste Management

Municipal solid waste produced in and around the construction site will be collected and managed properly by the contractor. Waste bins will be placed in and around the construction site; regular cleaning of the construction site shall be carried out using mechanical sweepers and at least two (02) to four (04) sweepers will be deputed for the proposed Project to assure regular cleaning.

iii) Awareness and Training

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

ANNEXURE-X: WASTE MANAGEMENT PLAN

CONSTRUCTION WASTE MANAGEMENT PLAN

Construction waste material consists mainly of concrete, masonry, limestone, sandstone, metal, and wood, depending on the construction type. In building waste, a larger percentage of paper, plastic, etc. expected due to packaging materials and the wood retired from formwork and scaffolding. This is in addition to significant amounts of concrete, masonry and metal materials.

1. ORIGINS AND CAUSES OF CONSTRUCTION WASTE

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

ORIGINS OF WASTE	CAUSES OF WASTE
	▪ Packaging.
Other	▪ Weather; ▪ Vandalism; and ▪ Theft.

2. CONSTRUCTION WASTE MANAGEMENT PLAN

a. Waste Management Goals

To establish clear goals with respect to waste management and the processes shall be employed to ensure that this goal is met. These shall include prevention of damage to materials to be incorporated into the work due to mishandling, improper storage, contamination, inadequate protection or other factors as well as minimizing poor quantity estimation, as well as through building design.

b. Responsibility

- The PMIU shall be responsible for the implementation of the administrative portions of this program, including the notification of subcontractor management, the training of the site supervisor and the onsite posting of this plan; and
- The site supervisor will be responsible for the implementation of the onsite portions of this program including the training of subcontractor personnel.

c. Waste Prevention Planning

- In addition to other requirements specified herein it is a requirement for the work of this Project that the contractor comply with the applicable city waste disposal requirements;
- Of the inevitable waste that is generated, the waste materials designated in this specification shall be salvaged for reuse and or recycling where practical and possible;
- Project Construction Documents: The General Contractor will contractually require all subcontractors to comply with these recycling guidelines. A copy of this “Construction Waste Management Plan” will accompany all subcontractor agreements and require subcontractor participation; and
- The “Construction Waste Management Plan” shall be implemented and executed as follows and as on the chart:
  - Salvageable materials will be diverted from disposal where feasible;
  - There will be a designated area on the construction site reserved for materials that can be recycled;
  - Areas shall be marked to designate what recycle materials are to be stored there; and
  - Hazardous waste will be managed by a licensed hazardous waste vendor.

d. Communication & Education Plan

- This Construction Waste Management Plan will be posted onsite;
- Each subcontractor will be made aware of the intent of this Project with respect to reduction of waste and recycling;
- Onsite recycling containers and/or areas will be plainly marked;

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

e. Motivation Plan

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

f. Expected Project Waste, Disposal, and Handling

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

Material	Disposal Method	Handling Procedure
Land Clearing Debris	Keep separate for reuse and or wood sale. Separate topsoil and rock for future landscaping use.	Keep separated in designated areas onsite.
Clean Dimensional Wood and Palette Wood	Keep separate for reuse by on-site construction or by site employees for either heating stoves or reuse in home projects. May be offered to public.	Keep separated in designated areas onsite.
Plywood, OSB and Particle Board	Reuse onsite when possible, landfill or recycle off site.	Keep separated in designated areas onsite. Place in “Trash” container.
Painted or Treated Wood	Reuse, off site recycle and landfill.	Keep separated in designated areas onsite. Place in “Trash” container.
Concrete	Recycle when possible.	Keep separated in designated areas onsite.
Concrete Masonry Units	Keep separate for re-use by on-site construction or by site employees.	Keep separated in designated areas onsite.
Metals	Recycle off site when possible. Separate copper wire when possible.	Keep separated in designated areas onsite. Place in “Metals” container.
Paint	Reuse onsite.	Keep separated in designated areas onsite.
Insulation	Reuse and landfill.	Keep separated in designated areas onsite.

Material	Disposal Method	Handling Procedure
Flooring	Reuse and landfill.	Keep separated in designated areas onsite.
Carpet and Pad	Reuse or recycle with carpet manufacturer.	Keep separated in designated areas onsite.
Glass	Glass Bottles: recycle locally.	Keep separated in designated areas onsite.
Plastics	Plastic Bottles: recycle locally; be aware of plastics that are acceptable to recycle facility.	Keep separated in designated areas onsite.
Beverage	Recycle locally	Keep separated in designated areas onsite.
Cardboard	Recycle locally	Keep separated in designated areas onsite.
Paper and Newsprint	Recycle locally	Keep separated in designated areas onsite.

3. WASTE DISPOSAL COMPANY

The contractor shall engage a licensed waste transporter and disposal facility, where required, in accordance with applicable regulatory requirements. Details of the proposed waste disposal company, including contact information and relevant licenses/authorizations, shall be submitted to the PMIU/Supervision Consultant (SC) for review and approval prior to mobilization. Waste transfer records/manifests shall be maintained for all off-site waste disposal.

4. RECYCLE HAULER

Recyclable materials shall be transported by a licensed recycling contractor or authorized recycler, where applicable. If recyclable materials are transported directly by the contractor/builder, they shall be delivered only to authorized recycling facilities. Details of the recycler/hauler and contact information shall be submitted to the PMIU/SC prior to mobilization, and records of recycled materials shall be maintained.

5. POSSIBLE RECYCLE LOCATIONS AND ACCEPTABLE MATERIALS

- Coordinate with companies which are registered with local Municipality that accept materials for recycle; and
- Using the above as a resource, a list will be kept indicating local opportunities for recycle of expected materials. New locations shall be added as needed.

ANNEXURE-XI: SERVICE CONTINUITY PLAN

Service Continuity Plan (SCP)

1.1 Introduction

The Service Continuity Plan (SCP) has been developed to ensure uninterrupted delivery of essential healthcare services during the implementation of KPHSSP. The objective is to minimize disruption to hospital operations while ensuring patient safety, maintaining access to critical services, and enabling coordinated execution of construction activities.

1.2 Scope of the Plan

The SCP applies to all rehabilitation-related activities within operational hospital premises, including internal refurbishment, utility upgrades, minor excavation works, and temporary relocation of selected hospital units. Since all works are confined within existing hospital boundaries, the approach emphasizes phased execution, careful planning, and continuous coordination with hospital administration to maintain service delivery.

1.3 Continuity of Critical Healthcare Services

Critical services shall remain operational through hospital-specific phasing, approved temporary relocation arrangements, emergency access plans, backup utilities, infection-control barriers, and prior communication with hospital administration.

(i) Phased Implementation and Work Scheduling

Rehabilitation works will be executed in small, manageable phases to avoid simultaneous disruption of multiple departments. High-impact activities such as demolition, drilling, and heavy equipment operation will be scheduled during off-peak hospital hours.

(ii) Temporary Relocation of Hospital Units

Where necessary, selected hospital units will be temporarily relocated within available spaces such as vacant rooms or designated temporary areas. These arrangements will be made in coordination with hospital administration and will use temporary partitions or modular setups. All relocations will be clearly communicated to hospital staff, patients, and visitors to ensure continuity and avoid confusion.

1.4 Emergency Access and Internal Traffic Management

Emergency access routes and ambulance movement will remain fully functional at all times. Temporary diversions, where required, will be clearly identified and communicated. Traffic management measures will include segregation of construction and hospital traffic, installation of signage, and deployment of personnel at key locations to ensure safe and uninterrupted movement within hospital premises.

1.5 Utility Continuity

Continuous availability of essential utilities including electricity, water supply, sewerage, and medical gas systems will be ensured throughout the construction period. Any unavoidable interruptions will be planned in advance, approved by hospital administration, and executed within the shortest possible duration with appropriate backup arrangements.

1.6 Patient, Staff, and Visitor Movement

Safe and clearly marked pathways will be maintained for patients, staff, and visitors throughout the project. Temporary access routes will be installed where required, along with protective barriers separating construction zones from operational hospital areas. Signage and directional information will be provided to minimize disruption and ensure safe navigation.

1.7 Infection Prevention and Control (IPC)

Strict infection prevention and control measures will be implemented to safeguard patients and healthcare staff. Construction zones will be physically isolated, dust control measures will be applied, and access to sensitive areas such as ICUs and OTs will be strictly controlled in accordance with hospital IPC protocols.

1.8 Coordination, Communication, and Stakeholder Engagement

Continuous coordination will be maintained between the contractor, supervision consultant, and hospital administration. Regular meetings will be held to plan activities, resolve operational issues, and monitor service continuity. Advance communication regarding relocations, access changes, or temporary disruptions will be provided through signage, staff briefings, and institutional communication channels.

1.9 Grievance Redress Mechanism

A site-specific grievance redress mechanism will be established at each hospital to address concerns from patients, staff, and visitors. A designated focal person or Community Liaison Officer will manage complaints, ensure timely resolution, and escalate issues where necessary.

1.10 Monitoring and Compliance

Regular monitoring will be conducted to ensure effective implementation of the SCP. This will include daily coordination with hospital management, periodic inspections of access routes and service areas, and documentation of incidents, complaints, and corrective actions.

1.11 Restoration and Post-Construction Activities

Upon completion of rehabilitation works, all temporary arrangements will be dismantled and affected areas will be restored to their original or improved condition. Relocated hospital units will be shifted back to their designated locations in coordination with hospital administration, followed by final inspection and formal approval.

1.12 Conclusion

The implementation of this Service Continuity Plan will ensure that rehabilitation activities are executed in a controlled, phased, and coordinated manner, minimizing disruption to healthcare services. With effective planning and continuous stakeholder engagement, impacts on hospital operations will remain temporary, localized, and manageable across all project sites.

ANNEXURE-XII: EMERGENCY RESPONSE PLAN

1. PURPOSE

The purpose of this Emergency Response Procedure is to provide measures and guidance for the establishment and implementation of emergency preparedness plans for the proposed Project. The aim of the Emergency Response Procedure is to:

- Ensure all personnel and visitors to the office/job sites are given the maximum protection from unforeseen events; and
- Ensure all personnel are aware of the importance of this procedure to protection of life and property.

2. EMERGENCY PREPARATION AND RESPONSE MEASURE SCOPE

The emergency management program is applied to all Project elements and intended for use throughout the Project life cycle. The following are some emergencies that will require coordinated response:

- Construction Accident;
- Road & Traffic Accident;
- Hazardous Material Spills;
- Structure Collapse or Failure;
- Trauma or Serious Illness;
- Sabotage;
- Fire;
- Environmental Pollution;
- Loss of Person; and
- Community Accident.

3. RESPONSIBILITIES

The detailed roles and responsibilities of certain key members of the Emergency Response team available to assist in emergency are provided in **Table 1** below.

Table 1: Emergency Response Team

Action Group	Responsibility
Emergency Coordinator	▪ Overall control of personnel and resources. ▪ The Emergency Coordinator will support and advise the Site Safety Supervision as necessary. ▪ Serves as public relations spokes persons, or delegates to some staff member the responsibility for working with news media regarding any disaster or emergency. Also assure proper coordination of news release with appropriate corporate staff or other designated people.
Site Safety Supervision (Emergency Commander)	▪ Overall responsibility for activating emergency plan and for terminating emergency actions. ▪ Be alternative of emergency response chairpersons. ▪ Disseminates warnings and information as required to ensure all people in the immediate area have been warned and evacuated either by alarms or by word of mouth. ▪ Supervise the actions of the Emergency Response Team to ensure all persons are safe from the danger. ▪ Notify outside authorities if assistance is required.

Action Group	Responsibility
	▪ Carries the responsibility for coordinating actions including other organizations in accordance with the needs of the situation. ▪ Ensure maximum co-operation and assistance is provided to any outside groups called to respond to an emergency. ▪ Establish and appoint all emergency organization structure and team. ▪ Assures adequate delegation of responsibilities for all key positions of assistants on the Project to assist with any foreseeable emergency. ▪ Ensure resources available to purchase needed emergency response equipment and supplies. ▪ Assures that all persons on the Emergency Response Team aware and fully understand their individual responsibilities for implementing and supporting the emergency plan. ▪ Establish the emergency drill schedule of all identified emergency scenarios, track the status and evaluate the emergency. ▪ The Emergency Commander shall ensure that senior management personnel have been reported of the emergency as soon as practical after the event.
Security Team	▪ Ensure that the exit route is regularly tested and maintained in good working order. ▪ Maintain station at the security gate or most suitable location to secure the area during any emergency such that only authorized personnel and equipment will enter, prevent access to the site of unauthorized personnel. ▪ Assist with strong/activation of services during an emergency. ▪ Ensure vehicles and obstructions are moved to give incoming emergency vehicles access to the scene, if ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct any incoming emergency service to the site of emergency.
Rescue & Medical Team	▪ Protect the injured from further danger and weather. ▪ Provide treatment to the victim(s) to the best of their ability by first aid and then transfer to hospital. ▪ Remain familiar with the rescue activities and rescue apparatus. ▪ Assist outside medical services personnel when they arrive
General Administration Team	Response to support any requested general facilities for assisting Emergency Response Team in their work.
Government Relation Team	▪ Coordinate with local government on a matter of concerned in the emergency response plan to liaise with local officers in their affair for support Emergency Response Team. ▪ Coordinate emergency plan with the government authorities, local community.
Environment Team	In case of emergency related to the environmental pollution such as the chemical spill, oil spill into the ambient, the environment team will support the technical advice to control and mitigate the pollution until return to the normal situation.
Department Heads	▪ Call up of personnel into the safe location for protective life and property. ▪ Take immediate and appropriate action while Emergency Response Team is being mobilized. ▪ Keep in touch with the Emergency Commander ▪ Control and supervise operators and contractors on the implementation of this procedure, with consultation with Safety Team as necessary. ▪ Provide and maintain emergency equipment of their responsible areas.
Other Staff and Employees	▪ All other staff and employees will remain at their workstations or assembly point unless directed otherwise from Emergency Response Team.

Action Group	Responsibility
	▪ Each supervisor will ensure that all members of his/her work group are accounted for and keep in touch with each of their Department Head.

4. PROCEDURE

Emergency situation and injuries to person can occur at any time or place either on Project site or elsewhere. The most two common types of emergencies on site are fire and serious accident. The emergency procedures for fire and serious accident is shown in **Figure 1** and **2** respectively.

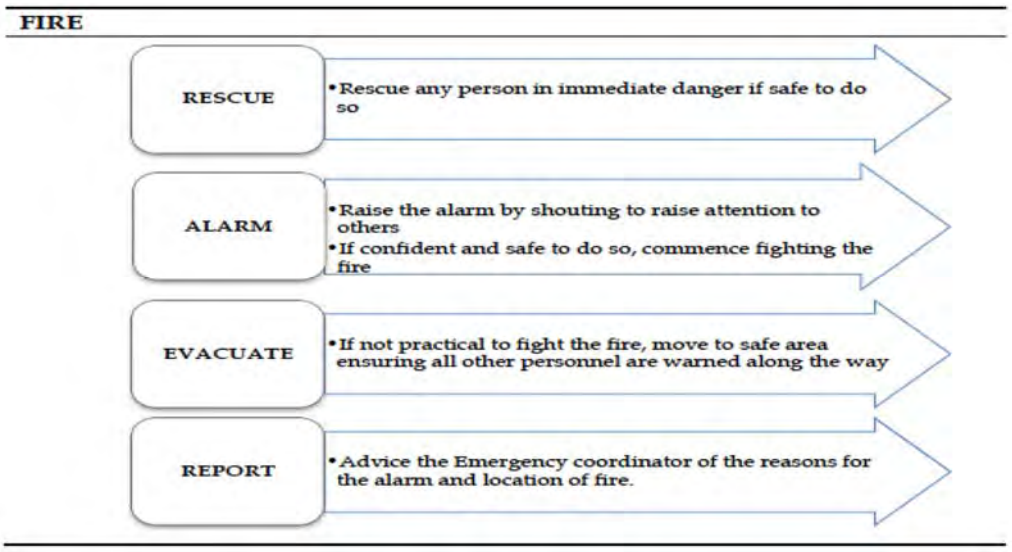


Figure 1: Emergency Procedures for Fire

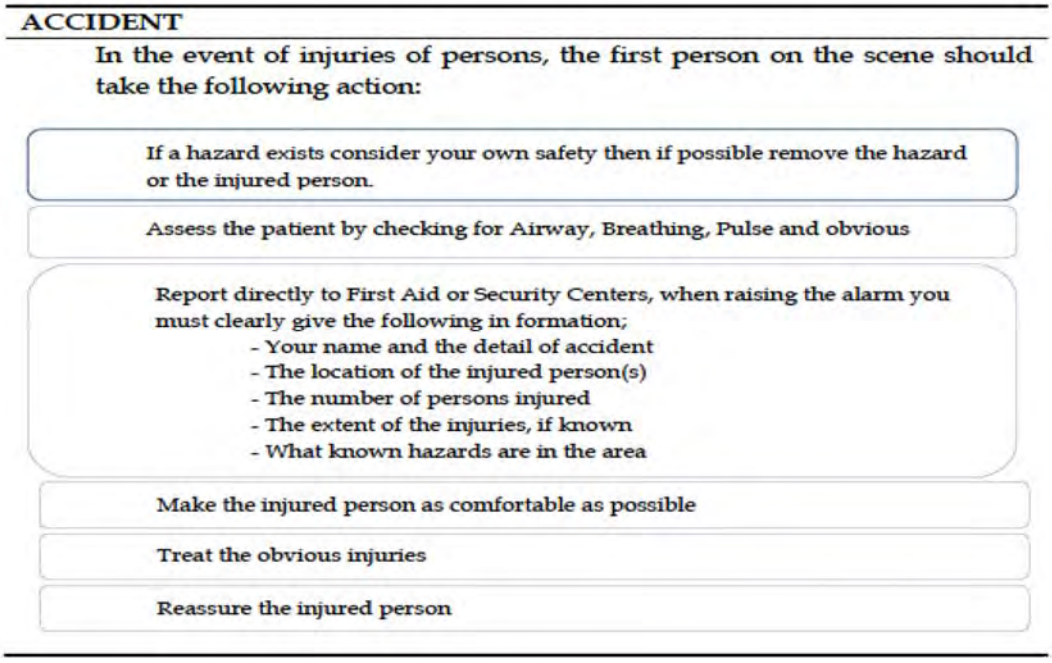


Figure 2: Emergency Procedures for Serious Accident

5. COMMUNICATION WITH AUTHORITIES / PRESS AT SITE

In the event of an accident or incident, only senior staff is permitted to give factual information to the authorities for resource of liability exposure. The press must be avoiding politely, at all costs, with the terse comment that “the matter is under investigation and relevant information when available will be provided by our Head Office”. Do not ever give your opinion or story.

6. First Aid Persons

Upon advice of medical emergency, make immediate assessment to response required and if necessary, advise security to summon ambulance or medical assistance, the qualified first aid attendant should also:

- Provide treatment to the victim(s) to the best of his/her ability;
- Ensure the safety of victims by ceasing any work activity in the area;
- Protect the injured from further danger and weather; and
- Assist medical services personnel when they arrive.
-

7. General Administration Team

Upon advice of medical emergency, maintain contact with First Aid personnel and summon ambulance if required.

8. Security Team

- If ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct vehicle closest to the scene; and
- Prevent access to the site of unauthorized personnel (press, etc.).

9. Emergency Coordinator

- The Emergency Coordinator shall assist emergency personnel at the scene as required through allocation of company resources;
- The Emergency Coordinator shall ensure next-of-kin are properly notified as soon as possible and give whatever company support and assistance is necessary to assist them bundle the situation; and
- The Emergency Coordinator shall ensure that senior management personnel are advised of the emergency as soon as practical after the event.

The emergency response procedure is shown in **Figure 3**.

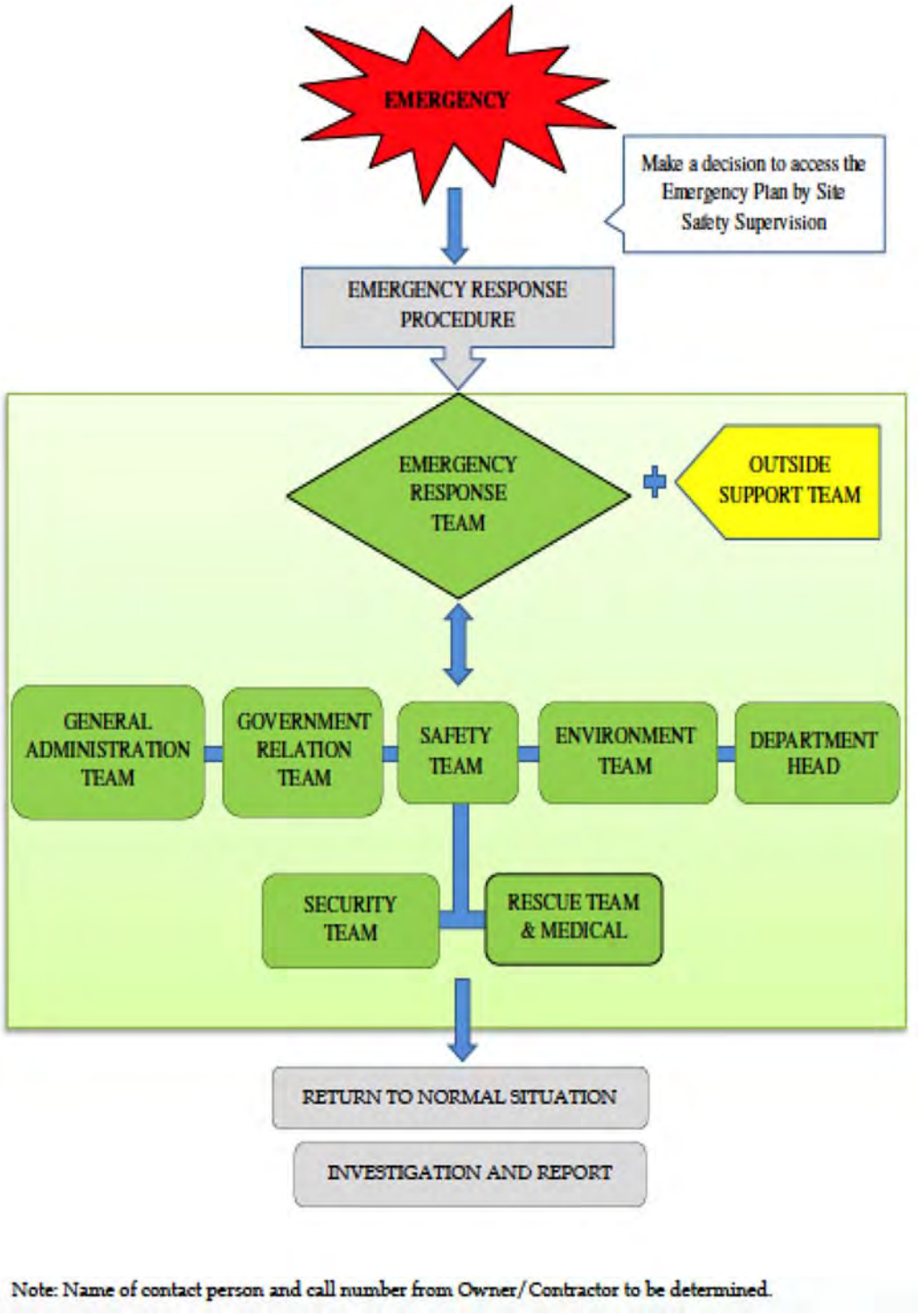


Figure 3: Emergency Response Procedure

10. INCIDENT AND ACCIDENT REPORT

Section A: Identification Data

Report No:	Date of Reported:	Reporter:	Sign:
Job Title:		Company Name:	

Section B: Violence Rate

Accident Violence: ☐ 01-Death ☐ 02-Serious Injury ☐ 03-Lost Time Injury ☐ 04-First Aid ☐ 05- Not Injury ☐ 06-Near Miss

Property Damage Cost: ☐ 1-2,000 USD ☐ 2,001-10,000 USD ☐ 10,001-50,000 ☐ > 50,001

Section C: Environmental Impact

Affected area	☐ Construction area	☐ Public area	
Receptor	☐ None	☐ Workers	☐ Community
Type of pollution	☐ Physical	☐ Chemical	☐ Biological
Toxicity	☐ Non-toxic	☐ Low - toxic	☐ High - toxic
Return to Normal	☐ 1 day	☐ 1 day to 1 week	☐ ≥ 1 week
Cumulative impact	☐ Non-cumulative	☐ Cumulative	

Section D: Injured/Illness Employee

1.Name:	Sex:	Date of Birth: Month	Day	Year	Age:	Regular Job Title:	Experience: In this job title Years	Weeks	In this Project Years	Weeks
	☐ Male ☐ Female									

Site:	Company:	Reference:	Phone No:	Social Security Number

Part of Body Injured or Affected:

☐ Head ☐ Hands ☐ Face ☐ Nose
☐ Eyes ☐ Legs ☐ Teeth ☐ Neck
☐ Trunk ☐ Toes ☐ Elbow ☐ Shoulder
☐ Back ☐ Ankle ☐ Wrist ☐ Foot
☐ Arms ☐ Thump ☐ Fingers ☐ Internal

Remark: .....

Nature of Injury or Illness:

☐ Laceration ☐ Amputation ☐ Puncture ☐ Fracture
☐ Strain & Sprain ☐ Burns ☐ Contusion ☐ Dry Heat Friction
☐ Hernia ☐ Foreign Body ☐ Chemical ☐ Contamination
☐ Skin (Occupationnel) ☐ Rash ☐ Irritation

Remark: .....

2.Name:	Sex:	Date of Birth: Month	Day	Year	Age:	Regular Job Title:	Experience: In this job title Years	Weeks	In this Project Years	Weeks
	☐ Male ☐ Female									

Site:	Company:	Reference:	Phone No:	Social Security Number

Part of Body Injured or Affected:

☐ Head ☐ Hands ☐ Face ☐ Nose
☐ Eyes ☐ Legs ☐ Teeth ☐ Neck
☐ Trunk ☐ Toes ☐ Elbow ☐ Shoulder
☐ Back ☐ Ankle ☐ Wrist ☐ Foot
☐ Arms ☐ Thump ☐ Fingers ☐ Internal

Remark: .....

Nature of Injury or Illness:

☐ Laceration ☐ Amputation ☐ Puncture ☐ Fracture
☐ Strain & Sprain ☐ Burns ☐ Contusion ☐ Dry Heat Friction
☐ Hernia ☐ Foreign Body ☐ Contamination ☐ Chemical
☐ Skin (Occupationnel) ☐ Rash ☐ Irritation

Remark: .....

Section E: Accidents/incident Details

Date Accident/Incident Occurred:	Time Accident/Incident Occurred:	Exact Location of the Accident / Incident:

Details of the actual Job Being done at the time:

Details of Accident / Incident / What actually happened?

Section F: Accident Cause (Basic cause mark X / Contributing cause, if any mark O)

UNSAFE CONDITIONS		UNSAFE ACTS	
1	☐ Inadequately Guarded	1	☐ Operating Without Authority / Training
2	☐ Unguarded	2	☐ Operating at Unsafe Speed
3	☐ Defective Tools, Equipment, or Substance	3	☐ Marking SHE Device Inoperative
4	☐ Unsafe Design or Construction	4	☐ Using Unsafe Equipment or Equipment Unsafely
5	☐ Hazardous Arrangement	5	☐ Unsafe Loading, Placing, Mixing
6	☐ Unsafe Illumination	6	☐ Taking Unsafe Position
7	☐ Unsafe Ventilation	7	☐ Working on Moving or Dangerous Equipment
8	☐ Unsafe Clothing	8	☐ Distraction, Teasing, Horse Play
9	☐ Insufficient Instruction	9	☐ Failure to use Personal Protective Devices
10	☐ Lack of system of work	10	☐ Lack of effective instruction or supervision

Why was the unsafe act committed?_____ Why did the unsafe condition exist?_____

Section G: Guide to Corrective Action (Base on the cause checked above, I am taking the following corrective action)

UNSAFE ACT	UNSAFE CONDITION	If Supervisor can't handle, then recommend to
☐ Stop the Behaviour	☐ Remove	☐ Site Engineer, or
☐ Study the job	☐ Guard	☐ Site Manager, or
☐ Instruct (tell-show-try-check)	☐ Warn	☐ Project Manager, or
☐ Follow Up	☐ Supervisory Training	☐ Safety Committee
☐ Enforce		

Detail below any immediate remedial actions that have been taken:

Detail below any corrective and preventative actions that could be taken to prevent future re-occurrence:	Responsible	Completion Date

Section H: Witness Statement	
Witness Name	Interviewer Name

Section I: Reviewed & Recommend by			
Recommendation:			
Reviewed By:	Position:	Signature:	Date:

Remarks : If Accident or Incident happened with lost time injury and affected to the publicity must further report to Safety Department;
: First Aid Cases will not applicable to this form;
: The accident report shall submit to Safety Department within 3 days
: Attached the photograph or sketch the location of accident / incident;

11. Suggested Contents of ERP

The Contractor should prepare the ERP based on the guidelines provided in the above sections. The suggested structure of the ERP is listed below:

1. Purpose;
2. Applicable Scope;
3. Preparation Basis;
4. Emergency Response System:
   - 4.1 Generals;
   - 4.2 Emergency Response System; and
   - 4.3 Responsibilities.
5. Major Safety Risks;
6. Precautionary Measures:
   - 6.1 Training and Exercise ;
   - 6.2 Hazard Source Monitor;
   - 6.3 Alert Action; and
   - 6.4 Management Measures.
7. Control Measures:
   - 7.1 Response;
   - 7.2 Response Procedures;
   - 7.3 Emergency Response; and
   - 7.4 Emergency Completion and Restoration.
8. Emergency Response Report and Settlement;
9. Supporting Measures:
   - 9.1 Communication;

9.2 Emergency Team;
9.3 Funding for Emergency; and
9.4 Provisions and Resources.

10. Records.

ANNEXURE-XIII: CHANCE-FIND PROCEDURE

CHANCE FIND PROCEDURE

Project will involve small scale excavation. Therefore, the possibility of chance find is not ignorable. In case of any chance find, the contractor will immediately report through Supervision Consultant to Deputy Secretary (Heritage) of Archeology and Museums Department, Government of Pakistan to take further suitable action to preserve those antique or sensitive remains. Representative of the Deputy Secretary (Heritage) will visit the site and observed the significance of the antique, artifact and cultural (religious) properties and significance of the Project. The report will be prepared by the representative and will be given to the Deputy Secretary (Heritage). The documentation will be completed and if required suitable action will be taken to preserve those antiques and sensitive remains.

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

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

The contact Address of Directorate General of Archeology and Museums KPK is given below:

Address	Jail Road, adjacent to Archives and libraries department, Finance Department, Civil Secretariat, Peshawar, Pakistan
Contact Number	0092-91-9211488
Fax Number	0092-91-9211194
Email Address	info.archaeology@kp.gov.pk

ANNEXURE-XIV: LISTS OF CONSULTATION PARTICIPANTS

DHQ Batagram

NATIONAL ENGINEERING SERVICES OF PAKISTAN (PVT) LIMITED

Date 05-05-2026

List of Participants

Sr. No.	Name/Father Name	Occupation	Signature/ Thumb
1	Amjadullah	Pvt Tobi.	
2	Aurangzeb	Labour.	
3	Asif Khan	Pvt. Worker	
4	Sajjad	Stall.	
5	Wallidllah	Carpenter	
6	Tahir Khan	Iron Shop.	
7	Shahid Muhammad	Doctor	
8	Ibrar Khan	Pvt Worker	
9	Najeebullah	Security Guard.	

NATIONAL ENGINEERING SERVICES OF PAKISTAN (PVT) LIMITED

25-04-2026

List of Participants DHQ Chitral

Sr. No.	Name/Father Name	Occupation	Signature/ Thumb
1	Saqib ur Rehman	Govt Job	
2	Syed Anwar	Businessman	
3	Rehmat Nabi	Labour	
4	Waseem Afzal	Govt Job	
5	Jahan Zaib	Govt Job	Jahan Zeb
6	Syed Jamal Shah	Businessman	
7	Yasmin Bibi	Govt Job	Yasmin Bibi

NATIONAL ENGINEERING SERVICES OF PAKISTAN (PVT) LIMITED

Date 22-04-2026 List of Participants DHQ Lakki Marwat

Sr. No.	Name/Father Name	Occupation	Signature/ Thumb
1	Shahmas-u-Rehman	Farmer	-
2	Muhammad Shoaib	Govt Job	Muhammad Shoaib
3	Ikram-ullah Jan	private Job	
4	Shaukat-Ullah	Govt Job	Shaukat Ullah
5	M. Danyal	Private Job	M. Danyal
6	Muhammad Javed	private Job	Javed
7	Ghulam Qadar	Govt Job	
8	Salah-ud-din	Govt Job	Salah-ud-din

DHQ Bathhella

NATIONAL ENGINEERING SERVICES OF PAKISTAN (PVT) LIMITED

Date 17-04-2026

List of Participants

Sr. No.	Name/Father Name	Occupation	Signature/ Thumb
1	Aziz ul Haq	Doctor	
2	Kibakullah	"	
3	Mustasimbillah	Govt: Employee	
4	M. Saad	Pvt. Job.	
6	Abdullah	Business	
7	Hassan Ali	Scrap work.	
8	Imdadullah. ~~Amjad Ullah~~	Doctor	
9	Maaz Khan	Pvt Job.	
10	M. Waqas	Shopkeeper	
11	Shafiullah	Labourer	
12	Aziz Ahmed	Agriculturist	

NESPAK

NATIONAL ENGINEERING SERVICES OF PAKISTAN (PVT) LIMITED

Date 18-04-2026 List of Participants DHQ Mansehra

Sr. No.	Name/Father Name	Occupation	Signature/ Thumb
1	Khurram Mujahid	Private Job	
2	Jamal	Labour	
3	Sahail Akbar	Govt Job	Sahail
4	Nousik Ahmed	//	Atiq Ahmed
5	Dr. Daheen	//	
6	Saba Ayub	//	Saba Ayub
7	Sher Bahadar	//	Sher Bahadar
8	Arshad Hussain	//	
9	Subhan	Private Job	

NATIONAL ENGINEERING SERVICES OF PAKISTAN (PVT) LIMITED

Date 27-04-2026 List of Participants DHQ Shangla

Sr. No.	Name/Father Name	Occupation	Signature/ Thumb
1	Sharif ullah	Businessman	
2	Shahid Ali	Labour	Shahid Ali
3	Tahir Ali	Farmer	
4	M Sajid	Govt Job	
5	Riaz khan	Govt Job	Riaz Khan
6	Nadeem	Govt Job	Nadeem Ali
7	Rehmat Ali	Govt Job	

NATIONAL ENGINEERING SERVICES OF PAKISTAN (PVT) LIMITED

Date- 20-04-2026 List of Participants DHQ Tank

Sr. No.	Name/Father Name	Occupation	Signature/ Thumb
1	Muhammad Shafiq	Labour	
2	M. Sabir	Govt Job	M. Sabir
3	Sher Gull	Business man	Sher Gull
4	Abdul Wakeel	Govt Job	Abdul Wakeel
5	Sana - ullah	Business Man	Sana ullah
6	Fazal Rahim	Unemployment	
7	Abdul - Rehman	Private Job	
8	Sami - ullah	Business man	—
9	Zia - ud - din	Private Job	Zia-ud-din

DHQ Saidu Shareef

NATIONAL ENGINEERING SERVICES OF PAKISTAN (PVT) LIMITED

Date 16-04-2026 List of Participants

Sr. No.	Name/Father Name	Occupation	Signature/ Thumb
1	Asfullah	Ward Boy	
2	M. Hussain	Storekeeper	
3	Habib ur Rehman	Teacher.	
4	Gul Farid	Labour.	
5	Anas Khan	Business	
6	Hassan Iqbal	Security Guard	
7	Mansoor Ahmed	Doctor	
8	Haider Ghat	"	
9	Kiamat Ali	"	
10	Akhtar Ali	Agriculturist	
11	Kaees Khan	Govt. employee	
12	Arshad	Business	
13	Zebair	Food Stall	
14	Ibrar Khan	Ward Boy	
15	Zulfiqar Hamid	Village Chanda Ucer	
16	Ali Iqbal	Pvt. Job.	

NATIONAL ENGINEERING SERVICES OF PAKISTAN (PVT) LIMITED

Date 07-05-2026 List of Participants DHO Kohistan

Sr. No.	Name/Father Name	Occupation	Signature/ Thumb
1	Imam-ullah	Private Job	
2	M. Usama	Farmer	Usama
3	M. Umar	Farmer	
4	Qasim Shah	Business Man	Qasim Shah
5	Gul Zareen	Farmer	
6	Siraj Ahmad	Govt Job	Siraj Ahmad
7	Tanveer Shah	Private Job	Tanveer Shah

ANNEXURE-XV: TREE PLANTATION PLAN

Tree Plantation Plan

Introduction

This is general Tree Planation Plan for Hospitals of the eleven (11) districts in KPK. It is meant to make provision for the landscaping and trees planation in each hospital. Each site has variable space and outdoor setting. The plan gives the generic provision for each site. The choice of trees, shrubs for each site would according to the available space and site conditions.

1. Objective

The objective of the tree plantation plan is to improve the hospital environment by:

- Enhancing air quality
- Providing shade and cooling
- Reducing noise pollution
- Creating a healing and calming environment for patients and staff
- Supporting biodiversity and environmental sustainability

2. Proposed Plantation Areas

Tree plantation should be planned strategically in the following areas:

1. **Entrance and Main Gate Area**
   - Decorative and shade trees to enhance aesthetics.
2. **Parking Areas**
   - Large canopy trees for shade and heat reduction.
3. **Boundary Walls**
   - Rows of trees to act as noise and pollution barriers.
4. **Patient Garden / Healing Garden**
   - Flowering and fragrant trees for relaxation.
5. **Walkways and Internal Roads**
   - Medium-sized shade trees planted at regular intervals.
6. **Open Spaces / Vacant Land**
   - Mixed native tree species for biodiversity.

3. Recommended Tree Species

Native and low-maintenance species are recommended.

Category	Tree Species	Benefits
Shade Trees	Neem, Rain Tree, Banyan	Cooling, air purification
Flowering Trees	Gulmohar, Jacaranda, Tabebuia	Beautification
Medicinal Trees	Neem, Amla, Arjuna	Health benefits
Fragrant Trees	Champa, Mogra	Calming environment

Fruit Trees	Mango, Guava, Jamun	Biodiversity

4. Plantation Design and Spacing

- Large trees: **6–8 meters spacing**
- Medium trees: **4–6 meters spacing**
- Small ornamental trees: **3–4 meters spacing**
- Boundary plantations: **staggered double rows**

5. Implementation Plan

Step 1: Site Assessment

- Identify available spaces
- Soil testing
- Mark plantation locations

Step 2: Pit Preparation

- Pit size: **1 m × 1 m × 1 m**
- Fill with mixture of soil, compost, and organic manure.

Step 3: Plantation

- Best time: **Monsoon season**
- Plant healthy saplings (1–2 years old)

Step 4: Protection

- Install tree guards
- Mulching around base

6. Maintenance Plan

Proper maintenance ensures survival and growth.

Activity	Frequency
Watering	2–3 times per week (first year)
Weeding	Monthly
Fertilization	Twice per year
Pruning	Annually
Pest Control	As needed

7. Community Participation

- Organize **Tree Plantation Day**
- Involve doctors, staff, and patients
- Partner with local environmental groups
- Install **name plates for trees**

8. Expected Benefits

- Improved **air quality**
- Reduced **temperature and heat stress**
- Better **patient recovery environment**
- Enhanced **hospital aesthetics**
- Contribution to **climate change mitigation**

9. Estimated Cost

Rs.500,000/ for each Hosiptal

ANNEXURE-XVI: GUIDELINE HSE PLAN

HEALTH, SAFETY AND ENVIRONMENT PLAN

1. GENERAL

Occupational Health and Safety covers all personnel working under the Project. The Occupational Health and Safety program will aim to ensure that the workplace is safe and healthy by: addressing the hazards and risks at the workplace; outlining the procedures and responsibilities for preventing, eliminating and minimizing the effects of those hazards and risks; identifying the emergency management plans for the workplace or workplaces; and, specifying how consultation, training and information are to be provided to employees at various workplaces.

Some of the risks/hazards associated with workplaces are due to working close to or at sites associated with the various Project construction activities. Other risks associated with the Project construction phase include risk of increase of vector borne and other different diseases.

The following sections will be implemented during the construction phase to address and ensure workers' health and safety.

2. SCREENING AND REGULAR UNANNOUNCED CHECKING OF WORKERS

As per the procedure for hiring workers, all contractors and labor agencies are required to make all prospective workers undergo medical tests to screen for diseases and sicknesses, prior to selection and employment of any worker. The contractor is also responsible for ensuring that no worker who has a criminal record is employed at the Project site. It will be ensured that all workers undergo medical tests to screen diseases at source and at sites in consultation with the designated Health Officer.

In addition to this, the Proponent will also undertake sudden, unannounced checks on workers to look for diseases such as COVID-19, HIV, STDs, and hepatitis and take necessary steps as mandated by the Contractual agreement between the Contractor and the Worker(s).

3. MINIMIZING HAZARDS AND RISKS AT THE WORKPLACE

To ensure safety at all work sites, the following will be carried out:

- Installation of signboards and symbols in risky and hazardous areas, to inform workers to be careful;
- Construction of barricades around construction sites and deep excavated pits, to cordon off and deter entry of unauthorized personnel and workers into these areas;
- Providing a safe storage site/area for large equipment such as power tools and chains, to prevent misuse and loss;
- Proper Housekeeping: Ensuring that materials are all stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling, or collapse. Brick stacks will not be more than seven (07) feet in height and for concrete blocks they will not be more than six (06) feet high;

- Removing all scrap timber, waste material and rubbish from the immediate work area as the work progresses;
- Where scaffolds are required, ensuring that each scaffold or its components shall be capable of supporting its own weight and at least four (04) times the maximum intended load applied or transmitted to it. The platform/scaffold plank shall be at least 15 inches wide and 1.5 inches thick. The rope should be capable of supporting at least six (06) times the maximum intended load applied or transmitted to that rope. Pole scaffolds over 60 feet in height shall be designed by a registered professional engineer and shall be constructed and loaded in accordance with that design. Where scaffolds are not provided, safety belts/safety nets shall be provided;
- Ensure that all ramps or walkways are at least six (06) feet wide, having slip resistance threads and not inclined at more than a slope of one (01) vertical and three (03) horizontal;
- Stacking away all excavated earth at least two (02) feet from the pit to avoid material such as loose rocks from falling back into the excavated area and injuring those working inside excavated sites;
- Constructing support systems, such as bracing to adjoining structures that may be endangered by excavation works nearby;
- Only a trained electrician to construct, install and repair all electrical equipment to prevent risks of electrical shocks and electrocution; and
- Install fire extinguishers and/or other fire-fighting equipment at every work site to prepare for any accidental fire hazards.

4. PROVISION OF PERSONAL PROTECTIVE EQUIPMENT

Risks to the health and safety of workers can be prevented by provision of Personal Protective Equipment (PPEs) to all workers. This will be included in the construction cost for each Contractor. Depending on the nature of work and the risks involved, contractors must provide without any cost to the workers, the following protective equipment:

- High visibility clothing for all personnel during building works must be mandatory;
- Helmet shall be provided to all workers, or visitors visiting the site, for protection of the head against impact or penetration of falling or flying objects;
- Safety belt shall be provided to workers working at heights (more than 20 ft.) such as roofing, painting, and plastering;
- Safety boots shall be provided to all workers for protection of feet from impact or penetration of falling objects on feet;
- Ear protecting devices shall be provided to all workers and will be used during the occurrence of extensive noise;
- Eye and face protection equipment shall be provided to all welders to protect against sparks;
- Respiratory protection devices shall be provided to all workers during occurrence of fumes, dusts, or toxic gas/vapor; and
- Safety nets shall be provided when workplaces are more than 25 feet (7.5 m) above the ground or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors or safety belts is impractical.

The specific PPE requirements for each type of work are summarized below.

Table 1: PPE Requirement List

Type of Work	PPE
Elevated Work	Safety helmet, safety belt (height greater than 20 ft.) and footwear for elevated work.
Handling Work Safety	Helmet, leather safety shoes and work gloves.
Welding and Cutting Work	Eye protectors, shield, helmet and protective gloves.
Grinding Work	Dust respirator, earplugs and eye protectors.
Work Involving Handling of Chemical Substances	Dust respirator, gas mask, chemical-proof gloves, chemical proof clothing, air-lined mask and eye protectors.
Wood Working	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.
Blasting	Hard hat, eye and hearing protection.
Concrete and Masonry Work	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.
Excavation, Heavy Equipment, Motor Graders, and Bulldozer Operation	Hard hat, safety boots, gloves and hearing protection.
Quarries	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.

5. PROCEDURES TO DEAL WITH EMERGENCIES SUCH AS ACCIDENTS, SUDDEN ILLNESS AND DEATH OF WORKERS

First Aid kits will be made available at all times throughout the entire construction period by the respective contractors. In addition to the First Aid kits, the following measures will be in place:

- A designated Environment, Health and Safety Specialist for the Project will be identified as a focal person to attend to all health and safety related issues. This employee's contact number will be posted at all work sites for speedy delivery of emergency services. The focal person shall be well versed with the medical system and facilities available at the hospital; and
- Communication arrangements, such a provision of radios or mobile communication for all work sites, for efficient handling of emergencies, will be made.

6. RECORD MAINTENANCE AND REMEDIAL ACTION

The Contractor will maintain a record of all accidents and injuries that occur at the work site. This work will be delegated by the contractor to the site supervisor and regularly reviewed every quarter by supervisory consultant. Reports prepared by the contractor shall include information on the place, date and time of the incident, name of persons involved, cause of incident, witnesses present and their statements. Based on such reports, the supervisory consultant can jointly identify any unsafe conditions, acts or procedures and recommend for the contractor to undertake certain meditative actions to change any unsafe or harmful conditions.

7. COMPENSATION FOR INJURIES AND DEATH

Any casualty or injury resulting from occupational activities should be compensated as per the

local labor laws of Pakistan. Where compensation is sought by the injured party, proper procedures for documentation of the case will be followed, including a detailed report on the accident, written reports from witnesses, report of the examining doctor and his/her recommendation for treatment. Contractor will be responsible for ensuring compensation for the respective workers.

8. AWARENESS PROGRAMS

The supervisory consultant will undertake awareness programs through posters, talks, and meetings with the contractors to undertake the following activities:

- Dissemination sessions will clarify the rights and responsibilities of the workers regarding interactions with local people (including communicable disease risks, such as HIV/AIDS, COVID-19), work site health and safety, waste management (waste separation, recycling, and composting) and the illegality of poaching; and
- Make workers aware of procedures to be followed in case of emergencies such as informing the focal health person who in turn will arrange the necessary emergency transportation or treatment.

9. NOMINATION OF A HEALTH AND SAFETY FOCAL PERSON

Within Project site, a Health and Safety Focal Person will be appointed. The Terms of Reference for the focal person will mainly be as follows:

- Function as the focal person / representative for all health and safety matters at the workplace;
- Responsible for maintaining records of all accidents and all health and safety issues at each site, the number of accidents and its cause, actions taken and remedial measures undertaken in case of safety issues;
- Be the link between the contractor and all workers and submit grievances of the workers to the contractor and instructions / directives on proper health care and safety from the contractors back to the workers;
- Ensure that all workers are adequately informed on the requirement to use Personal Protective Equipment and its correct use; and
- Ensure presence of First Aid kit at site and making sure that the basic immediate medicines are readily available.

10. SUGGESTED CONTENTS OF OCCUPATIONAL HEALTH AND SAFETY PLAN

The suggested contents of Occupational Health and Safety Plan to be developed by the Contractor(s) are described below:

- Purpose;
- Scope of Application;
- Complying Basis;
- Occupational Health and Safety Objectives;
- Organization and Responsibility:
    - Contractor’s Project Manager;

  - HSE Management Department of the Contractor(s);
  - Medical Treatment Room of the Contractor(s);
  - Subcontractor's Project Manager;
  - Subcontractor's HSE Managers;
  - Occupational Health and Safety; and
  - Community Health and Safety.
- Health Plan:
  - Labor Protection; and
  - Sanitary Epidemic Prevention.
- Safety Plan:
  - Summary;
  - Qualification Review;
  - Safety Training;
  - Construction Plans and Documents;
  - Control Measures;
  - Monitoring Measures; and
  - Management of the Key Safety Accidents.
- Public Security Plan; and
- Local Community Health and Safety.

CONSTRUCTION HEALTH AND SAFETY CHECKLIST

1. GENERAL INTRODUCTION

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

2. ACCESS ON SITE

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

3. WELFARE

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

4. SCAFFOLDS

- Are scaffolds erected, altered and dismantled by competent people?
- Are all uprights provided with base plates (and where necessary, timber sole plates)?
- Are all uprights, ledgers, transoms and braces in position?
- Is the scaffold tied to the structure in enough places to prevent collapse?
- Are there double guard rails and toe boards or other suitable protection at every edge, to prevent falling?
- Are brick guards provided to prevent materials falling from scaffolds?
- Are the working platforms fully boarded and are the boards arranged to avoid tipping or tripping?
- Are there effective barriers or warning notices in place to stop people using an incomplete scaffold, e.g. where working platforms are not fully boarded?
- Is the scaffold strong enough to carry the weight of materials stored on it and are these evenly distributed?
- Does a competent person inspect the scaffold regularly, e.g. at least once a week if the working platform is two (02) meter or above in height or at suitable intervals if less than two meter (02), and always after it has been altered or damaged and following extreme weather events?
- Are the results of inspections recorded and kept?
- Have proprietary scaffolds been inspected and are they being used in accordance with suppliers' instructions?
- Have the wheels of scaffolds been locked and outriggers deployed when in use and are the platforms empty when they are moved?

5. POWERED ACCESS EQUIPMENT

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

6. TRAFFIC, VEHICLES AND PLANT

- Are vehicles and pedestrians kept apart? If not, do you:
- Separate them as much as you can and use barriers?
- Tell people about the problem, and what to do about it?
- Display warning signs?
- Can zero tail swing excavators be used or is there adequate clearance around slewing vehicles?
- Can reversing be avoided, e.g. by using a one-way system, or if not, are properly trained signalers used?
- Are vehicles and plant properly maintained?

- Have drivers received proper training and are they competent for the vehicles or plant they are operating?
- Are loads properly secured?
- Have you made sure that passengers are only carried on vehicles designed to carry them?
- Have you made sure that plant and vehicles are not used on dangerous slopes?

7. CRANES

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

8. EXCAVATIONS

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

9. MANUAL HANDLING

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

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

10. HAZARDOUS SUBSTANCES

- Have you identified all harmful substances and materials, such as asbestos, lead, solvents, paints, cement and dust?
- Have you checked whether a licensed contractor is needed to deal with asbestos on site?
- Have you identified and put into place precautions to prevent or control exposure to hazardous substances by:
  - Doing the work in a different way, to remove the risk entirely;
  - Using a less hazardous material; and
  - Using tools fitted with dust extraction?
- Have workers had information and training so they know what the risks are from the hazardous substances used and produced on site, and what they need to do to avoid the risks?
- Have you got procedures to prevent contact with wet cement (as this can cause both dermatitis and cement burns)?
- Have you arranged health surveillance for people using certain hazardous substances?

11. NOISE

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

12. HAND-ARM VIBRATION

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

13. ELECTRICITY AND OTHER SERVICES

- Have all necessary services been provided on site before work begins and have you also identified existing services present on site (e.g. electric cables or gas mains) and taken effective steps (if necessary) to prevent danger from them?
- Are you using low voltage for tools and equipment, e.g. battery-operated tools or low-voltage systems?
- Where mains voltage has to be used, are trip devices (e.g. residual current devices (RCDs)) provided for all equipment?
- Are RCDs checked daily by users and properly maintained?
- Are cables and leads protected from damage?
- Are all connections to the system properly made and are suitable plugs used?
- Are tools and equipment checked by users, visually examined on site and regularly inspected and tested by a competent person?
- Where there are overhead lines, has the electricity supply been turned off, or have other precautions been taken, such as providing goal posts or taped markers?
- Have hidden electricity cables and other services been located (e.g. with a locator and plans) and marked, and have you taken precautions for safe working?

14. CONFINED SPACES

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

15. TOOLS AND MACHINERY

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

16. FIRES AND EMERGENCIES

General

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

Fire

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

17. PROTECTING THE PUBLIC

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