



TOURISM DEVELOPMENT CORPORATION OF PUNJAB

ESTABLISHMENT OF PARAGLIDING CLUB AT CHEVRA HILL TOP, KOTLI SATTIAN, DISTRICT MURREE



ENVIRONMENTAL IMPACT ASSESSMENT (EIA) STUDY

FINAL REPORT

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LIST OF ABBREVIATIONS

AIDs	Acquired Immunodeficiency Syndrome
AOI	Area of Influence
BCP	Building Code of Pakistan
BHU	Basic Health Unit
BOD	Biological Oxygen Demand
CBD	Convention on Biological Diversity
CC	Construction Contractor
CCTV	Closed-Circuit Television
CDA	Canal and Drainage Act
CDM	Clean Development Mechanism
CHS	Community Health and Safety
CoC	Code of Conduct
COD	Chemical Oxygen Demand
DCRs	District Census Reports
DFO	District Forest Officer
DG	Director General
DHQ	District Headquarters
ECO	Economic Cooperation Organization
EIA	Environmental Impact Assessment
EMMM	Environmental Mitigation and Management Matrix
EMP	Environmental Monitoring Plan
EPA	Environment Protection Agency
EP&CCD	Environment Protection and Climate Change Department
EPD	Environmental Protection Department
ERP	Emergency Response Plan
ESE	Environmental and Social Expert
GHG	Green House Gas
GoP	Government of Pakistan
GoPB	Government of Punjab
HH	Households
HIV	Human Immunodeficiency Viruses
HSE	Health Safety and Environment
HSP	Health and Safety Plan
HVAC	Heating, Ventilation, and Air Conditioning
IEE	Initial Environmental Examination
LAA	Land Acquisition Act
LPG	Liquefied Petroleum Gas
MSDS	Material Safety Data Sheet
NCS	National Conservation Strategy
NDMA	National Disaster Management Authority
NESPAK	National Engineering Services Pakistan
NFPA	National Fire Protection Association
NOC	No Objection Certificate
NPZs	Noise Perimeter Zones
O&M	Operation and Maintenance
OHS	Occupational Health and Safety



OIC	Organization of Islamic Conference
PAPs	Project Affected People
PCC	Plain Cement Concrete
PEPA	Punjab Environmental Protection Act
PEPC	Pakistan Environmental Protection Council
PEQS	Punjab Environmental Quality Standards
PGA	Peak Ground Acceleration
PGS	Punjab Growth Strategy
PM	Particulate Matter
POPs	Persistent Organic Pollutants
PPEs	Personal Protective Equipment's
RCC	Reinforced Cement Concrete
RE	Resident Engineer
RHC	Rural Health Clinic
ROW	Right of Way
RWMC	Rawalpindi Waste Management Company
SAARC	South Asian Association for Regional Cooperation
SAEMR	Semi-Annual Environmental Monitoring Report
SBC	Seismic Building Code
SDGs	Sustainable Development Goals
SPM	Suspended Particulate Mater
SSEMP	Site Specific Environmental Management Plan
STDs	Sexually Transmitted Diseases
TA	Technical Assistance
TDCP	Tourism Development Corporation of Punjab
THQ	Tehsil Headquarters
TMP	Traffic Management Plan
ToR	Terms of Reference
UNCCD	United Nations Convention to Combat Desertification
UNO	United Nations Organization
VOC	Volatile Organic Compounds
WMP	Waste Management Plan



EXECUTIVE SUMMARY

ES-1 INTRODUCTION

The Government of Punjab, through the Tourism Development Corporation of Punjab (TDCP), is committed to fostering tourism as a catalyst for economic growth and community development. With the increasing demand for sustainable and adventure tourism, efforts are being directed toward establishing new tourist destinations that balance ecological conservation with modern recreational experiences.

Despite its potential as a tourist destination, Kotli Sattian has not evolved in line with the growing interest and influx of visitors. The region faces several challenges, including poor waste management, traffic congestion, and a lack of modern amenities, which are early indicators of unplanned tourism. Additionally, environmental issues such as deforestation and pollution threaten the area's ecological stability. These concerns underscore gaps in infrastructure and management, highlighting the urgent need for strategic investments to promote sustainable tourism while preserving Kotli Sattian's natural beauty and cultural heritage for future generations.

To address these challenges and fully harness Kotli Sattian's tourism potential, the proposed Project aims to establish paragliding club at Chevra Hill Top.

ES-2 REGULATORY AND POLICY REVIEW

The EIA Study has been conducted for the subject Project as a mandatory requirement of Punjab Environmental Protection Act, 1997 (Amended 2012 & 2017). Section 12 (1) of the Act states that "No proponent of a Project shall commence construction or operation unless he has filed with the Provincial Agency an Environmental Impact Assessment or, where the Project is likely to cause an adverse environmental effect, an initial environmental examination, and has obtained from the Provincial Agency approval in respect thereof." Other relevant laws have also been discussed briefly in Chapter-2.

According to the Punjab Environmental Protection Agency (Review of IEE and EIA) Regulations 2022, the proposed Project falls under Category "H" (*Urban Development and Tourism*) and Category "I" (*Environmentally Sensitive Areas*) of Schedule-II, which requires an EIA before commencement of construction.

ES-3 DESCRIPTION OF PROJECT

Establishment of paragliding club is planned at Chevra Hill Top, Kotli Sattian, District Murree, covering an area of 10 Kanal 6 Marla at geographical coordinates 33°49'13.43"N and 73°32'3.44"E. The designated location has been carefully selected to enhance adventure tourism while maintaining environmental sustainability in Kotli Sattian.



The land allocated for the paragliding club, Chevra Hill Top is privately owned by local residents. The Tourism Development Corporation of Punjab (TDCP) has acquired this land. During the construction phase, the Project will require a workforce of approximately 70 workers per day, including skilled and unskilled labor as well as supervisory staff. The Project is anticipated to be completed within 12 months, with an estimated total cost of approximately PKR 423.927 Million.

ES-4 DESCRIPTION OF THE ENVIRONMENT

Physical Environment

The study area for the proposed Project consists of hilly terrain with scattered flat patches, featuring a mix of forest and residential land. Elevations range from 291 meters to 4,341 meters. The Project area is surrounded by forests, farmland, roads, mosques, residential areas, rivers, waterfalls, nullahs and commercial zones.

The climate of the region varies with its diverse topography. Summers are generally cool and mild, with higher elevations experiencing lower temperatures, while valleys remain relatively warmer. The annual average temperature in Kotli Sattian ranges between 10°C and 22°C. The area receives an average annual precipitation of approximately 1,538 mm, with an estimated 89.3 rainy days per year.

As per the Building Code of Pakistan (2007), issued by the Government of Pakistan, the project area falls under Seismic Zone 3, indicating a high damage risk with a peak ground acceleration (PGA) ranging from 0.24 g to 0.32 g.

Ecological Environment

The ecological environment of Kotli Sattian is defined by its diverse flora and fauna, shaped by the region's varied topography and climate. The vegetation consists of annual herbs (43%), shrubs (24%), grasses (13%), and trees (10%), forming a rich and balanced ecosystem. The forested landscape is dominated by Chir Pine (*Pinus roxburghii*), along with species such as Walnut, Almond, Olive, Apricot, and Pomegranate. The understory is populated with shrubs and herbs, including *Berberis aristata* and *Artemisia vulgaris*, while grasses like *Cynodon dactylon* provide vital fodder.

The region supports a diverse range of wildlife, including mammals such as the Common Leopard, Indian Pangolin, and Rhesus Macaque, as well as reptiles like the Indian Cobra and Russell's Viper. The avian diversity features species like the Himalayan Monal and Grey Francolin, enriching the area's biodiversity. Notably, endangered species, including the Barking Deer and Indian Pangolin, inhabit this region.

The forests of Kotli Sattian are classified into high hill, sub-mountain, and lowland forests, each playing a critical role in soil conservation and biodiversity preservation.

Socio-Economic Environment:

Kotli Sattian Tehsil, located in Punjab, Pakistan, is a region characterized by its diverse socio-economic landscape, rich cultural heritage, and natural beauty. With a population of 120,421 (as per the 2023 census), the area is predominantly Muslim, with Punjabi as the main language, though local dialects like Pahari and Dhundi-Kairali are also spoken. The economy primarily relies on agriculture, forestry, and livestock, while tourism is emerging as a significant contributor, driven by attractions such as the Murree-Kotli Sattian-Kahuta National Park, scenic treks, waterfalls, and historical sites. The region's infrastructure includes healthcare facilities like the Tehsil Headquarters Hospital, educational institutions ranging from primary schools to degree colleges, and an expanding road network connecting it to Islamabad and Murree.

Kotli Sattian is home to several recreational and cultural sites, including the Phofandi Burj Trek, Danoi Forest Rest House, and the World War I Memorial at Ariari. Its natural beauty is complemented by notable waterfalls like Dakhain and Bissa, as well as the serene Chevra Hills. Agricultural practices remain predominantly rain-fed, with wheat, maize, and fruit orchards (apples, pomegranates, and walnuts) playing a vital role in the local economy. With a blend of historical significance, natural landscapes, and evolving tourism opportunities, Kotli Sattian presents a unique combination of tradition and development, contributing to the region's socio-economic growth.

ES-5 STAKEHOLDER CONSULTATION

A series of public consultations were conducted to get the feedback/concerns of the different category of stakeholders including provincial departments i.e., Punjab Environmental Protection and Climate Change Department, Forest Department, Wildlife Department, TMA Kotli Sattian, Rawalpindi Waste Management Company, potential Project Affected Persons (PAPs), local community and other general public residing in and near the study area.

Consultation process included focus group discussions, semi-structured interviews, one to one meeting and interviews with the government and private institutions. Basic concerns of the stakeholders were related to land compensation, construction phase impacts including dust, air & noise pollution, employment opportunities for local communities, health & safety and privacy issues, etc. and implementation of mitigation measures.

ES-6 ANTICIPATED PROJECT IMPACTS AND MITIGATION MEASURES

Significant efforts were made to identify the main environmental (physical, ecological, social, and cultural) issues related to the design, construction and operation of the proposed Project.

The significant adverse impacts and their mitigations during the design, construction and operation phases are here under:

- The Project area, characterized by its forest-rich hilly terrain, provides a habitat for diverse wildlife species, including leopards, pangolins, and various bird species. However, construction-related noise, vibrations, and human activity may disrupt wildlife movement corridors, potentially leading to habitat fragmentation. To mitigate these impacts, nighttime construction will be restricted to minimize disturbances to nocturnal species. Additionally, unnecessary land clearing will be avoided, and native vegetation will be preserved to maintain ecological balance. Buffer zones will be established around critical habitats to reduce human-wildlife conflict, and awareness programs will be conducted for workers to promote wildlife protection and ethical conduct.
- The noise and vibration will be produced due to the operation of construction machinery and equipment. Noise and vibration are perceived as one of the most undesirable consequences of construction activities. There are a variety of ways by which construction equipment and worksite noise can be controlled that includes use of Quieter Equipment, Modification of Existing Old Equipment, Barrier Protection, change in Work Activity Schedule and Maintenance of vehicle/equipment.
- Wastewater will be generated at the construction camps and from construction activities. If the generated wastewater is not properly treated or disposed of, this may contaminate the surface water sources such as Jhelum River and Durnoyan Waterfall Kotli. The wastewater generation is estimated to be 592 gallons/day¹ for 70 construction workers; and sewage from construction camps will be disposed of after proper pre-treatment and processes such as soakage pit. Wastewater will be generated in the form of sewage from washrooms and other construction activities.
- A total of about 39 kg of solid waste will be generated from construction camps on a daily basis. All the solid waste from the camps will be properly collected at source by placing containers and disposed of through proper Solid Waste Management System;
- Air quality will be affected by fugitive dust emissions from construction machinery; dust from the unpaved surface and construction vehicles. Emissions from batching / asphalt plants can be controlled efficiently by the installation of cyclone / scrubbers. In addition to that, regular maintenance activities comprising changing of lubricating oil, changing the air and fuel filter, cleaning the fuel system, draining the water separators and proper tuning may also help in reducing the emissions from diesel generators;
- Due to the construction camps, number of impacts may arise that include waste, soil pollution, groundwater pollution, dust, etc. The construction activities and vehicular movement at construction sites may result in roadside accidents particularly inflicting local communities who are not familiar with presence of heavy equipment. Sensitive receptors within AOI may also suffer during the construction period due to air emission, construction noise, movement of construction machinery and road site accidents. Conflicts may arise between the local community and the construction workers, which may be related to religious, cultural or ethnic differences, labor influx or based on competition for local resources. Contractor will ensure the proper control on construction activities. Contractor will also take due care of the local community and observe sanctity of local customs and traditions by his staff. Contractor will warn the staff strictly not to involve in any unethical activities and to obey the local norms and cultural restrictions.

ES-7 ENVIRONMENTAL MONITORING PLAN (EMP)

The EMP of the proposed Project mainly comprises institutional requirements; environmental

¹ Design Criteria of Public Health Engineering for Water Supply, Sewerage and Storm Water Drain (Domestic sewage generation = 80% of water consumed/day)



mitigation and management; environmental monitoring plan; planning for EMP implementation; and EMP cost. TDCP will be responsible for implementation of EMP of the proposed Project during construction and operational phases. The total cost required to effectively implement the mitigation measures is approximately **PKR 5.8365 Million**, which includes cost of environmental monitoring, tree plantation and Health and Safety and environmental management, etc. during construction and operational phases. The EMP will be part of the contract document with the Contractor(s).

ES-8 CONCLUSION AND RECOMMENDATIONS

The Environmental Impact Assessment (EIA) study has determined that the proposed Project will have low to moderate impacts on the physical and social environment. However, several ecological concerns have been identified that require careful mitigation measures. These impacts can be minimized through the strict implementation of the Environmental Management Plan (EMP), which will ensure compliance with environmental regulations and best practices. A well-planned and meticulously designed paragliding club will help reduce ecological disturbances while preserving the natural landscape. Additionally, implementing a comprehensive tree plantation strategy and a structured wildlife management plan will play a crucial role in maintaining and enhancing biodiversity.

An Environmental Monitoring Plan (EMP) for all the phases (pre-construction, construction and operation) has been developed as part of the report that covers impacts, mitigation measures, roles and responsibilities and timings to avoid, minimize or mitigate the adverse impacts of the Project. The EMP, its mitigation and monitoring programs, contained herewith will be included within the bidding documents for Project works for all Project components.



1 INTRODUCTION

1.1 PROJECT BACKGROUND

Tourism in Pakistan is a rapidly expanding industry. In 2018, the British Backpacker Society recognized Pakistan as the world's top adventure travel destination, praising it as "one of the friendliest countries on earth, with mountain scenery beyond anyone's wildest imagination." The country boasts remarkable geographical and ethnic diversity, along with numerous historical and cultural heritage sites. According to the Travel and Tourism Competitiveness Report 2017 by the World Economic Forum, the direct contribution of travel and tourism to Pakistan's GDP in 2015 was US\$328.3 million, accounting for 2.8% of the total GDP.

Tourism holds significant potential as a key contributor to economic growth and job creation, with the number of domestic tourists visiting the northern areas increasing rapidly. Punjab, in particular, blessed with a diverse range of tourist attractions catering to various interests. The province offers breathtaking landscapes, including mountains, valleys, forests, and rivers, while its rich cultural heritage and traditions draw hundreds of visitors annually for festivals and cultural events. For adventure enthusiasts, Punjab provides ample opportunities for mountaineering, trekking, skiing, hunting, angling, and more.

The Government of Punjab, through the Tourism Development Corporation of Punjab (TDCP), is dedicated to promoting tourism as a key driver of economic growth and community development. With the rising demand for sustainable and adventure tourism, the focus has shifted towards developing new tourist destinations that harmonize ecological preservation with modern recreational opportunities.

Kotli Sattian is a tourist attraction that has not developed in step with the growing interest and increasing number of visitors. The region faces several challenges, including inadequate waste management, traffic congestion, and a lack of modern amenities, which are early signs of unplanned tourism. Additionally, environmental concerns such as deforestation and pollution of natural resources pose a threat to the area's ecological balance. These challenges highlight significant gaps in infrastructure and management, emphasizing the urgent need for strategic investments to promote sustainable tourism in Kotli Sattian. Ensuring well-planned development will help preserve the region's natural beauty and cultural heritage for future generations.

To overcome these challenges and unlock Kotli Sattian's full tourism potential, the proposed Project aims to establish paragliding club at Chevra Hill Top in Kotli Sattian.

TDCP has engaged National Engineering Services Pakistan (NESPAK) Limited to provide Consultancy Services for the preparation of Environmental Impact Assessment (EIA) study of the proposed Project, to fulfill the requirements of the Punjab Environmental Protection and Climate Change Department (Punjab-EP&CCD).



This document presents the findings of Environmental Impact Assessment (EIA) of Establishment of Paragliding Club at Kotli Sattian.

1.2 NEED FOR ENVIRONMENTAL STUDY OF THE PROPOSED PROJECT

As per Punjab Environmental Protection Act (Amendment) 2017, under Section 12 (1) IEE/EIA is mandatory, which states that:

“No proponent of a project of public and private sector shall commence construction or operation unless he has filed an Initial Environmental Examination / Environmental Impact Assessment with the Punjab Environmental Protection Agency, as the case may be, or, where the project is likely to cause adverse environmental effects; an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof”.

According to the Punjab Environmental Protection Agency (Review of IEE and EIA) Regulations 2022, the proposed Project falls under Category “H” (Urban Development and Tourism) and Category “I” (Environmentally Sensitive Areas) of Schedule-II, which requires an EIA before commencement of construction.

1.3 NATURE, SIZE AND LOCATION OF THE PROJECT

The Paragliding club will be developed in Chevra Hill Top in Kotli Sattian covering an area of 10 Kanal 6 Marla at geographical coordinates 33°49'13.43"N and 73°32'3.44"E. The details of these sites are provided in Table 1-1.

Table 1-1: Details of Project Area

Sr. No.	Location	Coordinates	Total Area (Acre)
1.	Chevra Hill Top	33°49'13.43"N 73°32'3.44"E	2.24

The Paragliding club site is strategically located with convenient access from Kotli Sattian Road, Kotli Link Road, Tourism Highway and Islamabad Expressway.

The proposed Project is a non-linear Project that involves the construction of Paragliding club comprising of construction of glamping pods, restaurant, wooden trees houses, Bonfire sitting point, Parking area, toilets, paragliding store, children play area, wooden gazebos, selfie points, reception, guard room, monitoring room and external development works.



Figure 1-1: Location Map of the Proposed Project



1.4 OBJECTIVES / SCOPE OF EIA STUDY

The overall objective of this EIA is to elucidate the anticipated aspects of the proposed intervention and to propose necessary mitigation measures to prevent/minimize adverse impacts on surrounding environment and community. To achieve this objective, an assessment of the existing environmental conditions of the Project corridor is a prerequisite and therefore, included after collecting the baseline data of major environmental attributes acquired from primary and secondary sources. This EIA has been prepared to ensure adequate environmental and social management during pre-construction, construction and implementation stages of the proposed Project. It also provides mechanisms to ensure that potentially significant environmental and social impacts of the proposed Project are identified, assessed and mitigated as appropriate. More specific objectives of this EIA report are to:

- Facilitate proponents and financiers of the Project in ensuring environmental and social sustainability of the Project;
- Review of all relevant existing data, studies, reports and drawings;
- Review of all applicable international/national and local guidelines, laws, and policies;
- Delineation of Area of Influence (AOI);
- Analysis of alternatives for the selection of most suitable option;
- Establish a baseline of existing social and environmental conditions prior to Project initiation by collecting secondary and primary data/information on physical, biological and socio-economic environment of the Project area;
- Identify potentially significant environmental and social impacts (both positive and negative) during all stages of the Project;
- Avoid, minimize, and suggest mitigation and compensation measures for significant adverse impacts;
- Conduct, record, report and ensure public consultations and participation with major stakeholders; and
- Provide Environmental Management Plan (EMP) for all stages of the Project as a tool for the implementation of the suggested measures, along with monitoring and evaluation mechanism with adequate resources including implementing agencies and capacity building.

1.5 THE PROPONENT AND CONSULTANT

a) Proponent Contact/Address

Project Director, Tourism Development Corporation of Punjab (TDCP),
Government of Punjab
68-Trade Center Block, Near Ayub Chowk, Johar Town, Lahore
Tel: +92 42 111 111 042

b) Consultant Contact/Address

National Engineering Services Pakistan Private Limited (NESPAK)
1-C, Block – N, Model Town Extension, Lahore
Tel: +92 42 99090000 Ext. 273

1.6 EIA TEAM COMPOSITION

Based on the objectives of the study, NESPAK formed a team of experts comprising a team leader (Environmental Expert) with professional support from the Environmental Scientists, Sociologist and Ecologist. The professional staff was involved in analyzing the data, impact assessment and mitigation measures and report compilation. Details of EIA team are given in **Table 1-2** below.

Table 1-2: Team Composition for the EIA Study

Sr. No.	Name of Expert	Designation
1.	Ms. Samreen Asghar	Project Manager
2.	Ms. Ridha Kamran	Senior Environmental Scientist
3.	Brig Saqib Rasheed Ahmad Khan	Paragliding Expert

1.7 APPROACH AND METHODOLOGY

A) Study Approach

The present study conducted in accordance with Punjab Environmental Protection Agency, (Review of IEE and EIA) Regulations, 2022 and Environmental Protection Agency (EPA), Government of Pakistan (GOP) guidelines, 2000. The discussions were also held with stakeholders including Client representatives, government officials, community representatives, women and a wide range of inhabitants and affectees of the Project area. The main purpose of this approach is to obtain a fair impression on the people's perceptions of the proposed Project and its environmental impacts.

B) Methodology

The following methodology was adopted for carrying out the EIA study of the proposed Project:

i) Orientation

Meetings and discussions were held among the members of the EIA Consulting Team. This activity was aimed at achieving a common ground of understanding of various issues of the proposed study.

ii) Planning for Data Collection

Subsequent to the concept clarification and understanding obtained in the preceding step, a detailed data acquisition plan was developed for the internal use of the EIA Consulting Team. The plan included; identification of specific data requirements and their sources; determination of time schedules and responsibilities for their collection; and indication of the logistics and other supporting needs for the execution of the data acquisition plan.



iii) Literature Review

Prior to mobilization, the Consultant conducted a desktop study through collection and review of guidelines, data and reports related to the Project, that included (a) review of National and Provincial Environmental Legislations; (b) Google Earth Satellite Imagery; (c) District Census Report Rawalpindi, 1998 and Socio-Economic Data of Census, 2017; (d) Design Data provided by the Client and Design Team; and (e) similar EIA / IEE project reports.

iv) Review of Environmental Laws and Institutional Requirements

All applicable national and international laws, legislations, guidelines and treaties were reviewed relevant to the proposed Project components.

v) Area of Influence (AOI)

Identification of Study Area/Area of Influence (AOI) is an important activity for environmental and social studies at this stage. AOI if not delineated properly can impact the overall objectives and conclusions of an EIA study. Moreover, it also impacts the allocated resources including the level of effort (LOE) and time. AOI is the area over which the proposed Project activities can potentially impact directly or indirectly on the environment and social aspects. In this report the word study area and AOI is used interchangeable.

The AOI is different for the physical, ecological and socio-economic environment. For physical environment, the AOI refers to the geographical or spatial extent in which particular physical factors exist or project has impacts on that component. The AOI of physical environment include Project boundary and its adjoining area within 200 m from Project boundary where the Project activities will directly or indirectly impact the physical environment which includes the construction site, access roads, and associated infrastructure, etc. The AOI map is shown as **Figure 1-2**.

Similar to AOI of physical environment, the AOI of socio-economic environment pertains to the spatial or social boundaries within which human activities, systems, and structures impact are foreseen. The AOI in the socio-economic context will be influenced by factors like political/district boundaries, demographic patterns, economic interdependencies, and cultural norms.

In contrast to above, the AOI of ecological environment refers to the spatial extent over which ecological interactions and processes occur. It encompasses the ecological relationships, dependencies, and dynamics among organisms, species, habitats, and ecosystems.

vi) Survey of AOI

A team of environmental and social experts including environmentalists, environmental engineers and sociologists carried out the environmental and social survey of the AOI from January to February 2025, to familiarize themselves with the local conditions and the environmental settings. During the survey, the information regarding the topography, soils, rock, surface water, groundwater, flora and fauna, forested areas, social settings and villages/towns along the AOI was observed and noted.

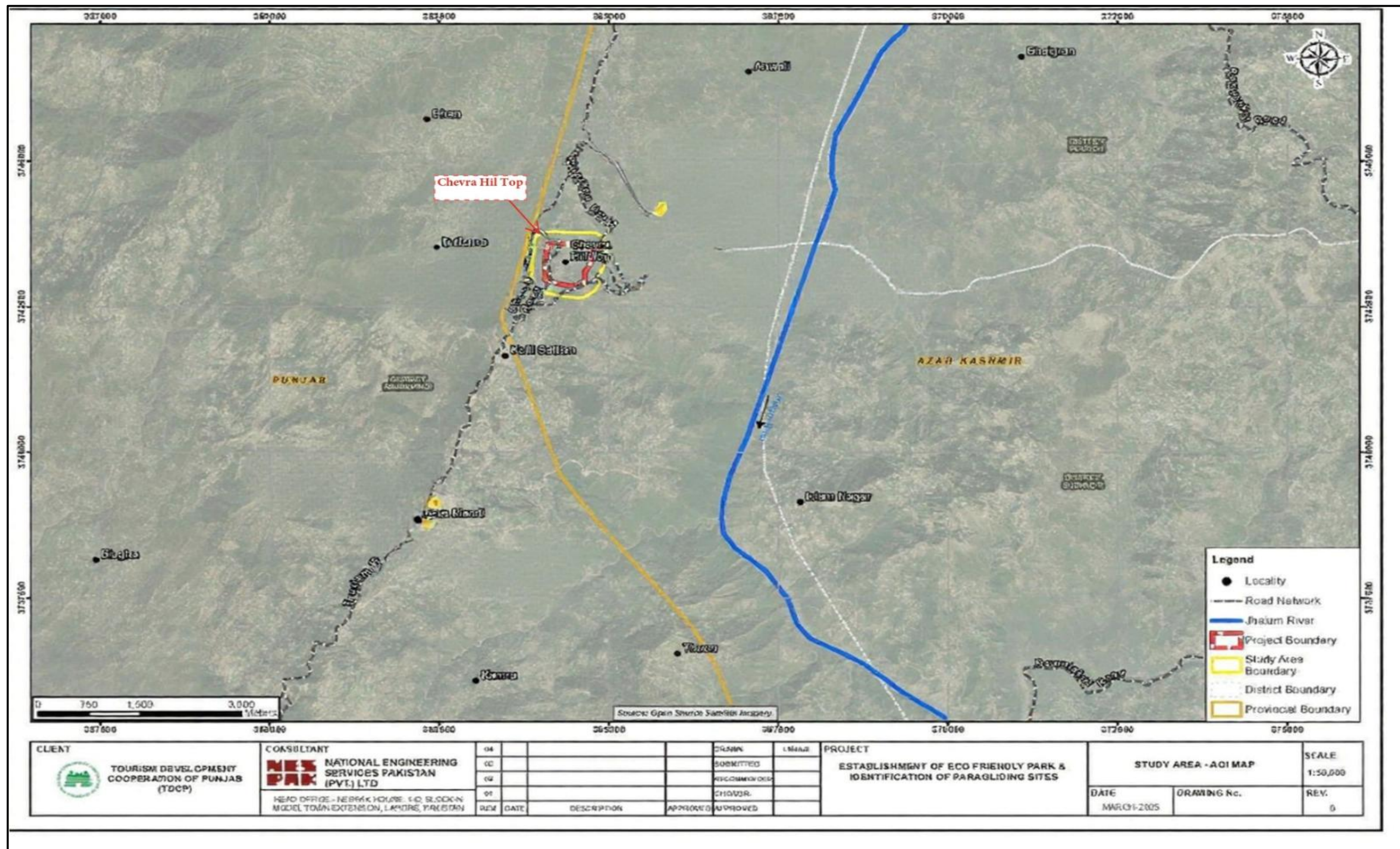


Figure 1-2: AOI Map of Proposed Project



vii) Analysis of Alternatives

It is a mandatory requirement for EIA study to analyze each potential alternative available that could have been developed to meet the objectives and recommend the most environmentally and economically feasible option.

The analysis of different alternatives was carried out including No Project Option (NPO) for the selection of the most feasible options of the study keeping in view the environmental, economic and social constraints. This exercise confirmed the justification for the need of the proposed Project.

viii) Environmental Baseline Survey of the Project for the Data Collection

After the selection of the most feasible option for the construction of the proposed Project based on environmental and social analysis and the delineation of AOI, detailed environmental and social surveys were carried out within the AOI. Detailed investigations/surveys were carried out for environmental and social parameters on which any adverse or positive impacts were envisaged by the implementation of the proposed Project. Prior to the start of field activities, comprehensive checklists, proformas and maps were developed to collect the information related to the following parameters:

a) Physical Environment

The information acquired for the establishment of physical environment baseline included the following main parameters:

- Land resources (including land use pattern, topography, soil composition, contamination of soil and soil erosion etc.);
- Water resources (including available surface and groundwater resources and streams / nullahs, hydrology, water supply, water contamination etc.); and
- Climate data (including temperature, rainfall, humidity, wind speed and direction, etc.); and
- Existing solid waste management and effluents disposal practices and storm water drainage.

b) Ecological Environment

The status of the flora and fauna of the study area were determined by a review of literature of the area, and an assessment of both terrestrial and aquatic environments. The information collected through primary (field surveys) and secondary data sources for the establishment of ecological environment baseline included the following main parameters:

- Flora (trees, herbs, shrubs, grasses and overall vegetation including valuable or rare trees and their loss due to implementation of the Project, etc.);
- Fauna / Wildlife (Mammals, reptiles, amphibians and avifauna);
- Aquatic ecology
- Agriculture and livestock;



- Protected areas, National Parks, Game reserves, Game sanctuaries any other ecologically important areas (if any);
- Migratory birds' corridors; and
- Endangered species (both flora and fauna).

c) Socio-Economic Environment

To assess the existing social environment and potential impacts of the proposed Project's construction, the multi-faceted approach employed including a review of relevant literature, field investigations, census reports, public consultations, and stakeholder interviews. Data collection focused on the following key aspects of the social environment:

- Demographic characteristics;
- Literacy status/ education;
- Nature of business/occupation;
- Livelihood/income;
- Living standard of the population;
- Social Infrastructure available;
- Gender issues;
- Pressing needs of the people;
- Community perception about the Project etc.;
- Labor Influx to Project area;
- Waste management services;
- Religious, cultural and heritage information (mosques, shrines, graveyards);
- Archaeological monuments;
- Buildings and infrastructure details, including residential, commercial which may be affected for complete/partial relocation due to proposed Project interventions;
- Other private/public infrastructures such as roads, telephone poles, transmission line, hand pumps, tube wells, schools, universities, markets, hospitals, shops, libraries, mosques, etc.

ix) Stakeholder Consultations

The Consultant identified Project stakeholders and held meetings with them to receive feedback on the expected environmental and social issues related to the Project impacts and suggested mitigation measures. Meetings in person and through e-communications were carried out with the Project affectees, women's, relevant departments including Forest, Punjab-EP&CCD, Rawalpindi Waste Management Company, TMA Kotli Sattian, etc. to discuss the issues/constraints and get their views and feedback to mitigate the potential environmental and social impacts associated with the implementation and operation of the proposed Project.

All consultations were conducted in accordance with Guidelines of Pakistan Environmental Protection Assessment, 1997 for Public Consultation to inform and educate the public about the Project, to identify problems and values associated with the Project including land acquisition and resettlement (if any) and to resolve conflict and reach consensus.



Grievance Redress Mechanism (GRM)

The GRM is important for any developmental project where ongoing risks or adverse impacts are anticipated. This mechanism serves as a way to meet requirements, prevent and address community concerns, reduce risks, and assist larger processes that create positive social change. The GRM for the proposed Project has been suggested along with the procedures for handling environmental and social concerns of the Project stakeholders. This procedure includes a redress mechanism scaled to the Project's identified risks and adverse impacts, focusing on stakeholders.

x) Impact Assessment and Mitigation Measure

A logical and systematic approach was adopted for impact identification and assessment by utilizing a combination of the secondary data, satellite imagery, E&S checklists, socioeconomic survey proformas, field observations and discussion with the local residents of the Project Area. The tools, which were used for impact assessment, are:

- Checklists to identify the impacts during field investigations/surveys;
- Matrices for qualitative assessment of the identified impacts;
- Overlays and GIS based assessment for the quantification of significant impacts based on Google imagery and field verification; and
- Public Consultation (discussions with the local residents of the Project Area).

The Consultant recommended practical, economically viable, and socially acceptable mitigation measures to address significant adverse environmental and social impacts. These measures focused on achieving the Project's objectives with minimal disruption to the existing environment by exploring alternative approaches, incorporating design modifications in advance, and implementing enhanced monitoring and management practices, such as proper storage of construction materials, establishment of labor camps, waste management, disposal of construction debris, etc. The mitigation hierarchy - avoid, minimize, mitigate, and offset was applied to effectively reduce the severity of potential impacts.

xi) Environmental Management Plan (EMP)

An EMP has been prepared to ensure the adequacy and effectiveness of the suggested mitigation measures by clearly identifying the roles and responsibilities of the agencies, monitoring mechanism, monitoring plan for environmental and social parameters to be monitored with their frequency, existing and suggested framework, necessary approvals, auditing and the required further studies. Similarly, costs for environmental monitoring, ecological and social component / social mitigation measures estimated and included as a part of the EMP.

xii) Conclusions and Recommendations

Based on the baseline conditions, identified impacts and suggested mitigation measures and proposed environmental cost, conclusions have been developed along with recommendations regarding the future plan of action and outcome of the EIA report.



1.8 Organization / Structure of the Report

This report contains nine chapters. The contents of chapters are described as follows:

Chapter 1 “Introduction” briefly presents the Project background, Project location, size & nature, objectives, methodology and need of the EIA study.

Chapter 2 “Policy, Legal and Administrative Framework” comprises policy guidelines, statutory obligations and roles of institutions concerning EIA study of the proposed Project.

Chapter 3 “Project Description” furnishes information about the location, cost and size of the Project and its major components for detailed environmental assessment including alternatives considered for selecting the most suitable alternative in terms of environmental, social and economic components.

Chapter 4 “Description of Environment” establishes baseline conditions for physical, biological and socio-economic conditions prevalent in the Project area.

Chapter 5 “Public Consultation” provides summary of consultative sessions with the local community as well as with other stakeholders including local government officials, policy makers and NGOs for their opinions and suggestions on the Project and define the grievance redress procedure for the proposed Project.

Chapter 6 “Anticipated Environmental Impacts and Mitigation Measures” identifies, predicts and evaluates impacts of the Project activities during the pre-construction / design, construction and operation stages and deals with the measures proposed to mitigate potential adverse impacts of the proposed Project.

Chapter 7 “Environmental Management Plan” outlines institutional arrangements for the implementation of the proposed mitigation measures during all stages, training needs of the staff for implementation of the mitigation measures, monitoring requirements, and environmental and social management cost.

Chapter 8 “Conclusion and Recommendation” elaborates the conclusion of subject environmental study and suggests the recommendations to address the issues raised from proposed construction and operational activities in environmental sustainable manner.



2 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORKS

2.1 GENERAL

This Chapter provides an overview of the policy framework and legislation that applies to control the environmental consequences as a result of the proposed 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 Provincial Government (Punjab).

2.2 SUMMARY OF RELEVANT STRATEGIES, POLICIES, ACTS AND LEGISLATION

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. These aspects are covered in the impact assessment and relevant mitigation measures have been included in the EMP.
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	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.

Sr. No.	Policy/Strategy	Brief Coverage	Relevance to Project
		and to ensure effective management of their environmental resources.	
3	National Climate Change Policy, 2012	The National Climate Change Policy provides a framework for addressing the issues that Pakistan faces or will face in future due to the changing climate. In view of Pakistan's high vulnerability to the adverse impacts of climate change, in particular extreme events, adaptation effort is the focus of this policy document. The vulnerabilities of various sectors to climate change have been highlighted and appropriate adaptation measures spelled out. The policy covers measures to address issues in various sectors such as water, agriculture, forestry, coastal areas, biodiversity and other vulnerable ecosystems. Notwithstanding the fact that Pakistan's contribution to global Greenhouse Gas (GHG) emissions is very small, its role as a responsible member of the global community in combating climate change has been highlighted by giving due importance to mitigation efforts in sectors such as energy, forestry, agriculture and livestock. Furthermore, appropriate measures relating to disaster preparedness, capacity building, institutional strengthening; technology transfer; introduction of the climate change issue in higher education curricula; ensuring environmental compliance through Initial IEE and EIA in the development process; addressing the issue of deforestation and illegal trade in timber; promoting Clean Development Mechanisms (CDM); and raising Pakistan's stance regarding climate change at various international forums, have also been incorporated as important components of the policy. The policy thus provides a comprehensive framework for the development of Action Plans for	This policy document is a 'living' document and will be reviewed and updated regularly to address emerging concepts and issues in the ever-evolving science of climate change. This policy will be applicable as the proposed Project entails establishment of paragliding club near residential area, necessitating conservation of natural resources and cost effective measures to mitigate impact on prevailing environmental conditions due to construction and operational activities, which involves emission from the construction machinery and equipment, discharge of effluents, soil erosion, etc.



Sr. No.	Policy/Strategy	Brief Coverage	Relevance to Project
		national efforts on adaptation and mitigation.	
4	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 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.	This policy applies to the proposed Project during both the construction and operational phases, ensuring regular water quality monitoring and the implementation of measures to prevent groundwater and surface water pollution.
5	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.	This policy is applicable to the proposed Project throughout its construction and operational phases, ensuring regular water quality monitoring and the implementation of measures for groundwater and surface water conservation especially of Durnoyan Waterfall Kotli Sattian. It also addresses meeting the water demand of construction workers and staff, as well as the proper disposal of sewage and management of wastewater.
6	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	The proposed Project involves the establishment of paragliding club within a designated area; therefore, this policy will not be applicable.



Sr. No.	Policy/Strategy	Brief Coverage	Relevance to Project
		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; 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.	
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:	The labor (skilled and unskilled) will be employed for construction and operational activities of the proposed Project. The provision of

Sr. No.	Policy/Strategy	Brief Coverage	Relevance to Project
		• Legal Framework; • Advocacy: rights of workers and employers; • Skill development and employment; and • Manpower export.	this policy is applicable to all the labor employed.
8	National Sustainable Development Strategy, 2012	The National Sustainable Development Strategy is an attempt to define sustainable development and the pathway to a “green economy” in Pakistan’s context. It lays out an adaptive system and approach that can be continuously improved, through regular updates, to respond to evolving challenges. The focus has been on integrating not only across the three overall dimensions of economic, social and environment but also integrating the goals with the existing development paradigm with the aim of shifting it on to a more sustainable pathway.	This strategy is applicable as the proposed Project involves the establishment of paragliding club which aligns with the principles of biodiversity conservation, ecosystem protection, and sustainable land use, preserving the area's ecological integrity.
9	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 AJ&K and regions. This policy covers disasters risk reduction in a more holistic way and introduces a proactive and anticipatory approach by laying special emphasis on risk assessment and prevention.	This policy will be elicited if any unforeseen natural and man-made disaster occurs during construction and operation phases.
10	Punjab Climate Change Policy, 2017	This policy proposes measures which address Punjab specific climate change impacts and is in line with National Climate Change Policy (2012) and its Framework for Implementation (2013). Mainstream climate change in long term development planning as a vehicle for the implementation of the provincial Punjab Growth Strategy (PGS)	This policy will be applicable as the proposed Project involves the establishment of paragliding club within a residential area, requiring the conservation of natural resources and the adoption of cost-effective measures to mitigate environmental impacts. These impacts may arise from construction and operational activities, including emissions from machinery and equipment, effluent discharge, soil erosion, and other



Sr. No.	Policy/Strategy	Brief Coverage	Relevance to Project
			potential environmental disturbances.

Table 2-2: Main Legislation/Acts Related to Environment and their Relevance to the Project

Sr. No.	Act	Brief Coverage	Relevance to Project
1.	Punjab Environmental Protection Act, 1997 (Amended, 2012 & 2017)	The Punjab Environmental Protection Act, 1997 (Amended, 2012 & 2017) is comprehensive legislation and provides the legislative framework for protection, conservation, rehabilitation and improvement of the environment. The 'environment' has been defined in the Act as: (a) air, water and land; (b) all layers of the atmosphere; (c) all organic and inorganic matter and living organisms; (d) the ecosystem and ecological relationships; (e) buildings, structures, roads, facilities and works; (f) all social and economic conditions affecting community life; and (g) the interrelationships between any of the factors specified in sub-clauses 'a' to 'f'. The notable points of the law are: • No proponent of a project shall commence construction or operation unless he has filed an IEE/EIA with the Provincial Agency designated by the Provincial EPAs an EIA, and has obtained an approval; • Establishment and formation of the Punjab Environmental Protection Council(PEPC); • Prohibition of certain discharges or emissions; • Punjab Environmental Quality Standards (PEQS) for wastewater, air emissions and noise; and • Provincial Government can issue notices and enforce them to protect the environment. In the recent amendment of 2012, legislatures powers related to environment and ecology are given to provincial governments from the Federal government. The provinces are required to enact their own legislation for environmental protection. Other amendments include increasing the penalties for violations.	The provision of the act is applicable to proposed Project for conducting an EIA according to section 12 and to obtain environmental approval from Punjab EP&CCD. The section 11 of the act is applicable in term of compliance with Punjab Environmental Quality Standards (PEQS). Similarly, section 13 of the act prohibits the import of hazardous waste. The provisions of section 16 are also applicable to comply with the discharge or emission of any effluent, waste, air pollutant or noise or disposal of waste or handling of hazardous substance. Under section 17, penalties will apply if anyone fails to comply with the provisions of section 11, 12, 13 and 16.

Sr. No.	Act	Brief Coverage	Relevance to Project
		For the proposed Project, Environmental Protection Department (EPD)/Environmental Protection Agency (EPA), Government of Punjab (GoPb) is the concerned authority. The capability of regulatory institutions for environmental management is ultimately responsible for the success of environmental assessments and that development projects are environmentally sound and sustainable.	
2.	Punjab Environmental Protection Agency, (Review of IEE and EIA) Regulations, 2022)	These regulations set out: • Key policy and procedural requirements for filing an EIA; • The purpose of environmental assessment; • The goals of sustainable development; • The requirement that environmental assessment be integrated with feasibility studies; • The jurisdiction of the Federal and Provincial EPA's and Planning & Development (P&D) Departments; • The responsibilities of proponents; • Duties of responsible authorities; • Provides schedules of proposals that the project requires either IEE or an EIA; • The environmental screening process of the projects under schedule I, II and III; and • The procedure for the environmental approval for filing the case with the concerned EPA for the granting of the NOC.	The provisions of these regulations are applicable for environmental screening of the Project, which implies that an EIA is required for the proposed Project. The process described in the regulation will be useful for TDCP to follow the procedure to file an EIA with Punjab EP&CCD and to understand its review process along with timelines to be followed.
3.	Punjab Environmental Quality Standards (PEQS), 2016	PEQS promulgated recently in 2016. Specified standards under PEQS are for: • Drinking Water; • Ambient Air; • Noise; • Industrial Gaseous Emissions; • Municipal and Liquid Industrial Effluents; • Motor vehicle exhaust and noise; and • Treatment of Liquid and Bio-Medical Waste.	The proposed Project is being implemented in Punjab therefore; it will conform to PEQS during all the phases i.e. construction and operation. During the construction phase, compliance with PEQS will involve: • Controlling dust emissions, minimizing exhaust from construction machinery, and implementing measures such as wetting surfaces and using low-emission equipment.

Sr. No.	Act	Brief Coverage	Relevance to Project
			- Ensuring that construction activities adhere to permissible noise limits, particularly in sensitive areas such as residential zones or ecological sites. - Treating and disposing of wastewater generated during construction in compliance with PEQS to prevent contamination of groundwater and surface water sources. During the operational phase, adherence to PEQS will focus on: - Ensuring emissions from operational activities remain within permissible limits. - Implementing effective wastewater treatment and disposal systems to prevent water pollution. - Maintaining noise levels within PEQS limits through proper planning and operational controls.
4.	Guidelines for the Preparation and Review of Environmental Reports, 1997	These guidelines describe the format and content of IEE/EIA reports to be submitted to PEPA for obtaining NOC/approval. The guidelines present: - The environmental assessment report format; - Assessing impacts; - Mitigation and impact management and preparing an environmental management plan; - Reporting; - Review and decision making; - Monitoring and auditing; and - Project Management.	These guidelines serve to describe the format, practices, and procedures to be employed when reporting EIA for the proposed Project.
5.	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	This act will be applicable as the proposed Project involves the establishment of paragliding club within a village, requiring the conservation of

Sr. No.	Act	Brief Coverage	Relevance to Project
		effects of climate change and for matters connected herewith and ancillary thereto.	natural resources and the adoption of cost-effective measures to mitigate environmental impacts. These impacts may arise from construction and operational activities, including emissions from machinery and equipment, effluent discharge, soil erosion, and other potential environmental disturbances.
6.	Land Acquisition Act (LAA), 1894 Including Later Amendments	The Land Acquisition Act, 1894, is a “law for the acquisition of land needed for public purposes and for companies and for determining the amount of compensation to be paid on account of such acquisition”. The exercise of the power of acquisition has been limited to public purposes. The principles laid down for the determination of compensation, as clarified by judicial pronouncements made from time to time, reflect the anxiety of the law-giver to compensate those who have been deprived of property, adequately. The land needed for the construction of development projects will be acquired under normal conditions based on prevailing market prices or negotiated prices between client and the owners of land. Section 17(4) of the LAA will not be used in the absence of an emergency. Instead, the land will be purchased under willing-seller willing-buyer deal at agreed upon market rates and the seller will have the option not to sell the land, in case an acceptable deal for both the parties is not reached.	This Act will anticipate if proposed Project involves temporary acquisition of land for the construction of contractor camps during construction phase.
7.	Punjab Wildlife Act, 1974	The Punjab Wildlife Act (1974) is developed for the regulation of activities relating to protection, conservation and management of wildlife in Punjab.	Surveys and assessments conducted in the Kotli Sattian region indicate that certain wildlife species experiencing various levels of threats are present in and around the surroundings of the Project area. Therefore, this Convention will applicable during the planning and execution phases of the Project to ensure that the ecological integrity of the

Sr. No.	Act	Brief Coverage	Relevance to Project
			region maintained, and that the conservation efforts for these threatened species are upheld.
8.	Punjab Plantation and Maintenance of Trees Act, 1974	The Punjab Plantation and Maintenance of Trees Act, (1974) regulates tree plantations and enforces measures for their protection.	The requirements of this act are applicable in terms of planting new trees and their maintenance by the occupier of the existing land who would have the physical possession.
9.	Pakistan Antiquities Act 1975 & Punjab Antiquities Amendment Act 2012	The Punjab Antiquities Amendment Act, 2012 is adopted from the Pakistan Antiquities Act of 1975 with a few minor changes. The Antiquities Act, 1975 (amended in 1990) states the following: • “Ancient” is any object that is at least 75 years old; • The Government is the owner of all buried antiquities discovered on any site, whether protected or otherwise; • All new construction within a distance of 200 feet from protected antiquities is forbidden; • No changes or repairs can be made to a protected monument, even if it is owned privately, without approval of the responsible authorities; and • The cultural heritage laws of Pakistan are uniformly applicable to all categories of sites regardless of their state of preservation and classification as monuments of national or world heritage.	Although no antiquity site has been identified within the proposed AOI. However, the law would be applicable to the Project mainly due to its two provisions: ▪ According to the law, any construction activity within 61 m or 200 ft. of protected antiquities, are prohibited. ▪ 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.
10.	The Punjab Special Premises (Preservation), Ordinance, 1985	The Punjab Special Premises (Preservation), Ordinance (1985) provides the legal framework for preservation of premises of historical, cultural, archaeological, and architectural value in the Punjab province. This legislation empowers the provincial government to notify heritage sites and sites of cultural and archaeological importance and to prohibit implementation of developmental schemes or new constructions within the notified areas around the special premises. So far 246 sites stand notified under the Punjab Ordinance.	The provision of the ordinance is applicable for the protection and conservation of special premises declared by the department of Youth Affairs, Sports, Archeology & Tourism, Punjab. The ordinance is applicable in terms of land acquisition, entrance, exploitation and destruction of special premises near the site.
11.	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	The provisions of the Penal Code, 1860 are applicable to the Project in terms of

Sr. No.	Act	Brief Coverage	Relevance to Project
		misconduct of an individual or organization. The Code also addresses control of noise, noxious emissions and disposal of effluents.	penalties for effecting human lives and public property. It also addresses the control of noise, air emissions and effluent disposal.
12.	Labour Laws as part of Constitution of Pakistan 1973,	The Constitution of Pakistan contains a range of provisions with regards to labour rights, in particular: - Article 11 of the Constitution prohibits all forms of slavery, forced labour and child labour; - Article 17 provides a fundamental right to exercise the freedom of association and the right to form unions; - Article 25 lays down the right to equality before the law and prohibition of discrimination on the grounds of sex alone; and - Article 37(e) makes provision for securing just and human conditions of work, ensuring that children and women are not employed in vocations unsuited to their age or sex, and for maternity benefits for women in employment. Labour law is controlled at both provincial and national levels with compulsory employment agreements containing the terms set out by the labour laws. The labour laws are a comprehensive set of laws in Pakistan dealing with the following aspects: - Contract of Employment; - Termination of Contract; - Working Time and Rest Time; - Working hours; - Paid Leave; - Maternity Leave and Maternity Protection; - Other Leave Entitlements; - Minimum Age and Protection of Young Workers; - Equality - Pay Issues; - Workers' Representation in the Enterprise; - Trade Union and Employers Association Regulation; and - Other Laws.	The labour laws will be relevant, as it would deal with employment of labour for the construction and operation phases of proposed Project. Following are the major labour laws which are applicable to the Project: - Bonded Labour System (Abolition) Act, 1992 - Employment of Child Act, 1991 - Minimum Wages Ordinance, 1961 - Industrial Relations Act, 2010 - West Pakistan Minimum Wages for Unskilled Workers' Ordinance, 1969



Sr. No.	Act	Brief Coverage	Relevance to Project
13.	Punjab Municipal Water Act, 2014	The basic aim of the Act is to recognize, regulate and manage present and future municipal water supply and sanitation services and to establish rights of access to basic water supply and basic sanitation, and to ensure conservation of water resources in the Province. This Act is in draft stage.	This Act will elicit if there is misappropriation of water supply during construction and operational phases.
14.	The Punjab Water Act, 2019	This act ensures comprehensive management and regulation of water resources in the Punjab in the interest of conservation and sustainability.	This act will be applicable as the Durnoyan Waterfall Kotli Sattian, Jhelum River and local nullah are located within the AOI, necessitating compliance with environmental regulations to protect water resources.
15.	Hazardous Substance Rules, 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.	The proposed Project might generate hazardous waste in the form of fuel or chemical spills. These Rules are applicable to the proposed Project due to involvement of such hazardous material as well as waste handling and disposal during different construction and operational activities.
16.	Punjab Environmental Protection (Motor Vehicles) Rules, 2013	Subject to the provisions of this act, and the rules and regulations, no person shall operate a motor vehicle from which air pollutants and noise are being emitted in an amount, concentration or level which is in excess of the Punjab Environmental Quality Standards, or where applicable the standards established under clause (g) of subsection (1) of section 6 of the act.	This act will be elicited during construction and operational phases due to use of motor vehicles that produces air pollutants and noise.
17.	The Punjab Occupational Safety and Health Act, 2019	This Act entails provision of occupational safety and health of the workers at workplace and to protect them against risks arising out of the occupational hazards; to promote safe and healthy working environment catering to the physiological and psychological needs of the employees at workplace.	The Act will trigger during construction and operational phases to ensure health and safety of workers at workplace associated with the Project activities.
18.	Punjab Restriction on Employment of	According to the sub-section 11(a) of this Act, an occupier who employs or permits a child (person under the age of 15 years) to work in	This Act will trigger if contract hire skilled and unskilled labour under age 15.



Sr. No.	Act	Brief Coverage	Relevance to Project
	Children Act, 2016	an establishment shall be liable to punishment with imprisonment for a term which may extend to six months, but which shall not be less than seven days, and a mandatory fine between 10,000 and 50,000 rupees.	
19.	Punjab Protection of Women against Violence Act, 2016	The act is administered by federal government which provides guidelines for the provision of disaster management plans, offer necessary technical assistance to the Provincial Governments and Provincial Authorities as well for preparing their disaster management plans in case of any mishap.	The will act will be applicable as it would deal with employment of female labor (skilled and unskilled) for the construction and operational activities of proposed Project.
20.	Electricity Act, 1910	The Act provides a legal basis for distribution of Power. It enables a licensee to conduct operations for supply of electricity and binds the license to payment of compensation in respect of any damages caused during the construction, Operation and Maintenance (O&M) of Power distribution facilities.	This act will be applicable in the event of any damages occurring during the construction and operational phases to power facilities.
21.	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 as the cutting of trees may be involved.
22.	Punjab Forest Act (Amended), 2016	The act empowers the provincial forest departments to declare any forest area as reserved or protected. It empowers the provincial forest departments to prohibit the clearing of forest for cultivation, grazing, hunting, removing forest produce, quarrying and felling, lopping and topping of trees, branches in reserved and protected forests.	The proposed Project involves the establishment of paragliding club near to residential area; This act will not be triggered as limited trees are present in and around the proposed Project boundary.
23.	The Punjab Protected Areas Act, 2020	The Act provides provisions for the protection, preservation, conservation and management of ecologically important areas such as National parks, Nature reserves, Wildlife sanctuaries, Wilderness areas, Buffer zone, Wetlands, etc.	
24.	The Punjab Heritage Foundation Act, 2005	This act entails preservation, conservation, maintenance and rehabilitation of the Punjab Heritage through various means, including technical or financial assistance and to create awareness among the people for preservation of the Punjab Heritage.	This act will not be triggered as no heritage sites are present in and around the proposed Project boundary.
25.	The Canal and Drainage Act, 1873	The Canal and Drainage Act 1873 (CDA) focuses on construction and maintenance of drainage channels and defines powers to prohibit obstruction or order their removal. It also covers issues related to canal navigation. It briefly addresses issues relating to	This act will be applicable as Jhelum River is passing along the southern-eastern side of the landing site of the Village Chevra.

Sr. No.	Act	Brief Coverage	Relevance to Project
		environmental pollution. Section 70(5) of the CDA clearly states that no one is allowed to “corrupt or foul the water of any canal so as to render it less fit for the purposes for which it is ordinarily used.” In addition, Section 73 of the CDA gives power to arrest without warrant or to be taken before the magistrate a person who has wilfully damaged or obstructed the canal or “rendered it less useful.”	
26.	The Punjab Emergency Service Act, 2006	It deals with the establishment of emergency service for a purpose of maintaining a state of preparedness to deal with emergencies, to provide timely response, rescue and emergency medical treatment to the affected persons and recommending measures to be taken by related organizations to avoid any emergency situation. It describes procedures to establish emergency service, emergency board, emergency fund, emergency ambulance and rescue vehicles, offence and punishment, etc.	This act is applicable to the proposed Project to provide timely response, rescue and emergency medical treatment to the affected persons during construction and operation phases of the Project.
27.	National Disaster Management Act, 2010	National Disaster Management Act, 2010 was passed by Parliament of Pakistan in 2010. The Act applies to whole Pakistan. The Act was passed in backdrop of 2010 Floods in Pakistan and strengthens Disaster Management system.	This act will be applicable as Jhelum River is passing along the southern-eastern side of the landing site which is subject to flooding in the past. Therefore, this act necessitates consideration to disasters and risk management strategies during design, construction and operational phases.
28.	Seismic Building Code of Pakistan 2007	This code stipulates the minimum requirements for seismic safety of building and structures and the provisions of the Building Code of Pakistan (Seismic Provisions-2007) shall apply for engineering design of buildings, like structures and related components. Construction of buildings shall be considered as violation of professional engineering work specified under clause (XXV) of section 2 of the Act.	This Code will be used in structural design of associated structures constructed under this proposed Project.
29.	Building code of Pakistan, Fire Safety Provisions, 2016	Building Code of Pakistan-Fire Safety Provisions-2016 provide rules for fire prevention, life safety in relation to fire and fire protection of buildings and structures as prescribed. Building Code of Pakistan-Fire	It is applicable to the design and implementation of the proposed Project to ensure fire safety compliance in all construction and operational activities. These provisions set

Sr. No.	Act	Brief Coverage	Relevance to Project
		Safety Provisions-2016 is applicable in the design of proposed expansion.	forth essential guidelines for fire prevention, protection, and emergency response measures to minimize the risk of fire-related hazards. The Project contractors are required to adhere to these regulations, incorporating fire-resistant materials, emergency evacuation plans, firefighting equipment, and adequate fire suppression systems in the design and construction phases. Additionally, activities involving electrical installations, storage of flammable materials, and operational safety protocols must align with these provisions to safeguard human lives, property, and the environment.

2.3 INTERNATIONAL PROTOCOL / CONVENTIONS

All applicable international conventions for the proposed Project to which Pakistan is signatory are discussed briefly in **Table 2-3**.

Table 2-3: International Conventional and its Relevancy to the Proposed Project

Sr. No.	Name of International Convention	Aims and Objectives of the Policy and Plan	Relevancy to the Proposed Project
1.	United Nation Framework Convention on Climate Change (UNFCCC) Amended, 2015	The objective of the Convention is to stabilize greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system." Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.	It is applicable to the proposed Project as its implementation is expected to result in the emission of greenhouse gases (GHGs) into the atmosphere, primarily due to construction activities. These emissions may arise from the operation of heavy machinery, transportation of materials, and energy consumption during various phases of the Project.
2.	Kyoto Protocol (Amended), 2012	The Kyoto Protocol aimed to reduce carbon dioxide (CO ₂) emissions and the presence of greenhouse gases (GHG) in the atmosphere.	

Sr. No.	Name of International Convention	Aims and Objectives of the Policy and Plan	Relevancy to the Proposed Project
3.	UNESCO Convention on the Protection of the World's Cultural and Natural Heritage, 1972	The convention aims the protection of the natural and cultural heritages.	At this stage convention will not be applicable as no world's cultural and natural heritage site is present in and around the Project area. However; this convention will be applicable if any cultural property will be found during excavation.
4.	Paris Agreement, 2015	The Paris Agreement's central goal is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below to two degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to one and half degrees celsius. Additionally, the agreement aims to increase the ability of countries to deal with the impacts of climate change, and at making finance flows consistent with a low GHG emissions and climate-resilient pathway.	It is applicable to the proposed Project as its implementation is expected to result in the emission of greenhouse gases (GHGs) into the atmosphere, primarily due to construction activities. These emissions may arise from the operation of heavy machinery, transportation of materials, and energy consumption during various phases of the Project.
5.	The Convention on Conservation of Migratory Species of Wild Animals, 1979	The Convention requires countries to take action to avoid endangering migratory species. The term "migratory species" refers to the species of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries. The parties are also required to promote or cooperate with other countries in matters of research on migratory species.	Based on surveys and assessments conducted in the Kotli Sattian region, there is no evidence of migratory wild animal species in the immediate vicinity of the Project area. The ecological characteristics of Kotli Sattian, encompassing habitat types, vegetation cover, and climatic conditions, do not align with known migratory routes for wildlife. While the region is recognized for its rich biodiversity, including various resident species of birds, mammals, and reptiles, studies have not identified migratory species utilizing this area.
6.	Basel Convention, 1994	In 1994, Pakistan signed Basel Convention that restricts trans-boundary movements of "Hazardous Waste and their Disposal" with aim to protect human health and surrounding environment by minimizing the use of hazardous waste production.	The proposed Project will not be necessitating the endowment of this convention.

Sr. No.	Name of International Convention	Aims and Objectives of the Policy and Plan	Relevancy to the Proposed Project
7.	International Union for Conservation of Nature and Natural Resources Red List, 2000	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.	Surveys and assessments conducted in the Kotli Sattian region indicate that certain wildlife species experiencing various levels of threats are present in and around the surroundings of the Project area. Therefore, this Convention will be applicable during the planning and execution phases of the Project to ensure that the ecological integrity of the region is maintained, and that the conservation efforts for these threatened species are upheld.
8.	Millennium Development Goals (MDGs)	The Millennium Development Goals (MDGs) were adopted in the General Assembly of the United Nations in the year 2000 by all the countries of the world and the world's leading developmental institutions.	The MDGs that will prevail for the proposed Project are as follows: • Promote Gender Equality and Empower Women: TDCP during operational phase will be responsible for hiring women for operational activities to elude gender discrimination and to promote women empowerment. • Combat HIV/AIDS Malaria and Other Diseases: Contractor and TDCP will be responsible to conduct medical surveillance of the workers before hiring to combat HIV/AIDS, Malaria, COVID-19 and other diseases. • Ensure Environmental Sustainability: Contractor and TDCP will be responsible to ensure environmental sustainability of the proposed Project area by ensuring implementation of EMP to mitigate adverse environmental impacts from construction and operational activities during implementation stage.



Sr. No.	Name of International Convention	Aims and Objectives of the Policy and Plan	Relevancy to the Proposed Project
9.	Convention on the International Trade of Endangered Species (CITES), 1975	The Convention requires countries to safeguard the trade in rare or endangered species and it established a permit system to control imports and exports of wild fauna and flora.	Surveys and assessments conducted in the Kotli Sattian region indicate that certain faunal species experiencing various levels of threats are present in and around the surroundings of the Project area. Therefore, this Convention will be applicable during the planning and execution phases of the Project to ensure that the ecological integrity of the region is maintained, and that the conservation efforts for these threatened species are upheld.

2.4 NATIONAL SCREENING AND REVIEW PROCESS – PUNJAB ENVIRONMENTAL PROTECTION AGENCY

Punjab Environmental Protection (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations 2022 provide the necessary details on the preparation, submission, and review of the IEE and the EIA reports. Categorization of projects for IEE and EIA is one of the main components of these regulations. Projects have been classified based on expected degree of adverse environmental impact.

According to the Punjab Environmental Protection Agency (Review of IEE and EIA) Regulations 2022, the proposed Project falls under Category “H” (Urban Development and Tourism) and Category “I” (Environmentally Sensitive Areas) of Schedule-II, which requires an EIA before commencement of construction.

Based on the nature and scope of the Project, the proposed project falls under Category “H” (Urban Development and Tourism) and Category “I” (Environmentally Sensitive Areas) of Schedule-II, which requires an EIA study for the urban development project. Therefore, an Environment Impact Assessment (EIA) report is prepared. The regulations stipulate that within ten (10) working days of the IEE or EIA study having been submitted, the concerned provincial agency will confirm that the document submitted is complete for the purpose of review. During this time, should the agency require the proponent to submit additional information, it will return the IEE or EIA to the proponent for revision, clearly listing those aspects that need further discussion. Subsequently, the concerned Provincial EPA would make every effort to complete an IEE review within thirty (30) days and an EIA review within forty-five (45) days of filing.

Article 12(4) of Punjab Environmental Protection Act (Amendment), 2017 binds the concerned EPA to communicate its approval or otherwise within a period of four months from the date the IEE or EIA study is filed, complete in all respects in accordance with the prescribed procedure, failing which the IEE study or, as the case may be, the EIA study shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations made thereunder.



2.5 ADMINISTRATIVE FRAMEWORK

2.5.1 Tourism Development Corporation of Punjab (TDCP)

The implementing agency of the proposed Project is Tourism Development Corporation of Punjab (TDCP). The management of TDCP will ensure that all the proposed mitigation measures are effectively implemented at the design, construction, and operation stages of the proposed Project.

2.5.2 Environmental Protection and Climate Change Department (EP&CCD), Punjab

As the proposed Project falls under the administration jurisdiction of Murree District, Punjab therefore; EP&CCD-Punjab will be responsible for reviewing the proposed Project report, issuing environmental approval and overall/broad-based monitoring of the proposed Project activities, as per Punjab Environmental Protection Act, 2017 **(Amended)**.

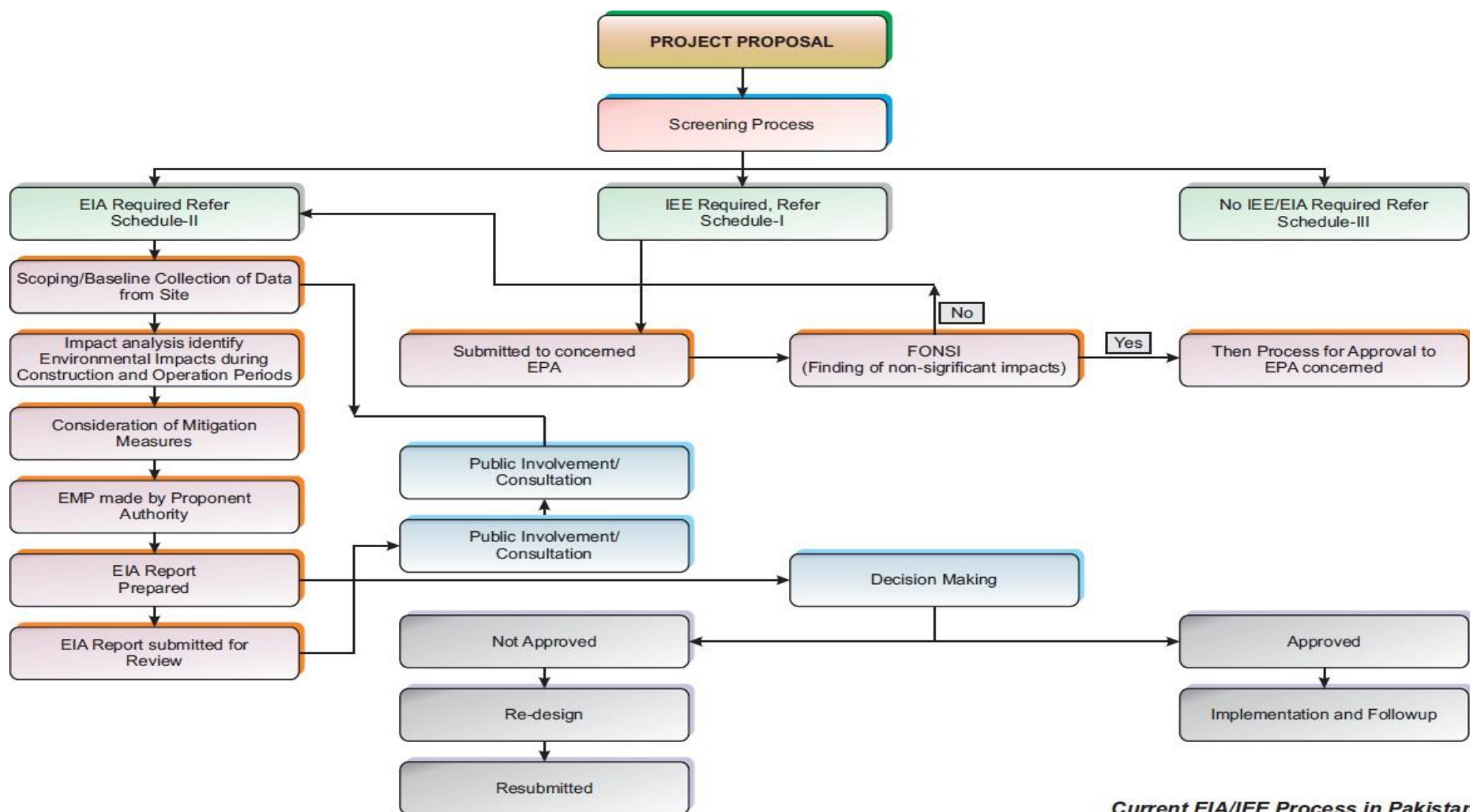


Figure 2-1: Procedure for Submitting the EIA Report

Current EIA/IEE Process in Pakistan



3 DESCRIPTION OF PROJECT

3.1 GENERAL

This Chapter presents the detailed Project description along with Project cost, land requirement, implementation schedule, workforce and water requirements, etc.

3.2 OBJECTIVES OF THE PROJECT

The primary objective of the Project is to develop sustainable tourism infrastructure that promotes economic growth while safeguarding the natural and cultural heritage of the Kotli Sattian region. It seeks to address challenges posed by unregulated tourism, such as environmental degradation, inadequate facilities, and limited socio-economic benefits for local communities. By integrating sustainability principles into its design and development, the Project aims to establish Kotli Sattian as a premier eco-tourism destination in Punjab, serving as a model for responsible and inclusive tourism development that benefits both visitors and the local community.

Other objectives include:

- **Enhance Recreational Infrastructure:** Develop safe and accessible amenities, including designated paragliding club site with walking trails, picnic areas, camping zones, etc., to attract a diverse range of visitors.
- **Promote Environmental Conservation:** Implement sustainable design strategies that minimize ecological impact, preserve biodiversity, and raise awareness about environmental stewardship among tourists and local communities.
- **Utilize Eco-Friendly Landscaping:** Incorporate native plant species and environmentally conscious landscaping techniques to maintain ecological balance and minimize environmental degradation.
- **Encourage Adventure Tourism:** Host annual paragliding festivals and competitions, along with certification programs, to position Kotli Sattian as a hub for adventure sports.
- **Provide Training and Skill Development:** Offer introductory courses and professional training in paragliding, safety protocols, and eco-tourism management to enhance local expertise and engagement in the tourism sector.
- **Boost Local Economic Growth:** Generate employment and business opportunities for local residents by promoting tourism-related enterprises such as guided tours, hospitality services, and handicrafts.
- **Enhance Community Engagement:** Encourage local participation in tourism planning and development to ensure that economic and social benefits are equitably distributed.
- **Improve Accessibility and Connectivity:** Upgrade transportation and infrastructure facilities to ensure seamless access for visitors while maintaining environmental sustainability.
- **Support Cultural and Heritage Preservation:** Promote and safeguard the region's cultural heritage, local traditions, and historical landmarks through tourism initiatives and awareness campaigns.
- **Provide a Relaxing and Therapeutic Environment:** Establish serene and scenic spaces that promote relaxation, mental well-being, and nature-based wellness experiences for visitors.
- **Diversifying Tourism to Reduce Overcrowding in Murree:** Murree, being a popular hill station, experiences excessive tourist influx, leading to issues like traffic congestion, environmental degradation, strain on local resources, and infrastructure overuse. By promoting Kotli Sattian as an



eco-tourism and adventure sports hub, the Project seeks to offer visitors a sustainable and less congested alternative, thereby alleviating pressure on Murree.

3.3 PROJECT ADMINISTRATIVE JURISDICTION

The proposed Project lies in Tehsil Kotli Sattian of Murree District in the Punjab Province of Pakistan.

3.4 PROJECT ACCESSIBILITY

The paragliding club site is located at Chevra Hill Top which is accessible through Kotli Sattian Road, Tourism Highway, Islamabad Expressway, Lahore- Islamabad Motorway, Sialkot-Lahore Motorway, G.T. Road, and Murree Expressway.

3.5 PROJECT IMPLEMENTATION SCHEDULE

The tentative implementation period for proposed Project is twelve (12) months.

3.6 COST OF THE PROJECT

Tentative cost of the proposed Project is about PKR 423.927Million.

3.7 COMPONENTS OF THE PROJECT

The components of Paragliding club are provided in **Table 3-1** and **Figure 3-2** shows Master Plan of the proposed Project.

Table 3-1: Components of Paragliding Club

Sr. No.	Land Use/Facilities
1.	Construction of Glamping Pods Dome Style with MS frame work, wooden and reflective glass cladding (10 Nos.)
2.	Construction of A-Frame Type Restaurant dual height, MS frame work, wooden cladding and corrugated roof top
3.	Construction of wooden Trees Houses/Huts size (2 Nos.)
4.	Construction of 02 Nos. Public Toilet
5.	Construction of paragliding store
6.	Sculpture, made of stone and wood (3 Nos)
7.	Bonfire Sitting Point Area (2 Nos)
8.	Non Mechanical Kids Rides
9.	Installation of wooden gazebos with wooden benches (10 Nos)
10.	Selfie Point (5 Nos)
11.	Construction of Monitoring Room
12.	Construction of Electric Room
13.	Construction of Guard Room
14.	Construction of Reception
15.	Construction of Kitchen & washroom



The components of Paragliding club with respect to are provided in **Table 3-2**.

Table 3-2: Other Components of Paragliding Club at Chevra Hill Top

Sr. No.	Facilities
1.	Providing and fixing hot dipped galvanized iron chain link mesh fence
2.	Construction of Walk Ways
3.	Landscaping work
4.	Parking Area & Parking Shed
5.	Approach road
6.	Tube well
7.	Construction of Paragliding Strip
8.	External Electric (solar system included)
9.	Underground Water Tank
10.	Water Supply System
11.	Sewerage System
12.	Construction of Septic Tank & Soakage Well
13.	Construction of Septic Tank & Soakage Well
14.	Rain Water Harvesting Point

3.8 LAND ACQUISITION

The land designated for the construction of paragliding club located in Chevra Hill Top, Village is owned by local resident. The Tourism Development Corporation of Punjab (TDCP) has acquired this land.



3.9 CONSTRUCTION MATERIAL

The materials used in construction of the proposed Project would include following but not limited to: cement, reinforced cement concrete frame (RC Frame), brick infill, brick cladding coarse aggregates (crush), fine aggregates (sand), water and asphalt.

A rigid frame reinforced concrete is generally adopted in the local construction for similar building types. The new facility adopts this superstructure type. Building outer envelope is double concrete wall with insulation in between, referring to the BCP Energy Provision, Building Energy Code, 2011 (generally known as BEC – 2011) for energy conservation. External and internal finishes of main rooms/offices and other facilities.

The required construction materials for the proposed project components will be obtained from the nearby approved vendors/quarries sites.

3.10 CONSTRUCTION ACTIVITIES AND REQUIRED MACHINERY

Earthwork (Clearing of Vegetation/Trees and Topsoil):

- Marking and staking the project area;
- Removal of unwanted vegetation while preserving mature trees where possible;
- Topsoil stripping and storage for later use in landscaping and rehabilitation;
- Installation of silt fences and retention barriers; and
- Terracing and regrading to maintain the natural slope and prevent landslides.

Excavation Work:

- Layout planning
- Excavation as per level
- Ant-termites spray
- Compaction of footing area
- Plain Cement Concrete work
- Construction of water channels to manage runoff.

Structural Works:

- Reinforcement work
- Concrete work
- Steel Structure works
- Grey Structure work

The list of the machinery and the equipment expected to be used for the proposed Project are provided in **Table 3-3**. The machinery and equipment used for the proposed Subproject will typically result in the release of oil spills and gaseous emissions.

Table 3-3: Machinery and Equipment Requirement for the Proposed Project

Sr. No.	Machinery Name	Sr. No.	Machinery Name
1.	Dump Truck	12.	Concrete Transit Truck
2.	Front End Loader	13.	Concrete Pump
3.	Dozer	14.	Excavator with bucket /braker
4.	Grader	15.	Water Pumps
5.	Vibratory Roller	16.	Cranes and Paver



6.	Water Tankers	17.	Vibrators
7.	Aggregate Spreader	18.	Generators
8.	Three Wheel Rollers	19.	Plate Compactor
9.	Tandem Roller	20.	Jumping Hammer
10.	Wheel Barrow	21.	Welding machines
11.	Cutting & Bending machine	22.	Concrete Vibrator

3.11 CONSTRUCTION CAMPS

Construction camps for the construction of proposed Project components will be located within the premises of the proposed Project.

However, if the construction camps are to be established outside the Project boundary, the Contractor shall adhere to the following criteria for identifying and setting up the construction campsites before commencing construction activities:

- There should be no or minimum resettlement issues for the location of the camps;
- The campsite should be located at a distance of 500m to 1,000m away from the residential areas/settlements and sensitive receptors;
- Selection of sites for construction camps shall be near the Project area having proper access to the nearby main/link road;
- The camps must be located in a place where the drainage from and through the camps will not threaten any domestic or public water supply;
- The campsite must be adequate in size to prevent overcrowding of necessary structures;
- The campsite should consider avoiding any damage to property, vegetation, irrigation, and drinking water supply systems;
- The campsite must not be subject to periodic flooding; and
- There should not be any ecologically sensitive areas e.g. wildlife sanctuaries, game reserves, national parks, etc. near the construction camp sites.

3.12 WORKFORCE REQUIREMENTS

Manpower demand estimation is an essential component to facilitate deployment of manpower.

Workforce during Construction Phase

Total man power required on site for proposed Project will be approximately 70 workers per day including skilled & non-skilled workers and supervisory staff, depending on the type of construction.

Workforce during Operation Phase

The total number of persons during the operational phase will be approximately 50 workers comprising administrative staff member's skilled & unskilled staff.



3.13 SOURCE OF WATER

Source of Water during Construction Phase

Contractor will be responsible to arrange water for construction works. It is estimated that 5000 gallon water tank will be used by contractor to bring water on the site for construction activities. Moreover; groundwater will also be used for construction activities.

Source of Water during Operation Phase

The municipal water supply will be utilized for drinking and sanitation purposes during the operational phase.

3.14 WATER REQUIREMENT

Construction Phase

The water consumption for construction phase is estimated to be 2800² liters/day for 70 workers during the construction phase of the proposed Project.

Operation Phase

The water consumption for operation phase is estimated to be 4,000³ liters/day for 100 workers during the operation phase of the proposed Project.

3.15 WASTEWATER GENERATION AND TREATMENT MECHANISM

Construction Phase

The wastewater generation is estimated to be 592⁴ gallons/day for 70 construction workers during construction phase of the proposed Project.

Temporary toilets with cesspit will be installed and treated periodically for construction staff and workers, and after the completion of work, the ground will be restored.

Operation Phase

The wastewater generation is estimated to be 423 gallons/day for 100 workers during operation phase of the proposed Project.

² Water consumption per capita= 40 liters/capita/day. For 70 workers water consumption= 40 liters/capita/day*70 persons= 2800 liters/day.

³ Water consumption per capita= 40 liters/capita/day. For 100 workers water consumption= 40 liters/capita/day*100 persons= 4000 liters/day.

⁴ Design Criteria of Public Health Engineering for Water Supply, Sewerage and Storm Water Drain (Domestic sewage generation = 80% of water consumed/day)



3.16 SOLID WASTE

Construction Phase

The solid waste generation is estimated to be 39 kg/day for 70 construction workers during construction phase of the proposed Project⁵.

Operation Phase

The solid waste generation is estimated to be 28 kg/day for 50 persons during operational phase of the proposed Project.

3.17 POWER REQUIREMENT / POWER SOURCE

Construction Phase

The main source of electricity/electric power during the construction phase will be diesel generators for construction camps.

Operation Phase

The source of power for the operation phase will be Islamabad Electric Supply Company (IESCO).

3.18 ALTERNATIVE ASSESSMENT

This section deals with an analytical overview of the different alternatives that have been considered for the proposed Project. The analysis has been carried out critically to justify the Project's need and selected option. Besides the economic viability, environmental sustainability and social soundness have also been considered for analyzing alternatives considered for the proposed Project.

3.18.1 Paragliding Club Alternatives

The proposed Project aims to establish paragliding club in the Chevra Hill Top, Kotli Sattian. In this context, the following alternatives have been considered and evaluated as part of the study:

- Alternative I: No-Project Option (NPO); and
- Alternative II: Establishment of Paragliding Club in Chevra Hill Top, Kotli Sattian.

Alternative I: No Project Option (NPO)

The designation of Kotli Sattian as a tourist destination by the Government of Punjab underscores its potential for socio-economic growth and environmental sustainability. However, the absence of a dedicated tourist park in the region may hinder the realization of these benefits. Without such a facility, Kotli Sattian risks missing opportunities to attract visitors, generate employment, and boost local business income, thereby impeding economic

⁵ Source: Estimated solid waste generation rate in the study area is about 0.55kg/person/day (Integrated Solid Waste Management Plan for Rawalpindi Region, (2023)-The Urban Unit, Lahore

diversification and resilience. Tourist spots play a crucial role in stimulating economic growth and serve as platforms for preserving and showcasing local culture and heritage. Their absence may lead to diminished cultural awareness and reduced opportunities for community engagement. Moreover, while reduced footfall might lower immediate environmental pressures, it also means missed opportunities for structured conservation efforts, such as implementing native landscaping, rainwater harvesting, and comprehensive waste management programs that help preserve natural resources.

Alternative II: Establishment of Paragliding Club in Chevra Hill Top

Cheva Hill Top is situated in the Kotli Sattian region, characterized by hilly terrain. The area's geographical position offers scenic views of the surrounding mountains and valleys, making it an ideal location for eco-tourism and recreational activities. Historically, the land has been used for subsistence grazing by local communities. The key attributes of the site include:

- The site is predominantly hilly with a mixture of forested land, sloped terrain, and pockets of flat areas, ideal for development while maintaining the natural landscape;
- The region experiences a temperate climate, with cold winters and mild summers. This makes the site an attractive year-round destination;
- Dense pine forests and other local flora dominate the area. The site features mature trees, which are integral to the area's ecological balance and will be preserved during the development;
- A natural water source, a perennial (Durnoyan Waterfall) is located on-site and will serve as a central feature for the water bodies designed for swimming and boating;
- The site is accessible by a narrow, single-track road requiring upgrades. Provisions for widening the road and creating a formal entry point are essential; and
- Electricity is available in a nearby village and can be extended to the site with minimal effort

Pros of Establishment of Paragliding Club in Chevra Hill Top

- Eco-tourism can stimulate local economies by creating employment opportunities and supporting local businesses. This influx can lead to improved infrastructure and services for the community;
- Properly managed eco-tourism initiatives can promote the conservation of natural resources. By attracting visitors interested in nature, funds and awareness can be directed towards preserving the local ecosystem; and
- A paragliding club can serve as a platform to showcase and preserve local culture and traditions, fostering community pride and identity.

Cons and Environmental Sensitivities:

- Increased human activity can lead to soil erosion, vegetation damage, and wildlife disturbances. For instance, recreational activities with high participation have been linked to such environmental impacts;
- The development may place additional pressure on local resources, such as water and energy, potentially leading to shortages or conflicts with existing community needs;
- Without proper waste management, tourism can result in pollution, affecting both terrestrial and aquatic ecosystems. This includes issues like littering and water contamination; and
- Eco-tourism areas are susceptible to climate change effects, such as altered weather patterns and increased natural disasters, which can impact both the environment and tourism viability.

Murree's high visitor volumes have resulted in environmental degradation, overburdened infrastructure, and cultural dilution. By diverting tourist demand to Kotli Sattian, the pressure on Murree can be alleviated, protecting its fragile ecosystem and cultural integrity. Furthermore, Kotli Sattian's planned sustainable infrastructure including eco-friendly transportation, renewable energy- powered facilities, and efficient water and waste management systems can foster balanced regional development. This diversification not only enhances economic growth and social well- being in Kotli Sattian but also contributes to long-



term environmental sustainability and a more resilient tourism sector across the region.

Environmental and Social comparison of Alternative-I and Alternative-II are discussed in **Table 3-4** below.

Table 3-4: Comparison of Alternative-I and Alternative-II

Sr. No.	E&S Criteria	Alternative-I	Alternative-II
1.	Avoidance of Natural/Landscape Areas	No disturbance to the natural landscape.	Development involves site modification, but natural features will be integrated into the design to maintain the scenic beauty.
2.	Avoidance of Tree Cutting	No tree cutting required.	Limited tree cutting (approx. 10 trees); compensatory plantation at a ratio of 10 trees planted for every tree removed.
3.	Topography and Soil Stability	No disturbance to soil structure or stability.	Earthworks may cause soil erosion risk, but proper slope stabilization and soil conservation techniques will be applied.
4.	Hydrology and Water Resources	No change to existing hydrological conditions.	Sustainable water management measures, including rainwater harvesting and groundwater recharge, will be implemented.
5.	Biodiversity and Wildlife Protection	No direct impact on wildlife and habitats.	A Critical Habitat Assessment (CHA) and Biodiversity Action Plan (BAP) is suggested to be developed to protect endangered species, if any and maintain ecological balance.
6.	Connection with Major Towns	No improvement in accessibility.	Improved connectivity with major towns, promoting tourism and local business growth.
7.	Land Acquisition and Resettlement	No land acquisition or displacement.	No additional land acquisition or displacement; the Project will be implemented on available government land.
8.	Livelihood and Employment	No new employment opportunities; limited economic growth.	Significant livelihood benefits, including job creation in tourism, hospitality, and local businesses.
9.	Public Utility Impacts	No impact on existing public utilities.	No adverse impact; utilities will be improved and extended where needed.
10.	Community and Cultural Impacts	No enhancement of local cultural activities or community engagement.	Development of cultural and educational programs promoting local heritage, traditions, and eco-tourism.
11.	Traffic and Road Safety	Existing roads remain unsafe and congested.	Road infrastructure will be upgraded, improving safety and reducing congestion.
12.	Air Quality and GHG Emissions	No additional emissions, but traffic congestion continues to contribute to poor air quality.	Temporary emissions increase during construction, but long-term improvement through reduced congestion and sustainable energy use.
13.	Noise and Light Pollution	No additional noise or light pollution.	Minimal noise and light pollution; eco-friendly lighting and noise reduction strategies will be employed.
14.	Waste Management	No waste management initiatives in place.	Strict waste management protocols, including recycling, composting, and controlled disposal, will be enforced.
15.	Climate Change Resilience	No measures to enhance resilience against climate change impacts.	Implementation of climate-resilient infrastructure and sustainable energy sources (solar power, water conservation).



16.	Tourism Potential	No increase in tourism; limited economic diversification.	Sustainable tourism development, attracting eco-tourists and reducing pressure on overburdened destinations like Murree.
17.	Disaster Risk and Emergency Preparedness	No improvements in disaster preparedness.	Disaster risk reduction strategies, including fire safety, emergency response planning, and controlled visitor capacity, will be implemented.
18.	Long-Term Environmental Sustainability	No active environmental conservation initiatives.	Implementation of conservation projects, including afforestation, habitat restoration, and water conservation programs.

While the No-Project Option (Alternative I) avoids direct environmental impacts, it also foregoes significant opportunities for economic development, ecological conservation, and improved community infrastructure. Alternative II establishment of paragliding club presents a balanced approach integrating environmental sustainability with economic growth (as discussed above). Key recommendations/mitigation measures, such as a Critical Habitat Assessment (CHA) should be conducted to identify and evaluate areas essential for the survival of wildlife species and especially endangered or endemic species, if any. Following the CHA, a Biodiversity Action Plan (BAP) may be formulated to outline strategies for conserving identified species and habitats in and around the Project area. The BAP would set measurable targets, such as achieving no net loss or a net gain in biodiversity, and detail actions like habitat restoration, species monitoring, and community engagement. For instance, the Murree Kahuta Kotli Sattian National Park Management Plan emphasizes the importance of such proactive measures in preserving regional biodiversity.



4 ENVIRONMENTAL BASELINE

4.1 GENERAL

For any development Project, the prevailing environmental and social 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 the 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 and social conditions in the Study Area.

The existing environmental conditions of the proposed Project have been considered within the AOI (taken 200 m from Project boundary of paragliding club) as shown in **Figure 1-2** with respect to physical, biological and socio-economic aspects. Information has been collected from variety of sources, including published literature, DCRs, field observations and surveys, conducted specifically for this Project have been analyzed for this study. Consultations were also held with the general public and stakeholders of the Project area in order to seek public opinion on the implementation of the proposed Project.

4.2 PHYSICAL RESOURCES

The following section provides an overview of the information on the physical environment of the proposed Project Study Area collected from primary as well as secondary sources. The major parameters covered include physiography and topography, geology, soil, seismicity, climate and meteorology, water resources, solid waste, land use, etc.

4.2.1 Physiography and Topography

Kotli Sattian is a tehsil in Murree District, Punjab, Pakistan. It is located between 33°37' to 32°35' north latitudes, and 73°26' to 73°27' east longitudes in the northeastern part of Punjab near the boundary with Azad Jammu & Kashmir (AJK) and Khyber Pakhtunkhwa (KPK). Murree and Abbottabad District to the north, Kahuta Tehsil to the south, Jhelum River and Bagh District (AJK) to the east, and Rawalpindi to the west, border the region.

Kotli Sattian is part of the Himalayan foothills, featuring a rugged and mountainous landscape with dense pine and oak forests, deep valleys, and numerous streams. The elevation varies significantly, ranging from approximately 600 meters to over 2,000 meters above sea level, with higher peaks offering panoramic views of the Jhelum River and surrounding areas.

The hills of the Kotli Sattian being part of the Himalayan foothills principally consists of four spurs, namely, the Patriata spur, the Phhofandi Spur, the Chevra Spur and the Narrar Spur. These spurs runs parallel to each other from north east to south west lessening there height gradually and running in general very sharply from their highest points eastward to the Jhelum River and more gradually westward to the Rawalpindi and Islamabad. Besides these spurs there are other small spurs, which are offshoots and branches.

The top of the **Patriata Spur** attains an altitude of 7,212 feet. From the top, it runs down southward. The Soan River flows through this Spur. The Spur on top also runs down northeastward and spreads in a continuous lofty crest for about 24 km up to the Jhelum River. This is the most beautiful and spectacular ridge of the region.

East of the Patriata Spur is the **Phhofandi Spur**. It separates on the top of Patriata and runs down toward Khad Biaga on the south. The highest point of the Phhofandi Spur is 7,034 feet and is the peak just above the Phhofandi Village.

Narrar Spur is in the southern Spur of Kotli Sattian. It rises above the Jhelum River in the east into which it drops by steep descent. It runs down gradually westward from the Grand Plateau on the top of Narrar Mountain. This is a tableland some kilometers in length and breadth, 6,000 feet above sea level, just above the Jhelum River. The Narrar Mountain, with its massive square front and precipitous sides, is a fine and striking feature in the landscape. Precipitous on three sides, the Spur sinks very gradually from east to west until it reaches the Soan river, which cuts through the western end of the spur, and forms a very wild and picturesque gorge at the southern end.

The **Kotli Spur** or the **Chevra Spur** is the lowest and smallest Spur of the subdivision. It stands between the Narrar and Phhofandi Spurs. It rises above Kahuti and Chevra and gently runs to Sumbriat just above the Jhelum River. Both sides of the Spur, eastward and westward are slopes. The area on both sides of the Spur is known historically as Narri. The highest points of Chevra and Sumbriat are 5,392 and 5,080 feet high above sea level respectively.

Project Area:

The study area of the proposed Project is hilly terrain with some flat patches with elevation generally ranges between 291 to 4,341 m surrounded by forest, agricultural land, roads, mosques, residential areas, rivers, waterfalls, nullahs and commercial areas. The Topography Map of the Study Area is shown in **Figure 4-1**.

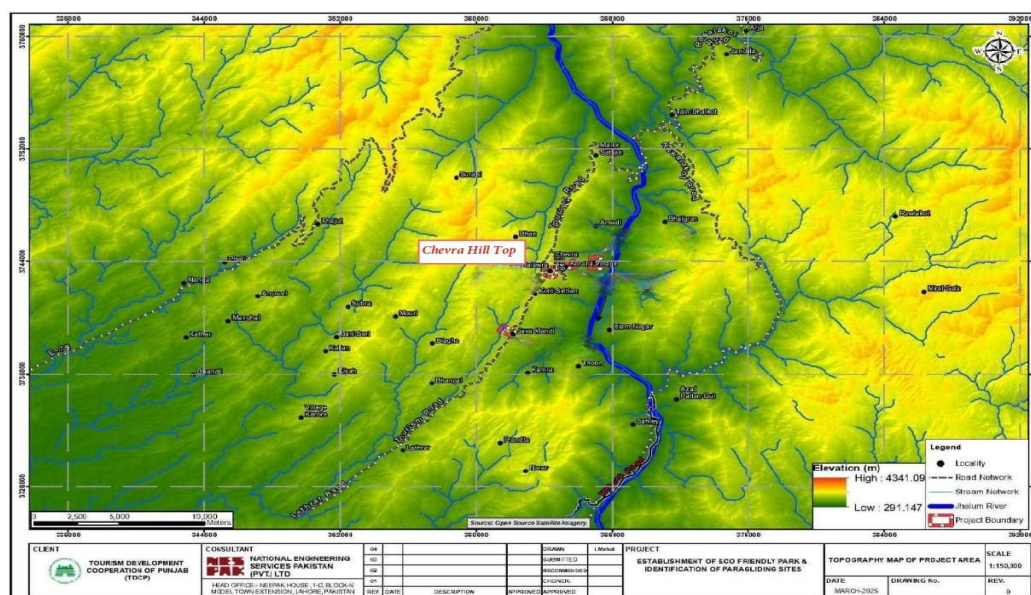


Figure 4-1: Topography Map of the Study Area



4.2.2 Geology

Kotli Sattian, situated within the Himalayan foothills, exhibits a diverse geological composition that reflects its complex tectonic history. The region's geology is primarily characterized by sedimentary rock formations, including limestone, shale, sandstone, and claystone. The sandstone, part of the Murree Formation, varies from medium to coarse-grained and displays colors ranging from purple to greenish-grey. Notably, the greenish-grey sandstone is softer with higher iron content, whereas the purplish or reddish-brown variants are more compact and harder.

Structurally, Kotli Sattian is influenced by the broader tectonic framework of the Sub-Himalayas. The area features significant geological structures such as anticlines and synclines, resulting from the Himalayan orogeny. These structural features have led to the deformation of rock sequences ranging from the Precambrian to recent periods. Major folds in the vicinity include the Nar Anticline and Gulpur Syncline, accompanied by faults like the Bajwal Thrust and Panjan Fault. These geological structures play a crucial role in shaping the region's topography and influence its seismic activity⁶.

Additionally, Kotli Sattian lies within the transitional zone between the Indo-Himalayan ecological region and the Irano-Saharan ecosystem. This unique positioning contributes to the area's rich biodiversity and varied landscapes.

Project Area:

The geological composition of the proposed Project area primarily consists of Miocene-aged rock formations, specifically the Murree Formation (Tmm). This formation, which dates back approximately 23 to 5 million years ago, is part of the broader Siwalik Group (as discussed above) and is predominantly composed of thick sequences of sandstone, siltstone, and shale.

Figure 4-2 shows the Geological Map of the Study Area.

4.2.3 Soil

The soils of Kotli Sattian have primarily developed from the weathering of the Murree Formation, which is composed of sandstone, siltstone, and shale. This geological composition, combined with the region's rugged topography and climatic conditions, has resulted in soils that are predominantly loamy to sandy-loam in texture, offering moderate fertility. These soils can be classified into three main groups based on their location:

Soils on Hill tops: These soils develop in situ through the weathering of underlying rocks, particularly sandstone and shale. They occur as a thin layer of silty clay or calcareous clay, typically ranging from two to three feet in depth. Due to the dense vegetation cover on hilltops, the soils contain a high percentage of organic matter, which enhances their fertility.

Soils on Slopes: These soils are derived partially from the underlying rudimentary rocks and are colluvial in nature, meaning they result from the movement of soil and rock fragments downslope due to gravity. The steepness of the slopes limits soil accumulation, making these soils shallow, typically one to two feet thick. They have a high organic content, including decomposed and partially decomposed plant material, but are highly susceptible to erosion, especially during heavy rainfall.



Soils on Terraces: These soils originate from terrace deposits and materials washed down from upper slopes. They are typically a heterogeneous mix of boulders, pebbles, sand, silt, and clay. Compared to hilltop and slope soils, terrace soils are deeper, often exceeding six feet, providing better moisture retention and greater potential for agricultural use.

Project Area

The soils at Chevra Hill Top consist of thin layers of silty clay or calcareous clay, typically ranging from 2 to 3 feet in depth. Due to the dense vegetation cover, these soils have a high organic matter content, making them relatively fertile. However, they are highly susceptible to erosion, particularly from strong winds and surface runoff.

The terrace soils of Korana are predominantly alluvial, having accumulated over time through water and gravity-driven deposition from higher elevations. These soils are deep and well-drained, often exceeding 6 feet in depth, and comprise a mixture of boulders, pebbles, sand, silt, and clay. While they offer stability and are suitable for agriculture, implementing soil conservation measures is essential to prevent degradation and erosion.

The soil map of the study area shown in **Figure 4-3**.

4.2.4 Seismology

Kotli Sattian, situated in the Himalayan foothills of northern Pakistan, is part of a seismically active region due to its proximity to significant tectonic fault lines, including the Main Boundary Thrust (MBT) and Main Frontal Thrust (MFT). These faults demarcate the collision zone between the Indian and Eurasian tectonic plates, rendering the area susceptible to earthquakes ranging from mild tremors to potentially destructive events. Historically, the region has experienced numerous earthquakes attributed to ongoing tectonic movements, particularly along the Hazara-Kashmir Syntaxis and other active fault systems.

Project Area

According to Building code of Pakistan, 2007 issued by Government of Pakistan, the Project area falls in Seismic Zone 3 of Pakistan (High damage) with peak ground acceleration (PGA) from 0.24 g to 0.32 g. **Figure 4-4** shows the seismic zoning map of Project Area.

⁶ *Structure Analysis of Nar Anticline, District Kotli, Azad Jammu And Kashmir, Pakistan - International Research Journal of Modernization in Engineering Technology and Science. Volume:03/Issue:06/June-2021*

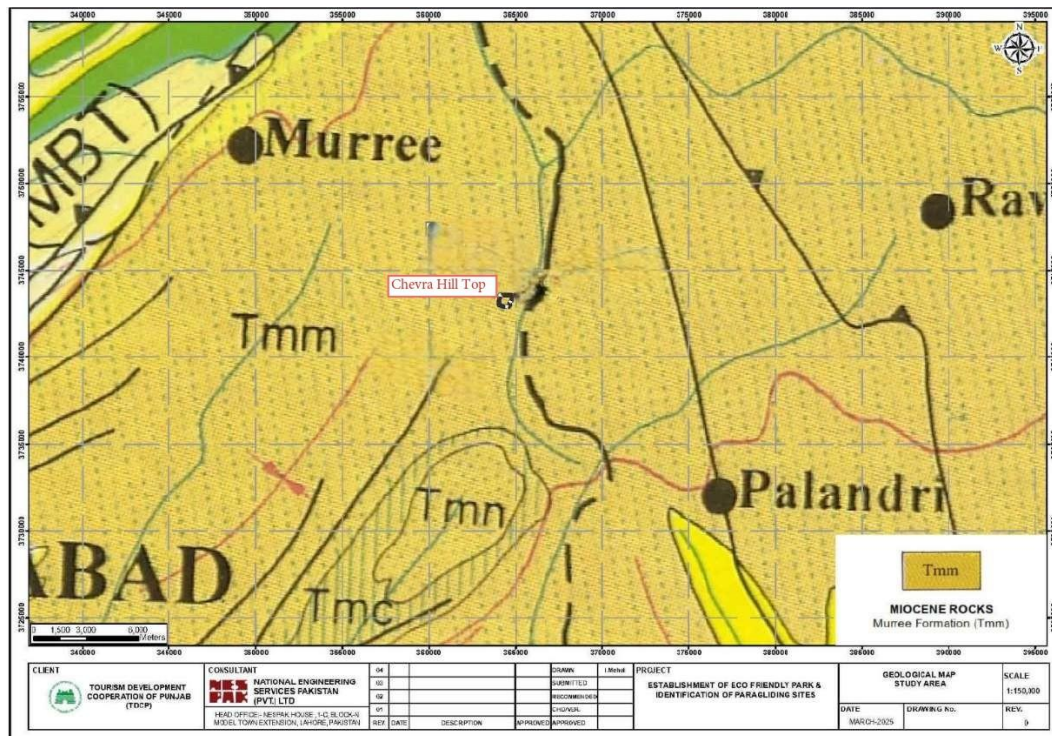


Figure 4-2: Geological Map of Project Area

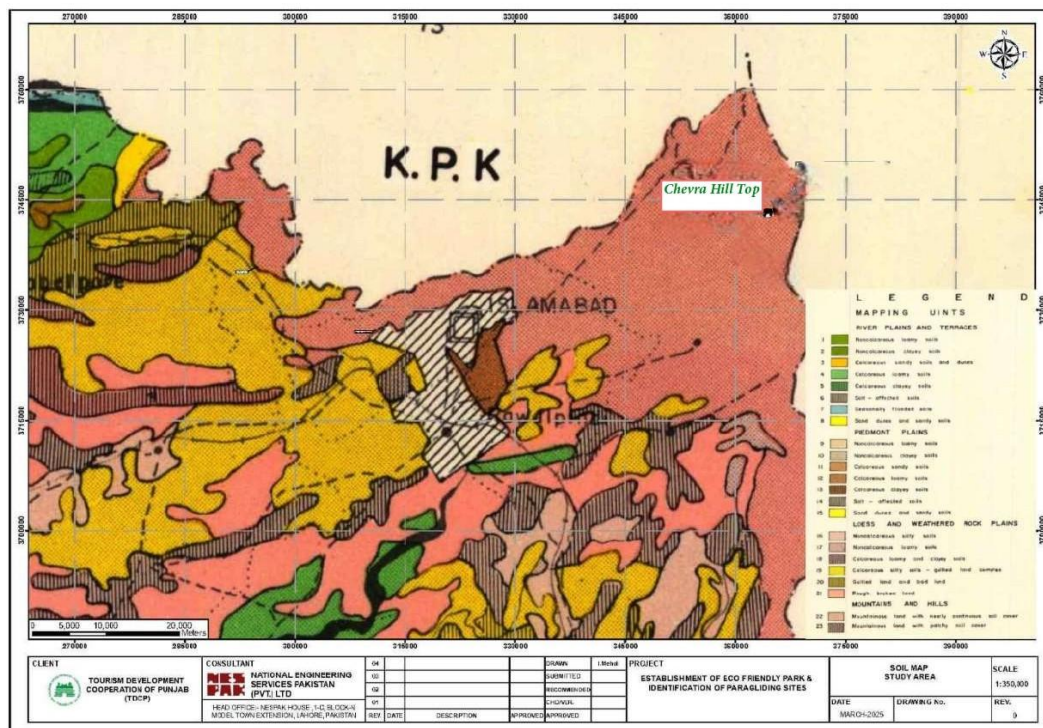


Figure 4-3 Soil Map of the Study Area

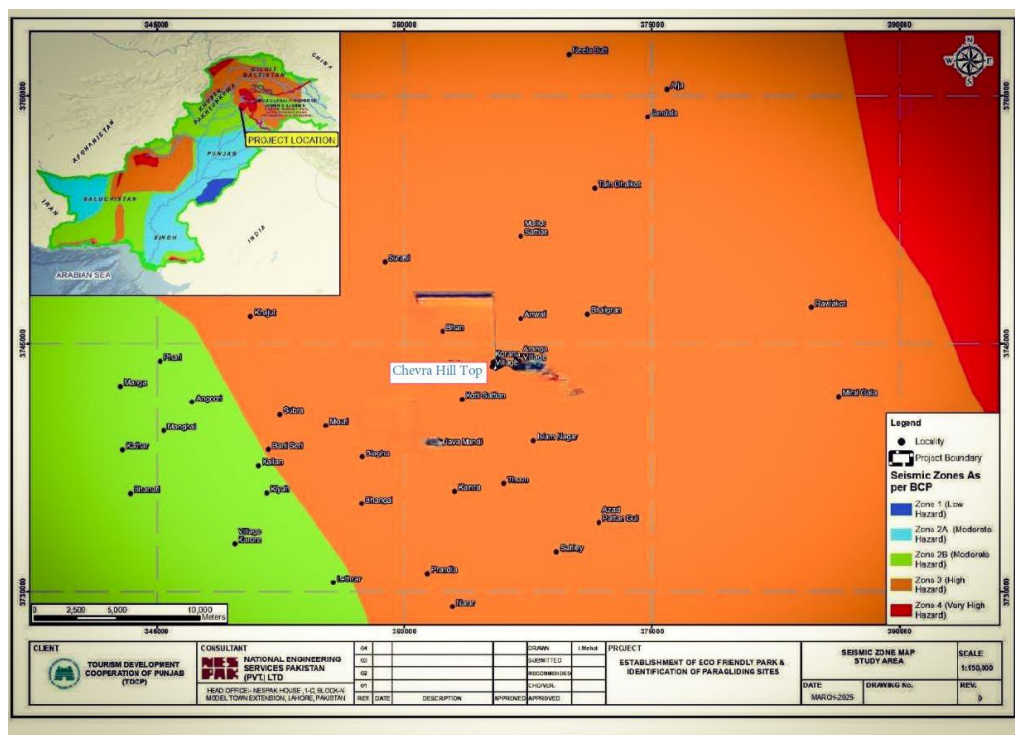


Figure 4-4: Seismic Zoning Map of Project Area

4.2.5 Climate and Meteorology

The Project Area experiences a climate that varies with its diverse topography. The region generally enjoys cool and mild summers, with temperatures influenced by elevation; higher altitudes tend to be cooler, while valleys are relatively warmer. Winters are typically cold, especially in elevated areas. Precipitation patterns in Kotli Sattian are influenced by its geographical location, with rainfall occurring throughout the year. The monsoon season, spanning from June to September, brings substantial rainfall, contributing to the region's lush greenery.

The annual average temperature of Kotli Sattian generally ranges between 10°C and 22°C. The region receives an average annual precipitation of approximately 1,538 millimeters, with about 89.3 rainy days per year.

Since there is no dedicated weather station in Kotli Sattian, the climate and meteorological data for the proposed Project have been obtained from published records of the Climate Normals of Pakistan (1991–2020). The closest and most relevant weather station for reference is Murree, located at coordinates 33°55' N and 73°23' E.

For the analysis, historical data on temperature, rainfall, relative humidity, and wind speed from 1981 to 2020 recorded at the Murree weather station have been used as a representative dataset for the Project area. The subsequent sections present this climatic information, which provides insights into the prevailing weather conditions in Kotli Sattian.

Temperature

Table 4-1 shows mean minimal and maximal temperatures observed for each month between 1991 and 2020 in the Study Area. The highest temperature measured between 1991 and 2020 was 34.5 °C in June 17, 1995, and the lowest temperature was measured in January 14, 2000 i.e. -10°C.

Table 4-1: Mean Maximum Temperatures (°C) between 1991 and 2020

Sr. No.	Months	Mean Minimal Temperature	Mean Maximum Temperature
1.	January	- 1.6	8.6
2.	February	- 0.5	9.6
3.	March	4.0	13.9
4.	April	8.7	19.0
5.	May	13.0	23.6
6.	June	15.3	25.6
7.	July	15.7	23.5
8.	August	15.6	22.8
9.	September	13.8	22.3
10.	October	10.5	20.3
11.	November	5.7	16.3
12.	December	1.0	12.4

Source: Climate Normal of Pakistan (1991-2020)

Precipitation (Rainfall)

Table 4-2 shows mean monthly precipitation observed in the Study Area from 1991 to 2020 with an annual average rainfall of 1,713.6 mm.

Table 4-2: Mean Monthly Precipitation (1991 and 2020)

Sr. No.	Month	Precipitation (millimeters)
1.	January	119.3
2.	February	167.3
3.	March	170.7
4.	April	139.3
5.	May	82.1
6.	June	153.6
7.	July	315.3
8.	August	272.0
9.	September	148.3
10.	October	56.5
11.	November	39.5
12.	December	49.5
Annual		1,713.6

Source: Climate Normal of Pakistan (1991-2020)

Relative Humidity

Table 4-3 shows the mean relative monthly humidity observed in the Study Area from 1991 to 2020.

Table 4-3: Relative Humidity in Percentage (1991 and 2020)

Sr. No.	Month	At 00UTC	At 03 UTC	At 12 UTC
1.	January	62.9	60.7	62.9
2.	February	66.6	58.5	63.5
3.	March	58.8	51.3	58.7
4.	April	54.5	47.1	54.5
5.	May	49.8	43.2	45.5
6.	June	58.8	51.4	53.2
7.	July	81.0	76.7	80.0
8.	August	86.8	79.5	86.8
9.	September	75.5	68.2	77.8
10.	October	58.7	49.3	62.5
11.	November	52.9	45.1	56.8
12.	December	53.4	47.1	54.1

Source: Climate Normal of Pakistan (1991-2020)

Wind Speed and Wind Direction

Table 4-4 depicts the average wind speed in the Study Area from 1991 to 2020 and Table 4-5 wind direction.

Table 4-4: Average Wind Speed in Knots (1991 and 2020)

Sr. No.	Month	At 00UTC	At 03 UTC	At 12 UTC
1.	January	2.1	2.3	1.8
2.	February	2.4	3.3	2.5
3.	March	2.7	3.3	2.6
4.	April	3.5	3.3	2.5
5.	May	3.3	3.1	2.5
6.	June	2.1	2.2	2.2
7.	July	1.4	1.5	1.7
8.	August	1.3	1.4	1.4
9.	September	1.9	1.7	1.3
10.	October	1.9	1.9	1.2
11.	November	2.0	2.0	1.4
12.	December	1.8	2.2	1.7

Source: Climate Normal of Pakistan (1991-2020)

Table 4-5: Average Wind Direction in Degrees (1991 and 2020)

Sr. No.	Month	At 00UTC	At 03 UTC	At 12 UTC
1.	January	20	76	122
2.	February	16	82	127
3.	March	10	71	126
4.	April	12	63	119
5.	May	7	67	114
6.	June	7	96	131
7.	July	31	107	132
8.	August	20	99	127
9.	September	3	84	128
10.	October	4	61	116
11.	November	9	67	103
12.	December	10	58	85

Source: Climate Normal of Pakistan (1991-2020)



4.2.6 Surface Water

Kotli Sattian located in the Himalayan foothills, has an extensive network of surface water resources, including rivers, streams (nullahs), and natural springs, which play a crucial role in water supply, agriculture, and ecosystem sustainability. The region's rugged terrain and high rainfall contribute to the formation of these water bodies, making them an essential part of the local hydrology.

Jhelum River

The Jhelum River, after traversing mountainous regions, enters Kotli Sattian near Chhaprian, east of Chajjana. A few miles downstream lies the Kalairi Bridge, connecting Islamabad and Rawalakot via Kotli Sattian. At this juncture, a stream from Poonch territory merges into the Jhelum River's left bank, offering excellent fishing opportunities in August and September. The river then flows smoothly between high mountains on both sides. Several kilometers downstream from Kalairi, it reaches Azad Pattan in the Kahuta subdivision, where another bridge spans the river, marking the eastern boundary of the area.

Soan River

The Soan River originates near Murree and descends steeply southward for approximately 15 kilometers, cutting through the Karor foothills before reaching the plains near Chirah. It carves a notable 1.5 km long gorge through the Narrar Spur, at the eastern end of which stands the historic Pharwala Fort. This river delineates the southwestern boundary of Kotli Sattian, with much of the Murree, Kotli Sattian, and portions of the Kahuta hills sloping towards it.

Streams and Nullahs (Seasonal Water Channels)

Several perennial and seasonal streams (nullahs) originate from the hilly terrain of Kotli Sattian, providing water to local communities and contributing to larger river systems. Key nullah include:

- Narh Nullah: One of the main freshwater sources, flowing through various settlements before joining the Jhelum River;
- Chevra Nullah: A stream originating from the highlands of Chevra Hill Top, contributing to local water supply;

Natural Springs

Numerous freshwater springs (Bissa Waterfall, Durnoyan Waterfall, etc.) are scattered throughout Kotli Sattian, especially in valleys and foothills, supplying clean drinking water to local residents. These springs are often fed by underground aquifers and emerge due to the region's geological formations.

Project Area

A local nullah flows through the Chevra Hill Top area.

The water resources map of the study area is shown in **Figure 4-5**.

4.2.7 Drainage System

The drainage system in Kotli Sattian is primarily influenced by its streams, which direct water either eastward into the Jhelum River or southward into the Soan River. Key contributors to the Soan River's drainage include streams such as Khad Chhainti, Khad Biaga, and Nala Dhalsans. Numerous mountain torrents descend from both sides of the spurs toward the south. On the eastern slopes of Kotli Sattian, where the terrain is steeper, streams and torrents flow directly into their respective khads—namely, Khad Chhajjana and Khad Thoon—without forming basins. Most of these streams and torrents are seasonal, becoming active primarily during rainfall. They typically traverse narrow valleys flanked by high cliffs and are often named after the villages they pass through or are referred to as khad, kass, or kassi.

4.2.8 Drinking Water

In Kotli Sattian, the Tehsil Municipal Administration (TMA) oversees the distribution of water for drinking and domestic purposes. The primary sources of drinking water in the region include river water and natural springs. Notably, a water supply scheme has been implemented to channel water from Dhoke Dhandi (GHEL) to Dhoke Dand Gali Nullah in Union Council Chhajjana, enhancing the water infrastructure in Tehsil Kotli Sattian.

Project Area

The municipal water supply and water springs are the main sources of water supply in the study area.

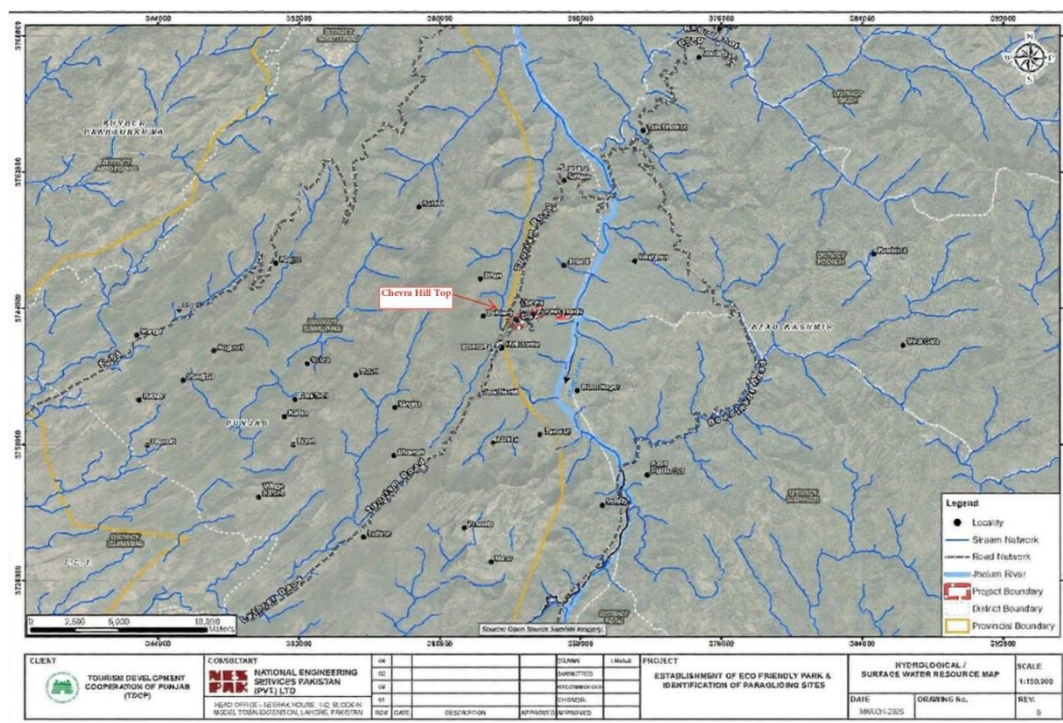


Figure 4-5 Surface Water Hydrology Map of Project Area



4.2.9 Solid Waste

Rawalpindi Waste Management Company (RWMC) is a responsible authority to ensure efficient collection, transportation, recovery, treatment and disposal of waste generation in Kotli Sattian. The total waste generation of Kotli Sattian is approximately 100 tons of municipal solid waste daily, and per capita waste generation is 0.55 kg/capita/day⁷.

Project Area

RWMC is responsible authority for the collection and management of municipal waste generated in the study area. However, from the field survey, it was observed that there is no facility of waste collection and management in the study area, as waste was seen dumped as open heaps at road sides, in vacant plots near residential area and in nearby wastewater drain by residents and road users.

4.3 LAND USE

The land use of the study area is mainly hilly terrain and residential land located in mouza Burhad. The built-up area primarily includes the residential area, masjids, graveyards, health clinics, educational institutions and commercial facilities. **Table 4-6** depicts the land use cover of the study area. The land use map of the proposed Project sites is shown in **Figure 4-6**.

Table 4-6: Land Use Stats in the Study Area

Sr. No.	Land Use	Area (Acres)
		Chevra Hill Top
1.	Forest	35.33
2.	Agricultural	12.89
3.	Built-Up	5.01
4.	Structure	0.04
5.	Graveyard	--
6.	Water body (nullah/waterfall/river)	--
7.	Bridge	--

4.4 ENVIRONMENTAL SENSITIVE RECEPTORS

Sensitive receptors are people/places more susceptible to the adverse effects of exposure to the pollutants and social disturbance, due to the developmental projects. Thus, sensitive receptors are necessary to be identified, to evaluate the potential impacts of the proposed Project on public health and the environment and adopt necessary mitigation measures to minimize the impact.

No sensitive receptors have been identified within the Project AOI except residential area, which is prone to sensitivity during construction phase, due to emission of air pollutants, noise and vibration, temporary edifice of construction camps and mobilization issues.



4.5 ECOLOGICAL ENVIRONMENT

The ecological study of the area has been conducted using standard ecological assessment techniques based on primary and secondary information and the inclusion of additional information collected during site visits, discussions, and meetings with groups of communities/public living in and around the Project area coupled with expert visual observations. Following is the description of the baseline ecological environment of the area.

4.5.1 Flora

Kotli Sattian, situated in the Himalayan foothills, boasts a diverse range of plant species adapted to its varied topography and climate. The region's flora is predominantly composed of annual herbs, which constitute approximately 43% of the plant life. Shrubs (24%), grasses (13%), and trees (10%) follow this. In terms of life-form classifications, therophytes (annual plants that complete their life cycle during favorable seasons) are the most prevalent, accounting for about 46% of species. Phanerophytes (perennial plants with buds located well above the ground) make up nearly 30%, while hemicryptophytes (perennials with buds at the soil surface) represent approximately 18%.

The Project area is dominated by forest and agricultural land use. The soil of the Project area shows it is suitable for the agriculture and plantation of native species.

a) Trees

The proposed paragliding club is slated for development within a residential region predominantly characterized by Chir Pine (*Pinus roxburghii*) trees. In addition to these, the vicinity of the proposed paragliding club site hosts a variety of other tree species, as detailed below (**Table 4-7**).

Table 4-7: Major Tree's species in the Study Area

Sr. No.	Common Name	Scientific Name
1.	Pine	<i>Pinus spp.</i>
2.	Walnut	<i>Juglans regia</i>
3.	Almond	<i>Prunus dulcis</i>
4.	Olive	<i>Olea europaea</i>
5.	Apricot	<i>Prunus armeniaca</i>
6.	Japanese Persimmon	<i>Diospyros kaki</i>
7.	Loquat	<i>Eriobotrya japonica</i>
8.	Pomegranate	<i>Punica granatum</i>
9.	Grapes	<i>Vitis spp.</i>
10.	Apples	<i>Malus domestica</i>
11.	Lychees	<i>Litchi chinensis</i>

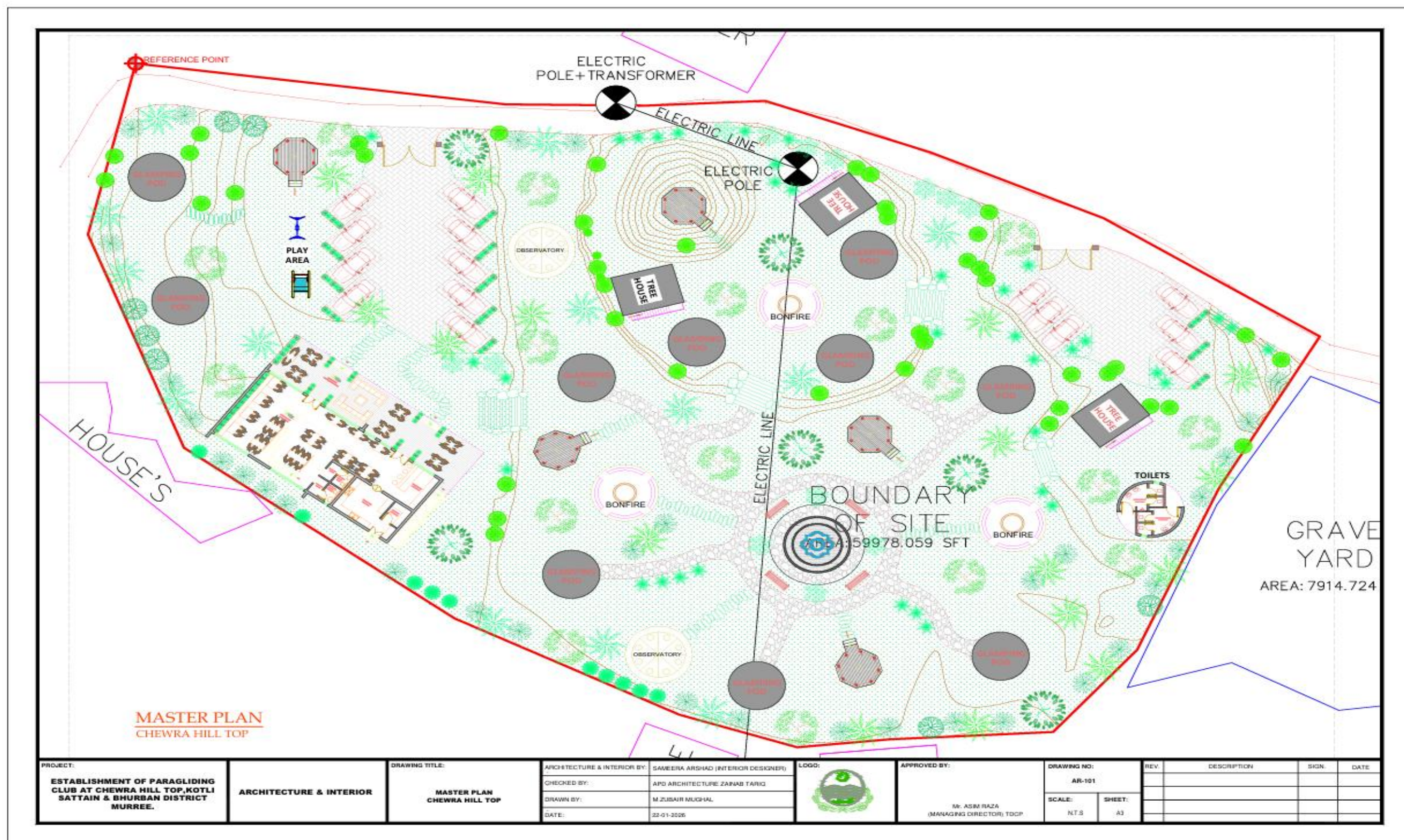


Figure 4-6 Master Plan of Chewra Hill Top



b) Shrubs and Herbs

Kotli Sattian, boasts a diverse array of shrubs and herbs that are integral to the region's ecology and traditional medicine. Some notable shrubs species in and around the Project area are *Berberis aristata*, *Rubus ellipticus*, *Punica granatum* and herbs are *Berberis lyceum*, *Impatiens glandulifera*, *Artemisia vulgaris*, *Achillea millefolium* and *Ageratum conyzoides*.

c) Grasses

The predominant grass species in the area is Khabbal (*Cynodon dactylon*), which serves as an essential fodder grass. Other notable grasses found within the study area include Sawak, Barun, Paran, Paluana, Sarala, Barras, Lundar, Dab, and Akar.

4.5.2 Fauna

a) Mammals

The diverse habitats of Kotli Sattian support a variety of mammalian species, ranging from small rodents to larger carnivores. Some of the commonly found mammals in & around the Project area include: Common Leopard (*Panthera pardus*), Golden Jackal (*Canis aureus*), Leopard Cat (*Prionailurus bengalensis*), Red Fox (*Vulpes vulpes*), Yellow-Throated Marten (*Martes flavigula*), Indian Grey Mongoose (*Herpestes edwardsii*), Indian Pangolin (*Manis crassicaudata*), Indian Hare (*Lepus nigricollis*), Rhesus Macaque (*Macaca mulatta*), Indian Porcupine (*Hystrix indica*), Small Indian Civet (*Viverricula indica*), and Wild Boar (*Sus scrofa*).

Cats, dogs, and monkeys were also observed within the study area near settlements and villages.

b) Reptiles

Kotli Sattian is home to a variety of reptilian species, adapted to its diverse habitats, including forests, rocky terrains, and water bodies. Some of the commonly found reptiles in the region include: Indian Python (*Python molurus*), Indian Cobra (*Naja naja*), Russell's Viper (*Daboia russelii*), Common Krait (*Bungarus caeruleus*), Rat Snake (*Ptyas mucosa*) and Himalayan Trinket Snake (*Coelognathus helena*).

Indian Monitor Lizard (*Varanus bengalensis*), Fan-Throated Lizard (*Sitana ponticeriana*), Common House Gecko (*Hemidactylus frenatus*), Indian Roofed Turtle (*Pangshura tecta*) and Indian Star Tortoise (*Geochelone elegans*) also observed in the study area.

c) Birds Avifauna

Kotli Sattian hosts a diverse range of bird species due to its rich forest cover, hilly terrain, and proximity to water bodies. The region provides an ideal habitat for both resident and migratory birds, making it an important area for avian biodiversity. Some of the commonly found birds in the region include Himalayan Monal (*Lophophorus impejanus*), Kalij Pheasant (*Lophura leucomelanos*), Francolinus francolinus, Chukar Partridge (*Alectoris chukar*), Grey Francolin

(*Francolinus pondicerianus*) and Himalayan Griffon Vulture (*Gyps himalayensis*). Common Kestrel (*Falco tinnunculus*), Shikra (*Accipiter badius*), Little Egret (*Egretta garzetta*), White-throated Kingfisher (*Halcyon smyrnensis*), Oriental Magpie-Robin (*Copsychus saularis*), Common Myna (*Acridotheres tristis*), House Sparrow (*Passer domesticus*), Egyptian Vulture (*Neophron percnopterus*), White-rumped Vulture (*Gyps bengalensis*), and Steppe Eagle (*Aquila nipalensis*) observed in and around the study area.

4.5.3 Endangered Species

Notable endangered species in the area include Barking Deer (*Muntiacus muntjak*), Indian Pangolin (*Manis crassicaudata*), Egyptian Vulture (*Neophron percnopterus*), Egyptian Vulture (*Neophron percnopterus*), and Steppe Eagle (*Aquila nipalensis*).

4.5.4 Designated Forests and Protected Areas

Kotli Sattian, located in the Western Himalayan region of Pakistan, is home to diverse forest types shaped by variations in altitude, climate, and topography. The Subtropical Pine Forests, found at elevations between 3,000 to 5,000 feet, are dominated by Chir Pine (*Pinus roxburghii*) and thrive in drier conditions with moderate rainfall, primarily covering the lower elevations of the region. At higher altitudes, ranging from 5,000 to 7,500 feet, the Moist Temperate Coniferous Forests or High Hill Forests are prevalent, featuring species such as Blue Pine (*Pinus wallichiana*), Deodar (*Cedrus deodara*), Green Pine, and Chir Pine. These forests receive significant rainfall, providing a rich habitat for various plant and animal species.

In addition to coniferous forests, Broadleaf and Mixed Forests are also found at mid to high elevations (4,000 to 7,000 feet), comprising species like Oak (*Quercus spp.*), Horse Chestnut (*Aesculus indica*), Maple (*Acer spp.*), and Walnut (*Juglans regia*), offering high ecological diversity. Alongside rivers (Jhelum and Soan) and streams, Riverine and Riparian Forests provide essential ecosystem functions, with dominant species such as Willow (*Salix spp.*), Poplar (*Populus spp.*), and Mulberry (*Morus spp.*) helping in soil stabilization and supporting aquatic biodiversity. These forest ecosystems collectively contribute to maintaining the environmental balance, preventing soil erosion, regulating water cycles, and serving as crucial habitats for wildlife in Kotli Sattian.

Kotli Sattian is part of the Murree-Kotli Sattian-Kahuta National Park, a major protected area established in September 2009. Covering approximately 57,581 hectares (142,283 acres), the park extends across Murree, Kotli Sattian, and Kahuta. It boasts diverse ecosystems that support a rich variety of flora and fauna, including several rare and endangered species.

The forests present in and around the study area is shown in **Figure 4-7**.

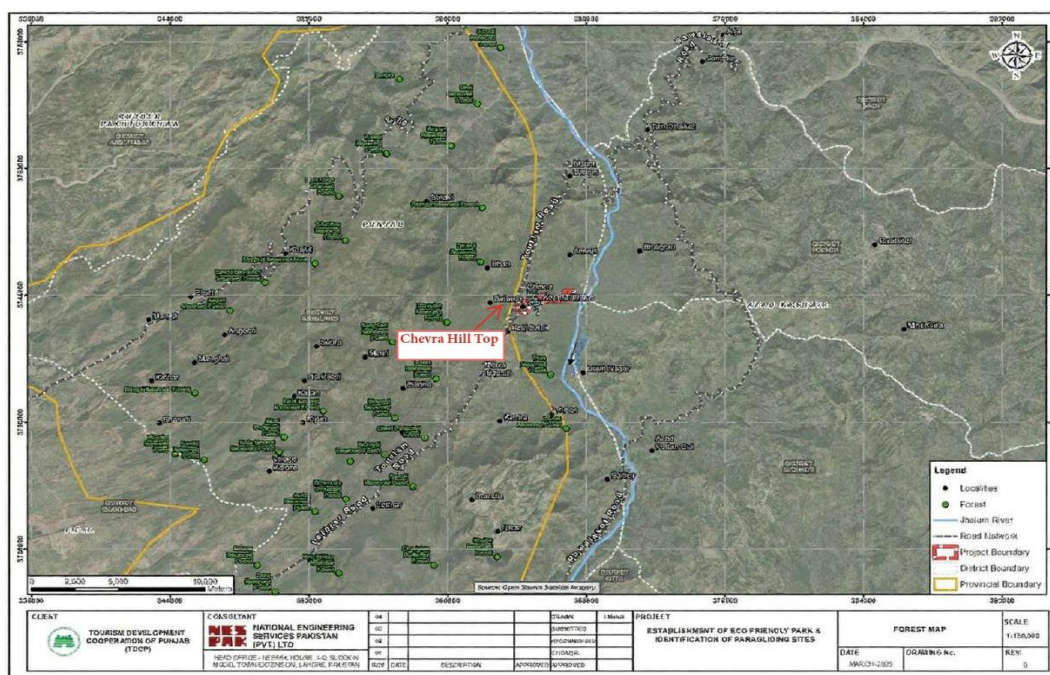


Figure 4-7: Forests in and around the Study Area

4.6 SOCIO-ECONOMIC ENVIRONMENT

The socio-economic aspects have been studied with respect to human and economic development and quality of life values of the population in the Project area. The human and economic development mainly focuses on population and communities, industrial development, infrastructure availability, institutions, transportation network, prevailing land use, power sources and agricultural pattern. Quality of life includes socio-cultural values, public health situation, recreational resources & development and archaeological/historical and cultural sites etc.

Baseline information was gathered from literature, study reports, district census reports (DCRs) and through field surveys in the villages present in the AOI.

4.6.1 General Description of the Project Area

- The Project area of proposed Project falls in Kotli Sattian Tehsil of Murree District. Four (04) main settlements fall near the proposed Project site, therefore, socio-economic survey was conducted in following areas:
- Java Mandi;
- Chevra Hill Top;
- Village Korana Ridge Top; and
- Village Arhanga.

Figure 4-8 shows the settlements in and around the study area

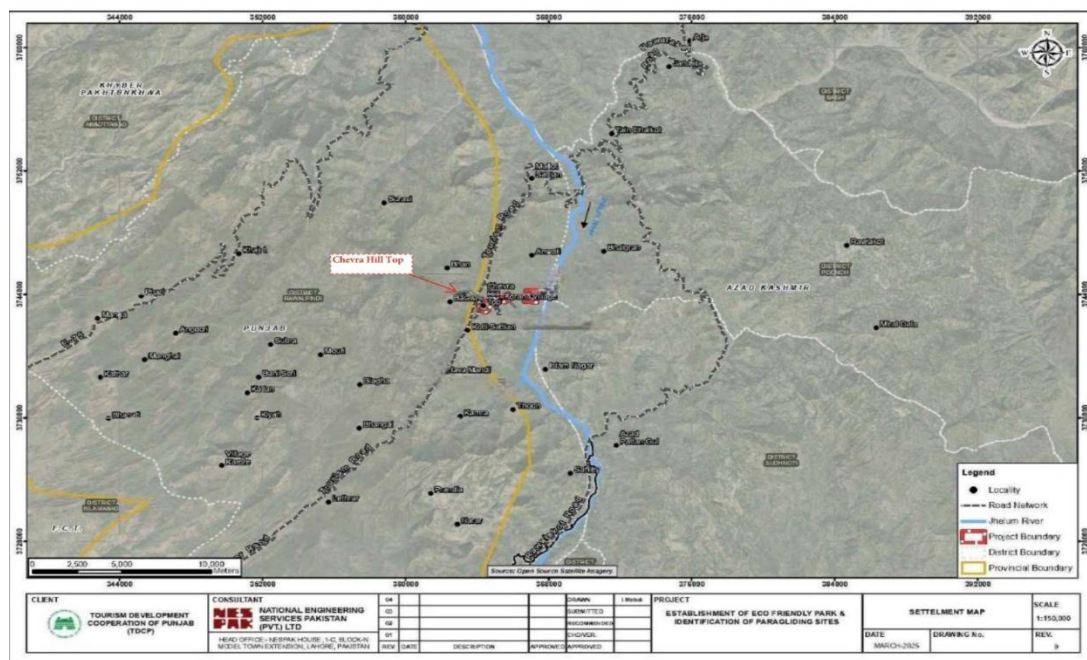


Figure 4-8: Settlements in and around the Study Area

4.6.2 Administrative and Political Settings

Kotli Sattian is a tehsil (subdivision) within the Murree District of Punjab, Pakistan. It is situated approximately 50 kilometers from Islamabad, bordering the Pir Panjal Range and adjacent to regions of Azad Jammu and Kashmir. Historically, Kotli Sattian was part of Murree Tehsil until 1990, when it was established as a separate tehsil by incorporating 40 villages from both Murree and Kahuta tehsils. The tehsil spans an area of 304 square kilometers. Administratively, Kotli Sattian functions under the governance of the Tehsil Council Kotli Sattian, which operates within the framework of the Punjab Local Government & Community Development Department. The region's name is derived from the mountain town of Kotli and the indigenous Satti tribe, reflecting its cultural and historical heritage.

4.6.3 Demographic Characteristics

a) Population

As of the 2023 census, Kotli Sattian Tehsil has a population of 120,421, reflecting a modest increase from 119,193 in 2017. The population density is approximately 396 individuals per square kilometer. The gender distribution is nearly equal, with males comprising 60,300 and females 58,980.

b) Religion

According to the 2017 Census of Pakistan, Kotli Sattian Tehsil has a population of 119,295, with the vast majority, 119,226 individuals, identifying as Muslim. The census also records 56 Christians and 13 individuals categorized under Scheduled Castes residing in the area.



c) Mother Tongue

According to the 2017 Census of Pakistan, the linguistic landscape of Kotli Sattian Tehsil is as follows:

- Punjabi: The predominant mother tongue, spoken by approximately 97.78% of the population (116,640 individuals);
- Urdu: Spoken by about 0.97% (1,161 individuals); and
- Hindko: Accounts for roughly 0.22% (263 individuals).

It's noteworthy that within Kotli Sattian, the local dialects such as Pahari (meaning "mountainous") and Dhundi-Kairali are often classified under the broader Punjabi language category in census data.

d) Ethnic Structure

Kotli Sattian exhibits a rich tapestry of ethnic diversity, predominantly characterized by the following tribes: Satti Tribe, Dhanial Tribe, Abbasi Tribe, Kethwal Tribe and Sadaat Community.

4.6.4 Economic Activity

Kotli Sattian has an economy deeply rooted in its natural resources and evolving tourism sector. Traditionally, the region's economy has been anchored in agriculture and forestry, with local communities engaging in farming and utilizing forest resources for timber and fuelwood.

In recent years, tourism has emerged as a significant contributor to the local economy. The establishment of the Murree-Kahuta-Kotli Sattian National Park has enhanced the region's appeal, attracting visitors to its natural landscapes and biodiversity. This influx of tourists has spurred economic activities, leading to the development of hospitality services, including hotels, restaurants, and transportation.

Additionally, the local economy benefits from the collection and sale of medicinal plants, leveraging the region's rich biodiversity.

Overall, Kotli Sattian's economic landscape is characterized by a blend of traditional practices and emerging tourism-driven opportunities, contributing to the region's sustainable development.

4.6.5 Health Facilities

Kotli Sattian Tehsil in Punjab, Pakistan, offers a range of health facilities to cater to the medical needs of its residents. The primary healthcare institution is the Tehsil Headquarters (THQ) Hospital Kotli Sattian, which provides various medical services, including dental care, ophthalmology, radiology, surgery, orthopedic care, gynecology and obstetrics, pathology, ENT, pediatrics, TB/chest treatments, hepatitis clinic, non-communicable diseases management, blood bank, emergency and trauma center, and pharmacy services.



In addition to the THQ Hospital, the Population Welfare Department operates Family Welfare Centers in the region, located at THQ Kotli Sattian, Karor, and Lehtrar. These centers focus on family planning and reproductive health services.

4.6.6 Agriculture Practice

Kotli Sattian practices agriculture primarily through rain-fed methods due to its hilly terrain and reliance on natural rainfall. The region's agricultural activities include the cultivation of various crops, fruits, and the collection of medicinal plants.

Crop Cultivation: Farmers in Kotli Sattian primarily cultivate staple crops like wheat and maize.

Fruit Orchards: Kotli Sattian is well known for its fruit orchards, particularly apple cultivation, along with pomegranates, peaches, pears and walnuts. However, studies indicate that climate change, characterized by unpredictable seasonal shifts and extended summer periods, has adversely affected apple production. Farmers have noted a decline in yields, attributing it to these environmental changes.

4.6.7 Livestock

Livestock farming plays a significant role in the rural economy of Kotli Sattian. Local households engage in rearing various livestock species, including cows, calves, and domestic poultry. A study⁸ indicates that in Kotli Sattian, cows constitute approximately 14% of the livestock, calves about 14%, and domestic poultry around 22%.

4.6.8 Educational Facilities

Kotli Sattian offers a range of educational institutions (both public and private) catering to various academic levels. Key institutions include Government High School (GHS) Kotli Sattian, which serves secondary-level students, and Government Girls High School (GGHS) Dheer Kot Sattian, focusing on female education. For higher education, the region hosts the Government Degree College for Boys Kotli Sattian, offering associate degrees in arts and science. Additionally, several primary schools, such as Government Girls Primary School (GGPS) Kotli Sattian, provide foundational education to young learners.

Government Special Education Centre situated near Bathal Village, addresses the educational needs of children with disabilities, offering tailored programs and support services.

4.6.9 Transportation Network

Kotli Sattian is well-connected through a network of roads linking it to major cities and surrounding regions. The primary route from Islamabad to Kotli Sattian covers approximately 45.5 kilometers via Lehtrar Road, while another key route connects Murree to Kotli Sattian via

⁸ An Assessment of Food Security Status and Contribution of Livestock in Households Consumption Profile: A Comparative Study in Different Regions of Punjab. J. Educ. Soc. Stud. 3(3) 2022. 169-177



Bunn Road. Within the region, local transportation options include public buses, vans, and private taxis, facilitating travel between villages and nearby towns. These transport services play a crucial role in ensuring accessibility for residents and visitors alike.

4.6.10 Recreational Resources

Kotli Sattian, offers a variety of recreational resources that cater to nature enthusiasts and adventure seekers alike. The region's natural beauty, characterized by dense pine forests and rolling hills, provides an ideal setting for leisure activities and outdoor adventures.

Natural Attractions:

- Phofandi (Burj Trek): Located about 6 kilometers from the town center, this scenic trail, often called the 'abandoned jeep trek,' leads to Phofandi, the highest peak in the region, reaching nearly 7,000 feet above sea level. Hikers are rewarded with breathtaking panoramic views of the Jhelum River and the distant landscapes of Azad Jammu and Kashmir.
- Chevra Hills: Renowned for their peaceful ambiance, the Chevra Hills are a popular destination for picnics and leisurely walks, offering visitors a chance to experience the serenity of nature.

National Parks:

- Murree-Kotli Sattian-Kahuta National Park: The Park serves as a sanctuary for wildlife enthusiasts and nature lovers eager to explore the region's breathtaking landscapes.

Water-Based Recreation:

- Dakhain Waterfall stands as a stunning natural marvel, where crystal-clear waters cascade over rugged rocks, creating a mesmerizing display. Surrounded by lush greenery, this serene retreat offers a tranquil escape from the hustle and bustle of urban life.
- Karore Picnic Point offers visitors breathtaking panoramic views of the surrounding hills, valleys, and forests. Throughout the day, the shifting light provides endless photographic opportunities, making it a paradise for photography enthusiasts. Beyond its scenic charm, the area invites adventurers to hike, explore, and immerse themselves in nature.
- Bissa Waterfall is a captivating natural wonder where pristine waters cascade over ancient rocks, forming a mesmerizing sight that showcases nature's untamed beauty.

4.6.11 Archaeological/Historical and Cultural Sites

Kotli Sattian is rich in archaeological, historical, and cultural sites that reflect its diverse heritage. Notable landmarks include:

Danoi Forest Rest House: Constructed during the British era in 1928, this historical structure is nestled within the lush forests of Kotli Sattian. Its colonial architecture and serene surroundings attract visitors seeking tranquility and a glimpse into the past.

Ariyari Fire Watch Tower: Located in the Karore area, this pre-partition era tower was historically used for monitoring forested regions to detect and prevent fires. Today, it stands as a testament to early conservation efforts and offers panoramic views of the surrounding landscape.



World War I Memorial at Ariari: This memorial commemorates the 13 sons from the area who lost their lives during World War I. Situated near a natural water fountain amidst dense pine forests; the site provides a poignant reminder of the region's contributions to global history.

Panjpeer Rocks: Although located in the neighboring Kahuta Tehsil, Panjpeer Rocks are in close proximity to Kotli Sattian. These cliffs, situated approximately 1,800 meters above sea level, are named after five holy men who are believed to have meditated there centuries ago. The site offers breathtaking views and holds significant spiritual importance.

4.7 Lab Reports of Baseline Environmental Analysis

Certified laboratory testing was conducted to assess the environmental conditions of the project site. Parameters tested include ambient air quality and water quality, with samples collected according to standard procedures. Results from these analyses are attached in the annexes section. The testing confirms that current environmental indicators are within acceptable national standards, although continued monitoring is recommended during project implementation. Following the explanation of the laboratory results:

4.7.1 Water Quality

Groundwater quality results as received from the environmental laboratory are pasted below with their explanation: Groundwater samples were collected from project site and analyzed for key physicochemical parameters in accordance with NEQS and WHO drinking water standards. The tested parameters included pH, Total Dissolved Solids (TDS), Total Hardness, Turbidity, Nitrate, and Iron content.

The tested parameters of the samples were compared to and complied with the Punjab Environmental Quality Standards for drinking water. Results showed that all the parameters are within permissible limits as per PEQS. The main reason behind the such purity of water is less anthropogenic activities in the project area. Nonetheless, as the project progresses, it is advisable to establish a groundwater monitoring plan to track potential impacts. Environmental Monitoring report has been annexed as **Annexure XI**.

4.7.2 Air Quality

The ambient air quality in the Murree–Bhurban area is generally clean and healthy, owing to its high elevation, dense pine forests, and low industrial and vehicular activity. Natural vegetation acts as a filter for dust and airborne pollutants, resulting in low concentrations of particulate matter (PM_{2.5} and PM₁₀), nitrogen oxides (NO₂) sulfur dioxide (SO₂), and carbon monoxide (CO) under normal conditions.

However, during peak tourist seasons, the influx of vehicles along access roads can temporarily increase vehicular emissions and dust levels, slightly affecting air quality. Construction activities may also contribute to dust and localized air pollution if proper mitigation measures are not implemented. To preserve air quality, the project proposes measures such as water spraying on construction sites, covering of material stockpiles, maintaining vehicle emissions standards, and controlling traffic flow, ensuring that the natural environment and visitor experience are not adversely impacted. Air quality monitoring results of EPA registered lab are in **Annexure XI**.



4.7.3 Noise Levels

The baseline noise levels in the Kottli Sattian, Murree area are relatively low due to the sparsely populated settlements, minimal industrial activity, and dense forest cover. Ambient noise is primarily generated by local vehicular traffic, occasional construction activities, and tourist movement during peak seasons, with typical daytime levels ranging between 48 to 50 dB(A). Nighttime noise levels are lower, reflecting the serene and quiet environment of the region. Seasonal increases in tourist activity can temporarily raise noise levels, particularly along access roads and areas close to settlements. To maintain the area's tranquility, construction and operational phases of any development project will incorporate noise mitigation measures, including restricting construction to daytime hours, using well maintained and low-noise machinery, installing noise barriers where needed, and leveraging natural vegetation as a sound buffer. These measures ensure minimal disturbance to both local residents and wildlife while preserving the natural acoustic environment. Environmental monitoring report has been attached as **Annexure XI**.



5 STAKEHOLDER CONSULTATIONS

5.1 GENERAL

Timely and broad-based stakeholder involvement is an essential element for an effective environmental assessment, as it is linked with project Planning, appraisal and development in general. Public involvement during EIA has a tendency to improve Project design environmental soundness and social acceptability.

Public involvement, undertaken in a positive manner and supported by a real desire to use the information gained to improve the Project design, will lead to better outcomes and lay the basis for ongoing positive relationships between the stakeholders. It gives the feeling of ownership to the local population. Public involvement is necessary for smooth implementation of the Project and especially the local community whose support is also required for the success of the Project.

The Project management and implementation authorities are committed for undertaking public consultation at Provincial and local levels as a part of Project planning/design for getting necessary environmental permissions.

This Chapter presents the objectives, process, and outcome of the consultations carried out with the key stakeholders of the Project during the present EIA study. A consultation framework, describing the consultations to be carried out during the subsequent phases of the Project implementation ensuring ongoing and inclusive dialogues with key stakeholder is also provided in this chapter.

5.2 OBJECTIVES

The objectives of stakeholder consultation were to contribute to the openness, transparency and dialogue. Special efforts were made to ensure that the communication with the public should be efficient and well balanced. The concerned stakeholder groups were identified to participate in the assessment process. Specific tasks and purposes of consultations with stakeholders have been given in the **Table 5-1**.

Table 5-1: Tasks and Purposes of Consultations

Task	Purpose of Consultation with Stakeholders
Why consultation with the stakeholders?	• To build trust to ensure sustained support for the Project and build resilience for times of crisis. • To learn about public concerns that need to be addressed and taken into account in designing of the Project concept and in formulating mitigation measures and programs. • To learn about the strengths, skills and organizations that the stakeholders can bring to support Project planning and implementation.
Modes and benefits of consultation	• Listening and dialogue with stakeholders to keep the Project at tuned to public concerns early, to pre-empt breakdowns in public confidence. • Engaging the public as advocates for the Project construction and to

Task	Purpose of Consultation with Stakeholders
	support the implementation of social, resettlement, and environment and health programs.

Other objectives of public involvement include:

- Informing the stakeholders about the proposed Project;
- Providing an opportunity to those who remained unable to present their views and values, therefore allowing more sensitive consideration of mitigation measures and trade-offs;
- Providing those involved with planning the proposal with an opportunity to ensure that the benefits of the proposal are maximized and that no major impacts have been overlooked;
- Providing an opportunity for the public to influence the Project design in a positive manner;
- Increasing public confidence in front of proponent, reviewers and decision makers;
- Providing better transparency and accountability in decision making;
- Reducing conflict through the early identification of contentious issues, and working through these to find acceptable solutions;
- Creating a sense of ownership of the proposal in the minds of the stakeholders; and
- Developing the Project, which is truly sustainable.

5.3 IDENTIFICATION OF STAKEHOLDERS

Identification of stakeholder is an important step, which ensures that all the concerned stakeholders are identified for the following:

- Sharing of information with stakeholders about the proposed Project activities and potential impacts of the proposed Project on the physical, ecological and socio-economic conditions in the AOI; and
- To address the most relevant concerns of the stakeholders on the Project and its activities including the upfront negative impacts.

5.3.1 Primary Stakeholders

Primary stakeholders are those who are directly concerned with the Project or directly affected both positively and negatively by the Project interventions. The primary stakeholders of this Project include landowners, tourists and local residents. Apart from this, the beneficiaries of the Project and the implementing agency are also primary stakeholders for the proposed Project.

5.3.2 Secondary Stakeholders

Secondary stakeholders are people or groups that are indirectly affected from the Project activities or have their interest in the proposed Project such as Punjab-EP&CCD, Forest Department, Wildlife Department, TMA Kotli Sattian, Rawalpindi Waste Management Company and other line agencies / departments of GoP.

Details regarding roles and responsibilities of the concerned agencies and departments are given below **Table 5-2**.

Table 5-2: Role of Concerned Agencies/Departments

Project Stakeholders	Roles and Responsibilities
Punjab Environmental Protection and Climate Change Department	• Punjab-EP&CCD is the regulatory authority and mainly responsible for the development and implementation of

Project Stakeholders	Roles and Responsibilities
	the environmental policies and strategies in order to integrate the environmental issues and sustainable development approaches into the legal and regulatory frameworks as per Punjab Environmental Protection Act, 2012 (Amended 2017). - Punjab-EP&CCD is responsible for the issuance of NOC of the proposed Project. - EP&CCD is responsible for the compliance of EMP and NOC provision during the construction and operation stages of the Project.
Forest Department	- Implementing strategies and policies to conserve, protect and enhance forest cover. - Ensuring the preservation of diverse plant and animal species in forests and natural ecosystems to maintain ecological balance. - Implementing government policies, laws, and regulations related to forests, wildlife, and environmental conservation. - Contributing to global efforts in mitigating climate change by preserving forests, which act as carbon sinks, and promoting sustainable practices to reduce carbon emissions.
Wildlife Department	- Protection, conservation, preservation and management of wildlife resources. - Management of protected areas, wildlife parks, safaris & zoos. - Preparation of development projects for ex-situ and in-situ conservation of threatened wildlife species. - Provide legal avenues of hunting as a mode of conservation. - Research, survey and training activities.
TMA Kotli Sattian	- The Town Municipal Administration (TMA) of Kotli Sattian is a local government body responsible for managing municipal services and development activities within the Kotli Sattian tehsil, located in the Rawalpindi District of Punjab, Pakistan. As part of the Local Government and Community Development (LG&CD) Department of Punjab, the TMA operates under the framework established by the Punjab Local Government Ordinance. - Responsible for preparing spatial plans for the town, including land use zoning and ensuring controlled land development to promote organized urban growth. - Executing and managing development projects related to infrastructure, such as roads, water supply systems, and public facilities, falls within the TMA's purview. - Enforces municipal laws, rules, and bye-laws concerning building codes, sanitation, and public health. - Organizes recreational events, maintains public spaces, and coordinates with village and neighborhood councils to enhance community welfare.
Rawalpindi Waste Management Company	Rawalpindi Waste Management Company (RWMC), established on July 15, 2013, under Section 42 of the Companies Ordinance, 1984, is responsible for providing efficient and effective solid waste

Project Stakeholders	Roles and Responsibilities
	management services in the Rawalpindi Division including Kotli Sattian. - RWMC's core responsibilities include the collection, transportation, and disposal of waste from households, hospitals, industries, and other sources, ensuring compliance with Punjab Environmental Quality Standards. The company emphasizes sustainable development to protect the environment for future generations. - In addition to waste management, RWMC engages in public awareness campaigns to educate citizens on proper waste disposal practices and the importance of maintaining a clean environment.
Punjab Revenue Department	The Punjab Revenue Department, operating under the Board of Revenue Punjab, responsible for land administration and revenue collection within the province. Its core responsibilities include surveying land, preparing and maintaining land records, implementing relevant laws, managing revenue administration across various levels, appointing local revenue officials (Iambardars), and recovering government dues.

Considering the importance of the Project, consultations were carried out at all possible levels i.e., departmental and local level. The process of consultation is an on-going process, which continues during the Project life cycle and even after the submission of this report and so on. Stakeholders identified, categorized and consulted at departments and community's level.

During the field survey, significant efforts made to identify the possible categories of stakeholders and their stakes. Key stakeholders of the Project include government departments such as Punjab-EP&CCD, Forest Department, Wildlife Department, and local communities including PAPs.

5.4 APPROACH FOR THE CONSULTATION AND INFORMATION DISSEMINATION

A series of public consultations were required to get the feedback/concerns of the different categories of stakeholders including provincial departments, district-level departments, potential PAPs, the local community and other general public residing in the Project area.

The consultation process included meetings with specific proposed PAPs, community meetings/consultations, semi-structured interviews and one-to-one meetings/ interviews with the government, private and civil society institutions. During the consultation process, the stakeholders briefed about the Project objectives and scope. Their fears and suggestions were recorded.

Consultations were conducted at two levels:

- Institutions/Departments Level
- Community level

5.4.1 Consultations with Stakeholders at Departments Level

The stakeholder consultations were held with officials of the relevant departments. Details of department officials contacted are given in **Table 5-3**.

Table 5-3: List of Government /Institutional Officials Consulted

Sr. No.	Department/Venue	Name/Designation	Date
1.	Punjab Environmental Protection and Climate Change Department	Dr. Amir Farooq, DG EIA	13-01-2025
2.	Forest Department	Mr. Ashfaq Ahmad, SDFO Kotli Sattian Mr. Nazakat, Forest Block Officer Kotli Sattian Mr. Farhan, Forest Guard Kotli Sattian	14-01-2025
3.	Wildlife Department	Mr. Abrar, Assistant Director Wildlife, Murree	13-01-2025
4.	TMA Kotli Sattian	Mr. Sahibzada Imran, COMC TMA Kotli Sattian	13-01-2025
5.	Rawalpindi Waste Management Company	Mr. Umair Usman, RWMC / GHS Kotli Sattian	14-01-2025
6.	Punjab Revenue Department	Mr. Imtiaz Ahmad Butt, ADLR Kotli Sattian Mr. Zafran, Patwari, Kotli Sattian	21-01-2025

The **Table 5-4** indicates the detail of issues raised/discussed and suggestions given during the consultation.

Table 5-4: Detail of Issues/Points Raised/Discussed during Departmental Consultations

Sr. No.	Department/ Organization	Suggestions
1.	Punjab- EP&CCD	- It was suggested that all the relevant Acts, laws, regulations, guidelines especially Punjab Environmental Protection Act, 2017 should be followed during the preparation of EIA report; - Establishment of paragliding club should be avoided at high ecologically sensitive sites; - Stakeholder Consultations with all the relevant departments should be carried out; - Environmental Monitoring at all environmental sensitive areas in the Project area should be considered; - Ensure continuous sprinkling of water on daily basis in the Project area to reduce emission of dust particles; - Health and Safety Management Plan shall be prepared and implemented to avoid health and safety issues occurring during construction period of the Project; - Solid waste produced shall be properly managed and disposed of in identified designated areas; - Construction material will be removed as early as possible on the construction sites; - Alternate routes shall be provided in consultation with Traffic Police to the residents, educational institutions and road users for their movement and to avoid the chaotic situation of traffic at this bottleneck; - Proper barricading shall be provided along excavation sites to avoid accidents and casualties; and - If tree cutting is involved then it should be avoided as much as possible and trees should be replanted and Tree Plantation Plan shall be provided.

Sr. No.	Department/ Organization	Suggestions
2.	Wildlife Department	- The NESPAK team visited the subject office to brief the officials regarding the Project and share details. - They shared the information mentioned below: - Paragliding Club shall be established outside the protected areas to protect wildlife habitats as the region is home to diverse faunal species, including leopards (<i>Panthera pardus</i>), barking deer (<i>Muntiacus muntjak</i>), wild boars (<i>Sus scrofa</i>), Indian pangolins (<i>Manis crassicaudata</i>), and various bird species such as the Himalayan monal (<i>Lophophorus impejanus</i>) and Kalij pheasant (<i>Lophura leucomelanos</i>). Therefore, efforts should be made to protect wildlife habitats in the region; - Include representatives from wildlife authorities in site selection and planning teams to provide insights on minimizing ecological impacts; - It was suggested that the migratory birds' international flyways will be considered while assessing the impacts of avi-fauna; - They also suggested avoiding negative impacts on local biodiversity and green cover, if any; and - Required details of the faunal species of the region were also provided.
3.	Forest Department	- The official was briefed by the NESPAK's relevant environment team regarding the proposed Project; - Detailed discussion was held among the forest officials and NESPAK team regarding the Project and it was shared: - Suggested suitable areas for the landing and takeoff sites with minimum interference of trees and forests and their role in environmental protection; - Tree cutting will be avoided up to maximum level; - Extensive plantation may be conducted to ensure Project sustainability and to enhance/conserves the local environment; - A feasible provision of budget for tree plantation plan shall be included in the Project cost; and - Required details of the floral species of the Project area were also provided.
4.	TMA Kotli Sattian	- The consultants briefed the official about the Project scope, components and its benefits. - TMA shared the information mentioned below: - The proposed Project by TDCP is a positive initiative, as it will boost the tourism in the area and create employment opportunities for locals; - Involve local residents in planning and decision-making processes to foster community support and ensure that tourism development aligns with their needs and environmental considerations; - Create comprehensive management plans for tourism site development that address environmental, social, and economic aspects, ensuring a balanced approach to tourism growth; and - Provision of proper waste management and sewage systems to prevent pollution and protect natural resources, thereby supporting sustainable tourism development.
5.	Rawalpindi Waste Management Company	- The consultants briefed the official about the Project scope, components and its benefits. - RWMC shared the information mentioned below: - The responsibility has recently been transferred to Rawalpindi Waste Management for waste management in the Kotli Sattian; - The proposed Project by TDCP is a positive initiative, as it will boost the tourism in the area and create employment opportunities for locals; and

Sr. No.	Department/ Organization	Suggestions
		A proper waste management plan shall be implemented to prevent the direct discharge of effluents and solid waste into the water body during construction and operational phases.
6.	Punjab Revenue Department	- The consultants briefed the official about the Project scope, components and its benefits. - The department shared the information mentioned below: - The proposed Project by TDCP is a positive initiative, as it will boost tourism in the area, create employment opportunities for locals and help in strengthening the economy of the country; - Provided land records for the identified site; and - Furnish market rates for privately owned properties within the Project area.
7.	Nambardar Village Korana Kotli Sattian	- The proposed Project by TDCP is a positive initiative, as it will boost tourism in the area and create employment opportunities for locals. - Provide alternate safe pedestrian routes, clear signage, and possibly designated pathways, to minimize the impact on female mobility. - Ensure continuous sprinkling of water on a daily basis in the Project area to reduce the emission of dust particles. - Labour should be bound to work and stay in the designated area or campsites to ensure the safety and privacy of females in the area. - Ensure minimum transportation of construction materials and use of construction machinery during peak working hours. - Efforts should be made to complete the construction works within the projected time period.

5.5 COMMUNITY CONSULTATION AND PARTICIPATION PROCESS

For ascertaining the perceptions of different stakeholders about the Project, meetings were held with communities within the Project area. 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.

5.5.1 Methods of Public Consultation

The following methods were used for public consultations with Project stakeholders in order to ascertain their stakes regarding Project implementation:

- Community/Public Consultations
- Individual meetings with Locals

The views of the beneficiaries were formally recorded. People of surrounding communities (males and females) were also consulted along with general public who were residing or working in the surroundings of the proposed Project.

5.5.2 Categories of Stakeholders Contacted

Different categories of stakeholders contacted during consultation are given in **Table 5-5**.

Table 5-5: Stakeholders Contacted in the Project Area

Sr. No.	Stakeholder Category
1.	Political Workers including MPA Staff
2.	People of the surrounding communities
3.	Local Residents
4.	Business/shop owners
5.	Government and private Servants

5.5.3 Consultations with Local Communities

Extensive consultations were conducted with the local communities in the Project area to record their views and incorporating in the Project planning. The major categories participated in these meetings were local residents, business/shop owners and landowners.

The participants were briefed about the proposed Project site with the help of design maps. During the consultations, participants were informed/briefed about the Project objectives and extensive question and answer sessions were conducted to clarify the Project related works and activities to resolve the environmental and social issues. They were briefed that the purpose of the consultations and discussions is to find out the possible solutions to the issues, which may be faced before and during the construction of the proposed Project. The concerns and their possible solutions presented by the participants regarding the proposed Project were recorded to make further possible recommendations.

The detail of the locations of consultations is provided in **Table 5-6** and the summary findings of the consultations are presented in an annotated form given in **Table 5-7**.

Table 5-6: Locations of Consultations

Sr. No.	Settlement	No. of Participants	Tehsil	District
1.	Chevra Hill Top	10	Kotli Sattian	Murree
2.	Village Korana Ridge Top	12	Kotli Sattian	Murree
3.	Village Arhanga	20	Kotli Sattian	Murree
4.	Java Mandi	12	Kotli Sattian	Murree

Table 5-7: Summary of Findings of the Consultations

Sr. No.	Concerns Raised by Participants	Mitigation Proposed by Participants	Action to be taken by Project Executors
1.	Loss of land and crops due to the establishment of paragliding club	Proper compensation shall be paid for the acquired land as per prevailing market rates prior to initiate civil works.	Land must be acquired from the landowners in accordance with the agreement before the commencement of construction activities.
2.	Due to construction of the proposed Project, local community will face mobility issues to their farmland and resident.	Alternate route should be provided to the local communities for convenience in mobility to their settlement and their farmland. Construction activities should be halted during peak hours.	Possible alternate route will be provided before the commencement of the civil work on the proposed Project.

Sr. No.	Concerns Raised by Participants	Mitigation Proposed by Participants	Action to be taken by Project Executors
3.	Health and safety and noise issues will arise for residents due to the construction activities.	Labour will bound to work and stay in the designated area or camp sites to ensure safety and privacy of female residents. Ensure minimum transportation of construction material and use of construction machinery during peak working hours and at night.	Contractor should be bound to take all protective and precautionary measures to keep safe the health of the local people.
4.	Disturbance of the social amenities.	Participants were of the view that due to construction of the proposed Project, several social amenities will be disturbed. These social amenities should be restored before commencement of the construction work to avoid any inconvenience for the local community.	Social amenities should be restored before execution of the civil work.
5.	Project area lacks the basic facilities i.e. proper sewerage system, filtration plants, solid waste management system, etc.	It is the need of the time for the proposed Project. TDC should implement this Project as soon as possible.	Construction of the proposed Project will be started soon.
6.	Due to the construction machinery and movement of loaded trucks carrying construction material during the construction period, congestion on the access road will increase.	The appropriate diversion plan will be developed to avoid traffic blockage/disruption due to the use of heavy machinery especially near sensitive receptors such as schools and mosques.	The contractor should be bound to make a site-specific traffic management plan in consultation with the traffic police during the construction phase.
7.	Due to construction activities as well as the influx of labor, the movement of the citizens particularly females, residing in the area will be restricted.	In order to tackle this situation, construction will be carried out in scheduled hours. Therefore, after construction hours, the local community, particularly females can easily move in the area.	People should be aware of complete construction activity plans so that they can move in the area freely and safely.
8.	Dust emissions due to construction activities such as deep excavations, transportation of construction materials and use of construction machinery.	Dust pollution will be controlled by water sprinkling on a regular basis.	The contractor should be bound to take all protective and precautionary measures to keep safe the health and properties of the local people.
9.	Job and labor opportunities for local people.	Skilled and unskilled workforce should be hired from the local community. It will enhance the	The contractor should be bound to hire skilled and unskilled workers from

Sr. No.	Concerns Raised by Participants	Mitigation Proposed by Participants	Action to be taken by Project Executors
		acceptability of the proposed Project among local people.	the local community as priority.



Consultation at Chevra Hill Top

Plate 5-1: Pictorial View of the Community Consultations

5.6 PROPOSED CONSULTATIONS PROGRAM

The stakeholder consultation and engagement is an ongoing process and will continue throughout the Project's construction as well as operation and maintenance phases. The ongoing consultation process could be scheduled on need basis with the stakeholders including but not limited to the concerned government departments, local administration, community representatives and PAPs from the proposed Project area.

The overarching goal of consultations and community engagement is to support and facilitate the Project's design and implementation, to reduce conflicts and Project opposition, and to increase Project's acceptability.

The consultations will be carried out during the construction and operation phases of Project. Consultations will be undertaken in all the communities twice or more time in a year, depending on the number of concerns raised under each consultation. Ongoing stakeholders' engagement activities include:

- Ongoing reporting on progress on the implementation of environmental and social management measures identified during the EIA process and recording of comments on the effectiveness of these measures;
- Updating communities and other stakeholders about Project developments and recording comments on these; and
- Ongoing action of the grievance mechanism.

Efforts will be made to maximize the consultations during the Project implementation. The consultations will be carried out with the objectives to develop and maintain communication linkages between the Project promoters and stakeholders, provide key project information to the stakeholders, and to solicit their views on the Project and its potential or perceived impacts, and ensure that views and concerns of the stakeholders are incorporated during the implementation with the objectives of reducing or offsetting negative impacts and enhancing benefits of the proposed Project. The framework for future consultations is elaborated in **Table 5-8**, but not limited to the following.

Table 5-8: Proposed Consultations Framework

Sr. No.	Stakeholders	Project Phase	Frequency of Consultation
1.	Institutions/Departments	• Pre-Implementation • During the Project Implementation • At Closure period	• One round of consultation before the implementation of the Project. • Bi-annually during operation phase. • Once before the closure of the Project.
2.	Local Communities/ Key Persons	• Pre Implementation • During the Project Implementation • At Closure period	• Consultation at different stages i.e., before implementation, periodic meetings during the construction phase and at the time of Project completion.

During the operational phase of the Project, consultations with stakeholders are important to assess the benefits of the Project and impacts on the local communities.

A comprehensive stakeholder consultation plan shall be prepared by the contractor(s) to get feedback from the stakeholders and to resolve the issues during the construction and operational phases of the Project.



6 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.1 GENERAL

This chapter identifies the beneficial as well as the potentially significant adverse environmental and social impacts during design/pre-construction, construction and operation phases of the proposed Project on the physical, ecological and socio-economic domains of the environment. The appropriate mitigation and remedial measures are proposed in this chapter. A Project impact evaluation matrix has been developed to evaluate the potential impacts of the proposed Project. A brief qualitative description of each aspect and the affected environment in Study Area / AOI is presented below.

6.2 NOTION OF SIGNIFICANCE

The term “**Environmental Impact**” or simply “**Impact**” covers the negative, adverse or harmful as well as positive, desirable or beneficial impacts of the Project on environmental settings. Prediction of impacts of the proposed activity is based on factual data; however, the significance of these impacts involves a value judgment technique. The nature of the impacts may be categorised in terms of:

- Direction** - Positive or Negative
- Duration** - Long or Short Term
- Effect** - Direct or Indirect
- Extent** - Wide or Local

Impact significance depends on both the nature of the impact and on the sensitivity of the receptor. The more sensitive the receptor the greater will be the significance of impact from that proposed activity. For this EIA, activities and nature of impact are combined with the sensitivity of the receptor to evaluate the significance of the impact. The significance of impact is characterized as very low, low, moderate, high and very high. Environmental issues having “moderate”, “high” and “very high” significance provided with mitigation measures.

Following the assessment of magnitude, the quality and sensitivity of the receiving environment or potential receptor has been determined and the significance of each potential impact established using the impact significance criteria matrix as shown below. Most of the potential impacts can be mitigated by implementation of various types of mitigation measures; however, some residual environmental impacts may remain after mitigation.

Table 6-1 Magnitude of Impacts on Sensitive Receptors

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

Magnitude of Impact	Sensitivity of Receptors			
	High (4)	Medium (3)	Low (2)	Negligible (1)
Negligible (1)	4	3	2	1

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

6.3 METHODOLOGY FOR IMPACT EVALUATION

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, reversibility, extent, etc.

6.3.1 Delineation of Project Area of Influence (AOI)

Before proceeding to the environmental analysis of the Project area, the Area of influence (AOI) was delineated. The AOI is a limit, which identifies the area where direct and indirect impacts of the Project activities are envisaged. This limit has been taken a 200 m radius starting from the Project boundary for the collection of baseline information, impacts assessment and mitigation measures of physical, ecological and socioeconomic resources.

Apart from the AOI, the area designated for the construction/ contractor camps, vehicle, equipment yard, material quarry areas, access tracks are also considered part of the AOI for the study. As the location of Construction/Contractor camps, vehicle, equipment yard, material quarry areas and access tracks are usually finalized by the construction contractor, so impacts evaluated due to these facilities in this Chapter will be of generic nature.

6.3.2 Project Impact Evaluation Matrix

The Impact Evaluation Matrix was developed by placing Project activities along the Y-axis, and on the X-axis the different environmental parameters likely to be affected by the proposed Project actions are grouped into three (03) categories i.e. physical, ecological and socio-economic environment. For the impact assessment, a Project impact evaluation matrix was used by dividing the Project action into different phases (construction and operational phases). The Project Impact Evaluation Matrix is given as **Table 6-2**.

6.3.3 Overlays

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. 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 EIA for the quantification of the land use categories are given in Chapter 4: Environmental Baseline.

6.4 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

There are some potential significant adverse environmental impacts on the local environment. The proposed Project is divided into three (03) phases i.e. Pre-construction / Planning and Design Phase, Construction Phase and Operation and Maintenance (O&M) Phase. The Pre-Construction Phase includes all the stages before the commencement of the Construction Phase (i.e. site investigation work such as topographical, seismic studies, etc.). The Construction Phase includes all the stages between (and including) the mobilization of the contractor up to the completion of the Project itself. Lastly, the Operation Phase starts after the Construction Phase, this includes both the inspection and repair works.

Adverse impacts envisaged at these three (03) phases of the proposed Project along with their proposed remedial/mitigation measures are detailed below.

6.4.1 Potential Environmental Impacts during Pre-Construction / Design Phase

Following is a brief description of the impacts envisaged and the recommended mitigation measures during Pre-construction / Design phase.

Physical Environment

6.4.1.1 Technical Design and Layout Planning

Incompatible layout plan and engineering design of the Project's structures (retaining walls, access road, buildings (administrative, glamping pods, etc.), offices, coffee shops, parking area, infrastructure facilities, etc.) can undermine the overall aesthetic beauty and ambience of the Project area. Also, low utilization of the available spaces and designing the structures without considering the prospective and futuristic needs can result in structures with low social acceptability and functionality. This impact will be permanent and moderate adverse in nature.

Mitigation Measures:

- All structural, layout and engineering design will be in strict accordance with the applicable MDA bylaws, national & international bylaws and engineering parameters and will consider prospective and futuristic needs of social acceptability and functionality;
- The proponent will review and validate all the design considering the possible impacts (as mentioned in succeeding sections) before the start of construction of the proposed Project; and
- Design flight paths away from residential areas and ecologically sensitive zones to minimize environmental sustainability.



Table 6-2: Environmental Impacts Matrix

Project Impact Matrix																												
Environmental Component Project Component		Physical Environment												Socio Economic Environment														
		Soil (Erosion / Stability / Contamination)	Air Quality	Noise Level	Surface & Ground Water Quality	Solid Waste Generation	Terrestrial Ecosystem	Endangered Species	Beneficial Plants	Aquatic Life	Avi-Fauna	Loss of Trees	Loss of Crops/Orchards	Conflict over Resources	Mobility of Locals	Public Infrastructure	Parking Facility / Traffic Management	Cultural Properties (Mosque, Shrine, Graveyard)	Community Stability	Gender Issues	Cultural & Social Issues	Health & Safety	Aesthetic	Labour Influx	Child Labor	Living Standards	Employment Opportunities	Economic Uplift
A. Planning & Design Phase		1	2	3	4	5	6	7	8		9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Topographic Survey of Project		0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	
Technical and Layout Planning		0	0	0	0	0	8	8	8	0	8	0	8	0	0	0	0	0	0	0	0	10	0	0	0	0	0	
Geotechnical Investigation		2	4	4	2	2	0	0	3		0	3	0	3	4	8	0	2	4	3	6	4	0	0	0	0	0	
Temporary Acquisition of Land		0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	8	8	0	0	6	0	0	
Parmanent Acquisition of Land		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
B. Construction Phase																												
ROW/ Site Clearance		9	9	9	6	10	0	0	6	9	12	9	9	6	8	8	9	0	2	6	2	9	4	8	8	0	8	9
Earthwork in Filling and Excavation		9	9	9	6	10	0	0	2	9	12	9	9	6	8	8	9	0	4	6	2	9	4	8	8	0	6	6
Establishment of Construction Camps & Workshop		6	9	9	6	8	0	0	4	9	12	0	0	8	8	0	6	0	4	6	6	8	4	0	0	0	4	0
Transportation & Storage of Construction Materials		4	6	6	2	6	0	0	0	0	0	0	0	0	4	0	4	0	4	0	4	8	4	0	0	0	4	0
Use of Construction Material and Heavy Machinery		4	10	10	2	6	0	0	0	0	0	0	0	0	6	0	8	0	8	0	8	10	4	0	0	0	4	0
Installation and operation of Batching and Asphalt Plants		4	10	10	2	6	0	0	0	0	0	0	0	0	4	0	6	0	4	0	8	10	4	0	0	0	4	0
Borrow Material		4	10	10	4	6	0	0	0	0	0	0	0	0	4	0	6	0	4	0	8	10	4	0	0	0	4	0
Spoil Disposal		5	6	0	6	8	0	0	0	0	0	0	0	0	0	0	0	0	2	0	4	6	4	0	0	0	4	0
Structural & Civil Work		6	8	8	2	8	0	0	0	0	0	0	0	4	5	4	6	0	4	8	5	9	4	6	6	0	8	0
Drainage Work		0	4	6	4	4	0	0	0	0	0	0	0	0	3	2	8	0	0	4	4	6	0	4	4	0	6	4
Miscellaneous Work (Road Ancillaries, Traffic Signs and Signals etc.)		0	4	4	2	4	0	0	0	0	0	0	0	0	2	0	4	0	0	4	4	6	4	4	4	0	4	6
Pavement Work		8	8	8	8	8	5	0	0	0	0	10	10	8	8	0	5	5	5	0	5	5	8	5	5	2	0	2
Storage of Oil/ Diesel		5	5	5	5	5	5	0	0	0	0	0	0	0	5	0	5	4	4	0	2	5	5	5	2	0	0	0
Finishing and Comissioning		0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
C. Operational Phase																												
Operation of Paragliding club		0	4	4	0	4	0	0	0	2	4	0	0	0	3	0	2	0	9	2	4	3	4	0	0	5	9	9
Building Maintenance		0	4	4	0	4	0	0	0	0	0	0	0	0	3	0	2	0	9	2	4	3	4	0	0	0	9	0
Operation of Solid Waste Sites		0	5	5	0	5	0	0	0	2	4	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	5	8
Transportation, Parking and Road Maintenance		0	5	5	0	0	0	0	0	0	0	0	0	2	0	2	4	0	4	2	2	4	4	2	0	0	5	5
Wildlife including Avi-Fauna		0	5	5	5	5	0	0	0	8	8	0	0	2	0	2	4	0	0	0	4	2	2	0	0	0	5	5
Maintenance of Miscellaneous Work (water supply, sewerage, drains and other allied facilities)		3	3	3	3	3	0	0	9	4	4	0	0	2	2	2	0	0	0	0	4	2	2	0	0	0	5	5
												Positive Impact Score			Impact Significance			Negative 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										



6.4.1.2 Topography

The topography of the Project area is hilly with some flat patches. As the proposed Project involves the establishment of paragliding club comprising of glamping pods, Tree houses, gazebos, toilets, parking area and allied facilities, so topography of the Project area will be changed. In addition to this, construction activities will also result in significant changes in topography due to earthworks and excavation including land clearing and leveling. This impact is permanent in nature.

Mitigation Measures:

- Due consideration will be given to aesthetic improvement during the design phase by avoiding excessive excavation and removal of vegetation and by adopting the best engineering practices;
- Provision of green belts for the landscape in design to augment the overall ambience of the study area; and
- Ground disturbances will be limited to only the areas necessary for Project related construction activities.

6.4.1.3 Seismic Hazard

As per Building Code of Pakistan, Seismic Provisions, 2007, the Project area is located in Seismic Zone 3 (High Hazard), where 3 represents peak horizontal ground acceleration from 0.24g to 0.36g. In this Zone, the designing of various types of structures should be done on the basis of PGA. A high-intensity earthquake impacting the Project site can adversely impact the development. This factor requires special consideration of the designers keeping in view of the earthquake of October 08, 2005 and recent earthquakes. This will be a local and high adverse impact.

However, no change (+/-) in the impact of seismology risk in the area is expected during the Project construction phase as none of the Project activities are expected to be of such a powerful extent to influence the tectonic risk.

Mitigation Measures:

- The proposed structures will be designed and constructed to withstand high intensity earthquakes. For seismic hazard analysis, updated structural, geotechnical and seismic studies will be conducted; and
- To mitigate the seismic hazard, Seismic Building Code of Pakistan 2007 (SBC-07) will be adopted. This code specifies minimum requirements for seismic safety of buildings and has to be applied and used by engineers in conjunction with the necessary understanding of the concepts of structural, geotechnical and earthquake engineering.

6.4.1.4 Ground Water / Drinking Water Contamination

Stress will be generated on groundwater reservoirs due to the operation of paragliding club. Water consumption may lower the underground water table in the long run and affect water supply system of surrounding areas due to excessive withdrawal of water.



Drinking water contamination can originate due to improper design of internal water network of the proposed project site. If the pipes and the overhead water storage tanks are not designed properly, it will lead to bacteriological contamination of the potable/drinking water and cause of infectious diseases/health problems in the employees, tourists, nearby residents and skilled and unskilled staff of the proposed project site. The impact is negative, local, medium, short term and probable.

Mitigation Measures:

- A detailed groundwater hydrological study should be conducted to foresee the impact of water extraction and recharge, so that there is no negative impact on the surrounding area and the delivery of services;
- A water filtration plant of the required capacity will be proposed in the design of the proposed project in order to avoid any bacterial contamination in the drinking water;
- Location of water storage tanks will be planned carefully. Water storage tanks meant for drinking will not be located directly beneath any sanitary plumbing or any other pipes conveying non-potable water;
- All the distribution pipes should be preferably laid one meter away or above the sewer lines;
- Water storage tanks will be provided with a cover, designed to prevent the entry of dust, roof water, surface water, birds, animals or insects;
- Selection of standard materials during the planning stage will be considered for efficient seepage control;
- Proper designing of pressure head, flow and pipe diameter of water pipes as per national and international practices; and
- Alternate arrangements will be suggested in design to cater over flow of water during construction and operational phases.

6.4.1.5 Surface Water Contamination / Pollutant Load on Receiving Body

The main surface water bodies identified within the Project vicinity is Durnoyan Waterfall Kotli Sattian, Jhelum River and local nullah. The proposed Project may dispose of its untreated wastewater generated from the proposed paragliding club into this distributary, deteriorating its water quality and compromising its primary purposes. The impact is negative, long term and probable.

Mitigation Measures:

- Avoid disposal of wastewater in water bodies by considering Septic Tanks/ Wastewater treatment Plants in the design for the treatment of wastewater prior to its disposal into the receiving body;
- Introduction of dual flush system to reduce the wastage of water by excess use in the low- or high-level cistern will be planned;
- Design shall be sufficient to avoid surface runoff in case of over flow; and
- Alternate arrangements will be suggested in design to cater the sewage flow during operation phase.

6.4.1.6 Water Quality

Construction Site Runoff

The potential sources of water pollution associated with the construction of the proposed Project are runoff from the construction works area that may contain increased loads of sediments, suspended solids and other contaminants. Potential sources of pollution from the site include:



- Runoff and erosion from exposed soil surfaces, earthwork areas and stockpiles e.g. grouting and cement material with the rain;
- Wash water from dust suppression sprays;
- Fuel and lubricants from maintenance of construction vehicles and mechanical equipment;
- Spillage of liquids stored on-site such as oil, diesel, solvents, etc. are likely to result in water pollution; and
- Uncontrolled discharge of debris and rubbish such as packaging, construction material and refuse.

Wastewater produced by On-Site Work Force

Wastewater will be generated from the workforce during the construction phase. However, wastewater can be adequately treated by interim sewage facilities, such as portable toilets, which can be installed within the construction site.

Construction waste, if left unattended will result in forming leachate that will percolate through the soil strata and will reach the underground water table and hence, will end up contaminating groundwater. There is a probability that various materials like fuel, lubricant oil and other oily products, which are used during the construction phase may contaminate groundwater and channels carrying water.

This impact can be categorized as direct, moderate, local, medium, temporary, and reversible.

Mitigation Measures:

As a mandatory step, all the effluents will be disposed as per the requirements of PEQS. Moreover, to reduce the risk of surface and groundwater contamination, good management practices will be adopted to ensure that fuels, chemicals, raw sewage and wastewater effluent are disposed of in a controlled manner. These measures are described below:

- Construction camp will be established in area with adequate natural drainage channels in order to facilitate the flow of the treated effluents after ensuring that PEQS are met;
- Oils, fuel and chemicals will be stored at bunded fuel stores and mobile bunded stores;
- Maintenance of vehicles and plant will be carried out only in impermeable areas where any oil spillages can be contained;
- Construct temporary storm water retention basins to reduce the runoff to the drain and use permeable material for temporary roads;
- Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- The proponent will ensure that the construction work is confined within the Project boundary and that water bodies especially Durnoyan Waterfall Kotli Sattian, Jhelum River and local nullah are prevented from pollution during construction;
- The solid waste will be disposed of in designated landfill sites to sustain the water quality for domestic requirements;
- Regular water quality monitoring according to the determined sampling schedule;



- Water required for construction shall be obtained in such a way that the water availability and supply to nearby communities remain unaffected;
- The contractor will ensure that construction debris does not find their way into the drainage which may get clogged;
- Wastes will be collected, stored and taken to approved disposal site;
- Wastewater effluent from the Contractors' workshops and equipment washing yards will be passed through gravel/sand beds to remove oil/grease contaminants before discharging into the disposal point. According to the PEQS, the BOD concentration in sewage must be brought down to less or equal to 80 mg/l before being discharged into a natural stream having capacity to dilute the effluent. For wastewater apart from BOD, COD of 150 mg/l will also be checked; and
- Similarly, if the sewage after treatment is to be discharged in to the land it will meet the requirements of the PEQS for disposal of wastewater.

6.4.1.7 Sewerage & Drainage System / Urban Flooding

The construction of proposed Project may be subjected to urban flooding during monsoon season as Jhelum River and local nullah is passing along the Project boundary which may be inundated during the high flood passage.

Large volumes of wastewaters are expected to be generated during the operational phase of the proposed Project, which needs to be managed properly through an efficient sewerage system. Improperly designed sewers may not carry the waste load, leading to failure and financial loss. The alignment of sewer lines and sewerage pumping station must be properly planned; else it may lead to both technical and social problems along with environmental issues of backflow creating foul smell and unhygienic conditions.

Accumulation of silt in sewers in low areas over time, overflows, blockages, power outages, harmful working conditions for the workers cleaning sewers, etc. are some of the issues that needs to be critically looked into during the sewer system design.

Improper design of drainage system of the proposed Project may result in stagnant water on the access road due to which following impacts are expected to arise:

- Deterioration of road surface and reduction of its bearing capacity;
- Inconvenience for tourists, employees, nearby residents and workers;
- Stagnant water may provide the breeding ground for disease vectors; and
- Foul odour may be generated.

Inadequate drainage design or natural cloud burst will lead to ponding on impervious surfaces such as roofs of buildings, parking lots and landing and taking off sites, and consequently may cause damage to the infrastructure in addition to vector breeding. This impact will be medium, negative and short term.

Mitigation Measures

- Adequate designing of drainage systems that conforms to the methods and criteria set out within the current versions of national/international criteria to avoid flooding especially during the



monsoon seasons and intense rainfall events. Proper slopes shall be incorporated in design to avoid the stagnant water;

- All sewer lines including trunk, lateral and branch sewer lines must be designed considering the waste generation rate;
- In all cases, the sewer line should be laid deeper than the water pipeline (the difference between top of the sewer and bottom of water pipeline should be at least 300 mm);
- Proper slopes shall be incorporated in design to avoid the stagnant water on at-grade road surface;
- Proper paving shall be provided adjacent to the exterior walls of the structures. These arrangements would stop ingress of surface water into the ground in the vicinity of the proposed Project and would provide safety against any possible distress;
- Dense plantation around the Project boundary except at landing and taking off sites; and
- Rainwater harvesting technique shall be planned for use of rainwater.

6.4.1.8 Building Illumination / Lighting

Design of a good illumination is necessary for the offices, tourist facilitation center, shops and buildings as if a proposed Project is designed without taking into consideration for illumination, it will affect the safety of the people who are working and visiting project site and adversely affect the activities within the proposed Project boundary. Light can also have an adverse impact upon local environment, typically through the unwanted effects of exterior lighting at night, often referred to as Light Pollution or Obtrusive Light. It can also affect the bats (if any) in the vicinity. This is a long term and moderate adverse impact.

Mitigation Measures:

- Illumination/ lightning system will be designed in such a way so as to maximize the use of natural day light and minimize the use of electric lighting;
- Special consideration will be given to control obtrusive light (light pollution) to safeguard the night time environment which can affect surroundings of the project site; and
- Care will be taken to ensure that lighting does not adversely impact upon nearby bats habitat (if any).

6.4.1.9 Improper Parking Facility / Traffic Congestion

Lehtrar Road, Kotli Sattian Road, Korang Road, Kotli Link Road, Tourism Highway, Islamabad Expressway, and Murree Expressway will be used as the main route to reach the project site by employees and tourists after the construction of the proposed Project, which will increase the traffic volume on the roads. These roads are busy due to the presence of educational institutions, industrial units, recreational facilities, commercial facilities, health care facilities, religious places (mosques, shrines and graveyards), government & private offices and as a main route used by passerby's and commuters to reach their destinations. During the construction phase, there is also a high chance of traffic jams and congestion on these roads due to the movement of heavy and light vehicles for the transportation of construction materials to the Project site. Hence, this impact is temporary and moderate in nature.

Improper parking facilities within the premises of the project site can lead to illegal parking, reduced traffic speeds, congestion, idling of vehicles, etc. within the study area, which demands a proper parking facility. This impact is negative, local, low, short term and definite.



Mitigation Measures:

- Adequate parking facilities has been planned within project site to accommodate employees and tourists, thereby addressing illegal parking issues. These facilities will be designed in compliance with MDA By-Laws and international best engineering practices; and
- A traffic study will be carried out during the design phase to calculate the existing and future capacity of the Lehtrar Road, Kotli Sattian Road, and Kotli Link Road to evaluate the possible solutions to overcome the future traffic problems (if any) during the construction and operation phases.

6.4.1.10 Deterioration of Ambient Air Quality / Climate Change

Air quality of the study area will be affected due to the movement of heavy vehicles (fuel sweltering in vehicles releases CO₂, NO_x, SO_x and particulate matters) and un-necessary idling of diesel run engines. In addition to this, construction activities (construction of contractor camps, excavation, footing reinforcement, shuttering, footing concrete, column casting, construction of walls, lintel, roofing, plastering work, fixing of electrical and plumbing works, painting, terrace water proofing and landscaping works) will emit CH₄, CO₂, N₂O, particulate matter, H₂S, CO, and HCFs that will contribute to the greenhouse effect in and around the Project area. The impact is considered to be negative, local, low to moderate, long term and definite.

Mitigation Measures:

- Provision of green areas/plantations will be given in the design in order to absorb the emissions due to Project activities; and
- The entire area of the project site shall be paved at the design phase.

6.4.1.11 Resource Efficiency and Pollution Prevention

Resources involved in the construction of the proposed Project would include construction materials, water and fuel. Construction material to be used for construction activities includes coarse aggregates, fine aggregates, asphalt, cementitious materials, reinforced and structural steel, etc. Almost all the materials to be used in the construction of the proposed Project, access road and allied facilities are non-renewable and therefore their sustainable use is necessary for future use.

Excessive water consumption will pressurize water resources in the Project area because water will be used by the construction staff for drinking and washing purposes and for construction activities during the construction phase. In addition to that, during the operational phase, water will be utilized by occupants for drinking, bathing, cooking, watering plants, etc. Fuel (diesel, petrol) will be used to operate construction machinery, asphalt and batching plants. Sustainable use of energy resources is very important not only to continue future use but also to reduce air emissions. The overall impact is considered to be local, high, long term and definite.

Mitigation Measures:

- Plan for use of solar panels and wind turbines at operation phase will be considered during design phase. It is strongly recommended to install solar panels at roof top of the buildings and LED lights;
- Batching plants with insulation lining to reduce heat loss shall be designed or purchased from local vendor for construction activities;
- A good camp design and an efficient worksite management plan will be prepared during design stage that may help the contractor to reduce the water demand, wastewater and solid waste volumes to the lowest levels; and



- Rainwater harvesting system shall be considered through collection of water from roofs and its proper usage to irrigate green areas and for domestic use with proper treatment during designing.

6.4.1.12 Emergency Management

Emergency management in case of natural and man-made disaster is a major concern. Increased incidents of disasters especially act of terror, fire, earthquakes, etc. demand proper planning. The impact is considered to be negative, local, high, long-term and probable.

a. Electrical Hazards

The workers, tourists, employees and customers of the proposed Project can be exposed to electrical hazards including shocks, fires and burns caused by faulty electrical wiring, unsafe installations, frayed cords, substandard power trips, and defective equipment.

Mitigation Measures:

- Appropriately grounded and double insulation of every single piece of equipment, machine, and device will be kept in the design;
- Proper installation check and periodic maintenance by a competent electrician will be planned; and
- All power strips will be planned in the design to place in well-ventilated areas for adequate heat dispersion.

b. Fire Fighting System

Inefficient firefighting system and insufficient storage of fire water will pose a severe threat to the human life and to the commercial facilities.

Mitigation Measures:

- Buildings in project site will be designed and constructed according to National Fire Protection Association (NFPA) standards for the prevention and control of fire and explosion hazards;
- Provision of a firefighting pump will be kept by the design consultant in the design to maintain a constant pressure of 4.5 bars in the system;
- A separate water storage tank will be designed for firefighting;
- Fire Hose Cabinets connected to pressurized water lines at different locations of the facilities shall be considered in the design;
- A separate fire alarm system will be designed for the buildings; and
- Following provisions for fire safety will also be made in the proposed Project during the design phase. These should be:
 - Assigning of special number to be dialed to inform about the fire to emergency response team; and



- Fire Extinguishers.

c. Lightning

Lightning is a constant hazard for buildings and equipment. One lightning strike can damage the project site and facilities and may cause failures to the electronic devices inside the buildings and facilities and sometimes it may even result in fire leading to human and financial loss.

Mitigation Measures:

- Design of an efficient Lightning Protection System (LPS) will be ensured to minimize the damage to buildings and facilities by creating a path (divert) for the lightning discharge to the ground.

6.4.1.13 Site Selection of Construction Camps

Improper site selection and location of construction camp(s) and mismanagement of construction camp activities can lead to various social and environmental impacts, which include loss of vegetation due to setting up construction camps, indiscriminate generation of solid waste, and discharge of sanitary effluent, water pollution and health & safety issues. Furthermore, cultural differences, behavior of construction workers and potential disregard for local cultural norms can lead to increase tension between local communities and workers residing in the construction camps. If the sites left unclear after completion of construction phase, it will cause disturbance for the proponent and local community. This impact is negative, local, low, short term and definite.

Mitigation Measures:

- Construction camps should be designed to be self-contained to reduce demand on infrastructure and services of nearby communities and to minimize the removal of existing macro-plants;
- There should be no resettlement issue for the location of the camps;
- Camp site should be away from the residential areas and sensitive receptors;
- Selection of sites for construction camps shall be near the Project area having proper access to the nearby main/link road;
- The camps must be located in a place where the drainage from and through the camps will not threaten any domestic or public water supply;
- Camp site must be adequate in size to prevent overcrowding of necessary structures;
- The camp site should consider avoiding any damage of property, vegetation, irrigation, and drinking water supply systems;
- The camp site must not be subject to periodic flooding;
- There should not be any ecological sensitive areas e.g. wildlife sanctuaries, game reserves, etc. near to the construction camp site; and
- Formulation of a comprehensive safety and security plan for the camps, which shall be comprised of a training manual, use of safety equipment, emergency preparedness and code of ethics.

Ecological Environment

6.4.1.14 Flora

The project site is not located within the forest area. Facilities are planned without affecting trees in the area, though few pine trees and other species of trees may be affected due to the development. A few locations of wild shrubs may also be affected. Since it is being developed as eco-tourism destination, development is mostly on the patches with no or low tree cover. Moreover, any loss of trees, shrubs and other undergrowth will be compensated through replanting native species, enhancing both the green cover and visual appeal of the



Project site.

During the pre-construction phase, activities such as installation of construction camps, construction of temporary roads and mobility of construction staff may damage the local vegetation/trees. As the heavy machinery and camps will be moved and installed, which require significant space due to which available vegetation is expected to be removed. This impact is site-specific, temporary, reversible, possible, medium significant and needs to be encountered prior to the start of construction stage.

Mitigation Measures:

- Prioritize areas with sparse vegetation for construction to reduce habitat disturbance;
- The camps, mobility of machinery and construction of temporary road shall be properly plan and well designed to avoid any loss to local green cover. It is recommended to establish the construction camps where minimum or no vegetation exists;
- Similarly, the alternate routes for roads and points for camps are recommended where no loss of vegetation is expected; and
- The location of construction camp will be selected so, as to have limited environmental effect during construction phase and to reduce the cost and land requirement.

6.4.1.15 Fauna

The region hosts diverse wildlife, including Leopards (*Panthera pardus*), Barking Deer (*Muntiacus muntjak*), Wild Boars (*Sus scrofa*), Indian Pangolins (*Manis crassicaudata*), and bird species such as the Himalayan Monal (*Lophophorus impejanus*) and Kalij Pheasant (*Lophura leucomelanos*). Therefore, the establishment of paragliding club at Chevra Hill Top may impact local fauna due to habitat disturbance.

Moreover, movement and installations of machinery and vehicles during the construction phase will generate noise that will create nuisance for avi-fauna and domestic mammals. The habitats of avi-fauna and domestic mammals may also be affected due to construction camps set-up and due to cutting of trees. This impact is site-specific, and high adverse.

Mitigation Measures

- Special consideration must be given in the planning of the establishment of paragliding club to species of fauna that are protected (if any), by national or international legislation or that are considered to be rare in a national or international context. It is an offence to damage or disturb a protected species and its habitat (including breeding and resting places);
- Critical Habitat Assessment (CHA) should be conducted to identify and evaluate areas essential for the survival of wildlife species and especially endangered or endemic species, if any during detailed design stage. Following the CHA, a Biodiversity Action Plan (BAP) may be formulated to outline strategies for conserving identified species and habitats in and around the Project area. The BAP would set measurable targets, such as achieving no net loss or a net gain in biodiversity, and detail actions like habitat restoration, species monitoring, and community engagement. For instance, the Murree Kahuta Kotli Sattian National Park Management Plan emphasizes the importance of such proactive measures in preserving regional biodiversity;
- The overall ecological value of an area, through which the Project will be implemented occurs, must also be considered. This should include the interconnections between habitats in the vicinity of the project site, which may be affected by fragmentation of habitat. Many species (particularly birds and mammals) have large, dynamic territories that extend beyond site boundaries, making them vulnerable to changes in external or local environmental conditions;
- Design designated takeoff and landing zones to prevent habitat fragmentation and protect natural vegetation from excessive trampling;



- The sites for the construction camps will be carefully selected keeping in mind the available faunal habitats along the study area. Moreover, the layout of camps needs to be designed while considering the faunal habitat of the area;
- Prior to commencing any construction work, any works required outside the construction footprint verified will be referred to the Project Director of TDCP for advice on further assessment and approval requirements so that damage to any available habitat over there can be avoided at maximum;
- The construction camp management plan during the planning stage will consider fencing and gating to check the entry of animals in search of eatable goods;
- Similarly, the waste management plan of the camps will be considered at the planning stage to prevent wild animals and birds; and
- The standard measures must be adopted to minimize noise due to machinery movements and installations.

Socio-economic Environment

6.4.1.16 Land Acquisition and Resettlement

Permanent Land Acquisition and Resettlement

All activities related to the establishment of paragliding club will necessitate acquiring land from private landowners, leading to resettlement-related impacts. These may include disruptions to livelihoods and commercial activities, displacement of people, and loss of income sources during the implementation of the Project. This impact can be categorized as moderate in nature.

Mitigation Measures

- Resettlement and relocation related impacts will be mitigated through proper remuneration of the impacts and judicious compensation to the affected persons by providing sufficient budget in the PC-I document, which will be prepared for the proposed Project.

Temporary Land Acquisition

The Contractors will require temporary land acquisition for the development of Contractor camps and other facilities i.e. storage, workshops, equipment parking and washing areas. The approximate area required for the establishment of one Contractor's camp facilities will be tentatively 1,500 m². Land utilization for Project activities and subsequent operation of Project may induce temporary changes in the existing land use pattern. This impact can be categorized as moderate in nature.

Mitigation Measures

- It is the foremost option to establish the construction camps at the acquired land to eliminate the issues of land leased etc. However, if this option is not feasible than the land for above mentioned facilities will be selected and leased prior to the start of construction phase. Land for above mentioned facilities will be directly rented from the private landowners by the Contractors. Rental terms will be negotiated to the satisfaction of the concerned landowners and the agreement will be in local language to make the process clear.



6.4.1.17 Public Utilities

Due to the proposed Project, public utilities (transmission lines) may be affected creating disruption of public service and inconvenience to the residents. This impact is temporary and may be considered moderately negative in nature.

Mitigation Measures:

- The design engineer will consider the adjustments of the proposed plans, where feasible and within acceptable design standards to avoid relocation or adjustment of major or costly utilities without changing the scope of the Project;
- Relocation of the utilities will be planned and approved before Project commencement by the Client (if any), to avoid inconvenience to the locals;
- The provision in the design and budget for the relocation of the existing utility infrastructures wherever required shall be finalized in consultation with the concerned department;
- All public utilities (e.g. transmission lines, water pipes, power/ telephone lines, etc.) likely to be affected by the proposed Project will be relocated well ahead of time before the actual commencement of the construction works;
- Complete rehabilitation of affected public utilities will be ensured; and
- Timely public notification of unexpected disruption of services.

6.4.2 Potential Environmental Impacts during Construction Phase

Following is the brief description of impacts envisaged and the recommended mitigation measures during construction phase.

Physical Environment

6.4.2.1 Topography & Visual Intrusion

Visual intrusion as one of the possible adverse impacts during construction phase activities are likely to arise from fugitive dust generated from site preparation, on-site storage of



construction material, storage of construction debris, physical presence and operation of labor camps, etc. because commercial facilities nearby study area will remain open for access by public, presence of these activities and materials thereof will cause temporary visual blight and topographical changes at the construction site. The impact is considered to be negative, local, medium, short term and definite.

Mitigation Measures:

- The area demarcated for proposed Project will be fenced and all construction activities will be restricted within the demarcated site;
- Site approach road will be kept free of dust and mud through the implementation of dust suppression measures;
- All temporary structures, surplus materials and wastes will be completely removed on completion of works; and
- The contractor will ensure minimal footprint of construction activities.

6.4.2.2 Soil Erosion and Contamination

Due to the proposed construction activities, soil erosion and contamination will occur. Soil erosion will occur on Project site and at contractors' camps because of removal of vegetation (loosen the soil and make it more susceptible to erosion due to wind and rain), uncontrolled run-off from equipment washing yards and excavation of earth/cutting operations. Erosion may increase during intense rainfall events and due to improper drainage systems at construction sites. During the rain, the eroded soil mix with stagnant water to transform into slush, which can affect the movement of vehicles and machinery and construction work as well as limit the movements of local people.

Contamination of soil may be caused by oil and chemical spills at asphalt plant sites, equipment washing yards, campsites and temporary construction site offices. This normally happens when these materials are transported in open or loosely capped containers. Various types of machinery will be used at the construction sites. This machinery will not only pollute the atmosphere at the construction sites and adjacent communities but also have a negative impact on the soil surface layer resulting in soil pollution. This impact is negative, local, medium, short term and definite.

Mitigation Measures:

- Confining excavations to the specified spots as per the approved engineering drawings and unnecessary excavations will be avoided;
- Loss of topsoil will be avoided by stripping and storing topsoil prior to construction, then re-using it for green areas of the establishment of paragliding club;
- Stored excavated material (rock and soil) will be covered and preferably reused;
- Prepare a plan for use and movement of construction vehicles within the area based on the nature of soil;
- Vehicles and equipment movement will be confined to dry areas with hardened soil; no vehicle and equipment will enter the damp areas, water areas, vegetative areas and areas with soft soil;
- Ensure sprinkling of water for reducing the erosion of soil;
- Washing yards will be paved to avoid seepage of runoff from the yard;
- Controlling runoff volumes and intercept runoff before it leaves the site;



- Non-bituminous wastes from construction activities and solid waste generated at the camp sites will be dumped in approved sites, in line with the guidelines for dump sites, and must be covered;
- Perennial grasses, sod, shrubs, and trees will be planted to control the runoff on the site;
- Excess spoil will be reused where possible and residual spoil can be disposed of at designated site to prevent erosion;
- Oil separators will be installed at equipment or machinery washing yards to prevent soil contamination from oily water;
- Re-vegetation of exposed areas around the site (if any) will be carried out rapidly, in order to mitigate against erosion of soil through surface water runoff and wind erosion;
- Septic tanks of adequate capacities will be constructed for receiving and treating wastewater from all temporary worksite toilets, and the temporary container offices. The toilet wastewater will not be discharged untreated onto the adjacent lands;
- Regular inspection of the wastewater disposal from construction camps;
- Construction work will be scheduled to be completed before monsoon season to avoid the soil erosion through surface run-off;
- Jute erosion protection mats will be applied in areas where erosion is noticed during inspections;
- Material Safety Data Sheets (MSDS) will be strictly followed during handling and storage of chemicals;
- Provision of impervious platform with oil and grease trap for collection of spillages during equipment and vehicle maintenance;
- All spoils shall be disposed of safely and the site shall be restored back to its original conditions;
- Use of modern, well-maintained machinery and vehicles by the contractor to avoid leakages; and
- Soils removed during construction will be stockpiled for reuse where possible.

6.4.2.3 Excavations

Deep excavation and vibrations from the construction machinery and equipment may damage the structure stability of the existing infrastructure in and around the Project site and may result in foundation collapse of the structure.

Borrow / open pits and associated excavation activities will result in soil erosion, loss of grasses and shrubs, landscape degradation, and damage to road embankments. Borrow / Open pits may become potential sources of mosquito breeding and may prove hazardous to humans, livestock and wildlife, if not taken care properly. This will also degrade hygienic condition of the Project area. This impact is negative, local, moderate to high, long term and probable.

Mitigation Measures:

- Confining excavations to the specified spots as per the approved engineering drawings and unnecessary excavations shall be avoided;
- The base of foundation excavation should be properly proof rolled before pouring lean concrete;
- During construction of foundation, the excavation should be inspected by an experienced Geotechnical Engineer before of pouring lean concrete;
- Confining excavations to the specified spots as per the approved engineering drawings and unnecessary excavations should be avoided;
- Mat / pile foundation shall be used for transferring the loads of the proposed paragliding club and overhead water tank safely to the underlying soil stratum. However, spread foundation shall be used for lightly loaded structures;



- Assure that proper sloping, benching, or shoring techniques are utilized in excavations of five (05) feet or greater in depth;
- Use trench shields during trenching operations, when required;
- Necessary permits will be obtained for any borrow pits from the competent authorities;
- Soil erosion along the borrow pit will be regularly checked to prevent/ mitigate impacts on adjacent lands;
- In case borrow pits are filled with water, measures have to be taken to prevent the creation of mosquito-breeding sites;
- Borrow pits will be used for construction waste, but during the excavation, top 20 cm soil cover will be preserved for vegetation after the filling of the pits. This is the best way to restore the flora of the area; and
- Quarry Management Plan is attached as **Annexure-I**.

6.4.2.4 Air Quality and Dust

Air quality will be affected by fugitive dust emissions from construction machinery; dust from the unpaved surface and construction vehicles. Emissions may be carried over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability. Besides, multifarious construction activities and increased vehicular traffic (construction vehicles) would also contribute to the localized airborne dust. The larger sized particles, under influence of gravity, tend to settle down in the immediate vicinity of the source. The Suspended Particulate Matter (SPM) tends to remain suspended in the environment for much longer and persistent time and is an environmental hazard. The objectionable impacts of settling the suspended dust would be its dry deposition on vegetation, motor vehicles, structures, and other exposed surfaces. Exhausts from fossil fuel burning in the construction machinery will also deteriorate local air quality. Similarly, exhausts from generators can also have impacts on air quality in the vicinity. The deteriorated ambient air quality may cause health hazards to the residents of nearby localities.

The operation of an asphalt plant causes the emission of many different pollutants. The most common pollutants emitted from hot mix asphalt plants are particulate matter (PM₁₀), sulfur dioxide (SO₂), nitrogen oxides (NO_x), volatile organic compounds (VOCs), and carbon monoxides (CO).

Potential impacts on the air quality during the construction stage will be due to the fugitive dust and the exhaust gases generated in and around the construction sites. Dust is a major component of air pollution during road construction. Emissions are generated mainly from the following construction activities:

- Site clearance and use of heavy vehicles and machinery/equipment etc. at construction sites;
- Procurement and transport of construction materials such as sand, cement, etc. to the construction sites;
- Other gaseous emissions during construction result from operating of construction vehicles, plant and equipment;
- During construction, the continuous operation of machinery and movement of heavy trucks/vehicles including futuristic growth of traffic volume during the construction period on the road and traffic jams may generate increased gaseous emissions and dust (PM₁₀ and PM_{2.5}), which are already exceeded and will severely affect the health of locals including residents, road users and business owners and can lead to a range of respiratory issues. Children, the elderly, and individuals with pre-



existing health conditions are more vulnerable to the health effects of PM pollution. Elevated levels of PM₁₀ and PM_{2.5} reduce air quality, leading to decreased visibility and hazy conditions. The construction activities as well as futuristic growth of traffic volume during construction period may also result in increased air pollution in the area. Increase in air pollution levels without Project and with Project during construction period (for mobile & stationary sources) is predicted from construction machinery, equipment, which reveals that there shall not be significant contribution towards pollution due to the construction activity of the Project if mitigation plan will be implemented and monitored in proper sense; and

- Asphalt heating.

The overall impact on the quality of air during the construction phase will be high adverse, however, it will be temporary and limited to the Project's implementation phase only.

Mitigation Measures:

- All vehicles, machinery, equipment and generators used during construction activities will be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions;
- Open burning of solid waste from the Contractor's camps and at construction site will be strictly banned;
- Preventive measures against dust will be adopted for on-site mixing and unloading operations;
- Construction materials (sand, gravel, and rocks) and spoil materials will be transported through trucks covered with tarpaulins and all vehicles (e.g., trucks, equipment, and other vehicles that support construction works) will comply with the PEQS for carbon emissions and noise;
- Regular water sprinkling of the site will be carried out to suppress excessive dust emission(s);
- Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair will be needed to minimize the hazardous emissions;
- Emissions from batching / asphalt plants will be controlled efficiently by the installation of cyclone / scrubbers. Diesel operated equipment will be equipped with well-maintained fuel filter and may be replaced timely (if required). In addition to that, regular maintenance activities comprising changing of lubricating oil, changing the air and fuel filter, cleaning the fuel system, draining the water separators and proper tuning may also help in reducing the emissions from diesel generators;
- PEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery will be enforced during construction works;
- Service roads (used for earthmoving equipment and general transport) will be regularly sprayed with water during dry weather;
- All excavation work will be sprinkled with water;
- Construction workers will be provided with masks for protection against the inhalation of dust;
- Vehicles used for construction will be tuned properly and regularly to control emission of exhaust gases;
- Vehicle speed in the Project area will be prescribed not more than 20 kilometer per hour and controlled accordingly;
- Tires of all the vehicles leaving the site will be washed. No earth, mud and dust shall be deposited on the public road;
- Immediately consolidate the backfilled soil and restore the road surface; if immediate road restoration is not possible, provide a layer of plain cement concrete (PCC) of suitable mix on the backfilled trench so that dust generation, and erosion are arrested and it will also provide a smooth riding surface for the traffic until the road is properly restored;



- Contractors will be asked to provide maintenance records for their fleet as part of the contract bid and at regular intervals throughout the life of the contract;
- Precautions shall be taken to minimize dust emissions from hot mix plants, crushers, and batching plants by installing protective canvases and dust extraction units where applicable. Mixing equipment will be well sealed and equipped as per existing standards; and
- Regular monitoring of air quality in accordance with the formulated environmental monitoring plan (given in EMP).

6.4.2.5 Greenhouse Gases and Climate Change

The main sources of greenhouse gases (CO₂, CH₄, NO_x, etc.) during the construction activities of the proposed Project will include both mobile and stationary sources. The mobile source will be the construction and transportation vehicles while the stationary source will be the batching and asphalt plants and indirect emissions from purchased electricity from external provider. Emission of greenhouse gases causes global warming and other climatic changes on regional and global scale. Cutting of trees in and around the Project site due to construction activities will also reduce the carbon sequestering and overall increase the CO₂ content in atmosphere, which is one of the major GHGs. This impact is permanent and moderate adverse in nature.

Mitigation Measures:

- Use construction machinery designed with suitable pollution abatement technology such as scrubbers;
- In order to control NO₂ emission at site, diesel engine equipment and machinery will be installed with catalytic converter, as it allows diesel engine to take advantage of the trade-off between NO₂, PM₁₀ and fuel consumption, and calibrate the engine in a lower area of fuel consumption;
- Ensure plantation development as per the tree plantation/reforestation plan for the sequestration of CO₂;
- Used and old electrical equipment will be banned to reduce air emissions;
- Environmentally friendly fuel such as Liquefied Petroleum Gas (LPG) shall be used instead of diesel;
- Using optimized transport routes and transportation of materials in bulk will lower the emissions;
- Efficient and low carbon footprint materials will be used in the construction;
- Burning of waste will be strictly prohibited at the site;
- Awareness programs of causes and effects of climate change will be conducted for mitigating GHG emissions among workers and concerned personnel;
- Regular motioning of the vehicles for engine efficiency;
- Avoid idling of construction vehicles;
- Alternative energy resources shall be considered where possible;
- PEQS, 2016 applicable to gaseous emissions generated by construction vehicles, equipment and machinery will be enforced during construction works; and
- Use of solar panels (if possible) at construction campsites instead of diesel generators.

6.4.2.6 Issues of Smog

Construction activities related to proposed Project could significantly contribute to smog issues, primarily due to various pollutants released during the construction phase. Some of the key elements contributing to smog during construction include:



- **Particulate Matter (PM):** Construction activities generate dust and particulate matter, especially from excavation, demolition, material handling, and transportation of construction materials. These fine particles can remain suspended in the air for long periods, contributing to smog formulation and enhancement of existing smog issue.
- **Vehicular Emissions:** Construction sites often involve heavy machinery and trucks for transportation of materials. These vehicles emit pollutants such as nitrogen oxides (NO_x), volatile organic compounds (VOCs), and particulate matter that will contribute to smog formation in reaction with sunlight and other pollutants in the atmosphere.
- **Incomplete Combustion:** Inefficient combustion of fuels, often used in construction equipment, can release pollutants like sulfur dioxide (SO₂), nitrogen oxides (NO_x), and particulate matter, which contribute to smog formation.
- **Lack of Dust Control Measures:** Inadequate measures to control dust and particulate matter at construction sites, such as un-covered construction materials, lack of water sprinkling, or absence of dust barriers, can significantly contribute to increased airborne particles.

Mitigation Measures:

To mitigate or reduce smog issues and impacts of construction activities on smog formation, following measures can be taken:

- Implement robust air quality monitoring systems to track pollution levels and take necessary actions accordingly;
- Implement and enforce regulations regarding air emissions as per PEQS, dust control measures, and the use of cleaner technologies in construction machinery and vehicles;
- Encourage the use of electric or hybrid machinery and vehicles to reduce air emissions;
- Employ effective dust control measures, such as water sprinkling, covering materials, and using dust barriers, to minimize the release of particulate matter;
- Educate construction workers and the public about the importance of adopting eco-friendly practices to reduce smog formation; and
- Vehicle Inspection & Certification System (VICS) should be implemented in true letter & spirit to reduce environmental pollution caused by unfit motorized vehicles.

The following SOPs shall be observed for the proposed Project as per Punjab-EPA Order U/S 6(1)(T) of the Punjab Environmental Protection Act 1997 for Dust Suppression and Control at Building Construction Sites:

- Installation of proper mist sprinkler systems around construction sites before the start of construction;
- The Mist Nozzles shall be mounted at a distance of 2 ft from one another on water pipe, in leak-free manner. The water pipe shall be mounted on a stable structure;
- The capacity and efficacy of Mist Sprinkler System shall be designed as per the dust emission level of the construction Site. The height of the system shall be adjusted as per construction altitude;
- The operation of Mist Sprinkler System shall be adjusted based on weather conditions, wind patterns, and dust generation levels;
- Prevent water accumulation in areas where it may pose a slipping or electrical hazard or lead to breeding of dengue mosquito;
- Install a curtain of at least 10 feet around the under construction building;
- Reduce the speed of trucks and trolleys when transporting soil or debris to reduce spread of dust; and
- Display these guidelines prominently on a cloth banner at the construction site.



6.4.2.7 Carbon Sinks

Climate change demands dramatic shifts in designing and construction of buildings. Currently, housing and supportive infrastructure continues to surge at record rates world widely. Buildings and their construction account for 39% of global carbon dioxide emissions; 28% of those emissions come from operational carbon (the energy used to power, heat and cool a building) and remaining 11% of carbon emissions are generated from building materials and construction. One important part of the solution is to convert the built environment from a carbon source to a carbon sink.

Mitigation Measures:

To mitigate climate change impacts from the buildings (tourist facilitation centre, administration, etc.), low-carbon and especially carbon-sink materials and products shall be considered as one of the most important mitigation opportunities:

- **Low-Carbon Bricks:** The utilization of low-carbon bricks helps to reduce embodied carbon found in conventional bricks and reduce CO₂ release produced during its manufacturing;
- **Green Concrete:** The raw materials to form conventional concrete can be substituted with byproducts of industrial processes and recycled materials i.e. Carbon Intensive Portland Cement can be substituted by fly ash and granulated blast-furnace slag. Aggregate or sand can be substituted by washed copper slag, and granite by recycled granite from demolished debris.
- **Wooden Materials:** Wood is a natural, renewable, and sustainable material for buildings, with a lighter carbon footprint than steel or concrete. Maximizing wood use in construction will remove CO₂ from the atmosphere.

6.4.2.8 Resource Efficiency and Pollution Prevention

The materials used in construction of proposed Project would include coarse aggregates (crush), fine aggregates (sand), steel, water, asphalt, reinforcement and cement. Almost all the materials to be used in the construction of proposed Project are non-renewable and therefore their sustainable use is necessary for the future use.

Fuel will be used to operate construction machinery and asphalt and batching plants. Sustainable use of energy resources is very important not only to continue future use but also to help to reduce air emissions / pollutants. For conservation of energy, efficiency of the engines and burning processes is very important. This impact is permanent and moderate adverse in nature.

Mitigation Measures:

- Diesel and fuels with low sulphur content will be used to operate construction machinery and equipment's;
- Efficient and well-maintained equipment and machinery shall be used for construction activities;
- The equipment's and machinery will be turned off when not in use;
- Regular maintenance of machinery to avoid fuel leakages;
- Reduction of wastage of water through training of workers involved in water use will be planned;
- Water jets and sprays will be used for watering surfaces rather than using overflow system;
- Ensure adequate insulation to reduce heat loss through batching and asphalt plants;
- Use minimum amount of bitumen for road surfacing;

- Plan for reuse of construction waste materials will be formulated;
- A good camp design and an efficient worksite management plan will be prepared that will help the contractor to reduce the water demand, wastewater and solid waste volumes to the lowest levels;
- Use of solar panels at camp sites to conserve energy;
- Careful selection of water source to minimize disturbances to existing community water supplies; and
- Regularly monitor CO and CO₂ content of the flue gases to verify that combustion systems are using practical excess air volumes.

The Resources Conservation Plan is attached as **Annexure-III**.

6.4.2.9 Noise and Vibration

The noise and vibration will be produced due to the operation of construction machinery equipment. Sources of noise and vibration during construction are heavy machinery such as bulldozers, excavators, stabilizers, concrete mixing plant, pneumatic drills, stone crushers, asphalt plants and other equipment. Noise and vibration are perceived as one of the most undesirable consequences of construction activity. The above machinery is expected to generate noise levels that would be severe in the Project area. The noise and vibration may cause health hazards to the residents of the study area.

The noise produced by construction equipment is presented in **Table 6-3** below as reference.

Table 6-3: Noise Produced by Construction Equipment

Sr. No.	Equipment	Noise dB(A) at 15ft from Source
1.	Wheeled Loading and Grader	90
2.	Vibration Pavement Roller and Bulldozer	86
3.	2 & 3-Wheel Vibration Pavement Roller	81
4.	Tire Pavement Roller	76
5.	Wheeled Pneumatic Dredger	84
6.	Sprayer	87
7.	Power Generator, Pneumatic Hammer and Rock Crusher	98
8.	Impact Drill	87
9.	Impact Pile Driver	112
10.	Truck	92
11.	Concrete Mixer	91
12.	Concrete Pump	85
13.	Mobile Lift	96
14.	Breaker	84
15.	Pneumatic Spanner	95

Source: Quagliata, A., Ahearn, M., Boeker, E., Roof, C., Meister, L., & Singleton, H. (2018). *Transit Noise and Vibration Impact Assessment Manual* (No. FTA Report No. 0123).

The likely impacts due to noise are:

- Psychological effects of distraction of attention, irritation and short temperedness in the exposed persons due to persistently higher noise levels;
- Noisy settings and higher background levels can cause temporary threshold shift and the consequent habit of speaking loudly, which may cause damage to vocal cords in the persons exposed;
- Potential impact from vibration during the construction period consists of damage to commercial facilities from heavy earthmoving equipment; and



- Moreover, vibrations from machinery and equipment such as hand-held compactors and concrete vibrators can produce easy fatigability and generalized aches in the persons operating these machines.

This impact is medium negative, local and short term.

Vibration generated by construction activity has the potential to damage structures. This damage could be structural damage, such as cracking of floor slabs, foundations, columns, beams, or wells, or cosmetic architectural damage, such as cracked plaster, stucco, or tile. The predicted ground vibrations at various distances are shown in **Table 6-4** for typical equipment that will be used during proposed construction. The typical vibration from heavy trucks is generally low, and usually imperceptible in nearby buildings.

Table 6-4: Typical Vibration Levels at Distances

Plant Item	Peak Vibration (mm/s), Distance from Source			
	10m	20m	50m	100m
15t Roller	7.0 to 8.0	3.8	1.5	0.8
7t Compactor	5.0 to 7.0	3.0	1.2	0.6
Dozer	2.5 to 4.0	1.6	0.7	0.3
Backhoe	1.0	0.5	0.2	0.1

Source: *Environmental Noise Management Manual-Roads & Traffic Authority, NSW, Australia, 2001*

This impact can be categorized as direct, medium, site-specific, short term, temporary, medium probability and reversible.

Mitigation Measures:

There are a variety of ways by which construction equipment and worksite noise can be controlled. The following is a list of ways to control noise level at the worksite of the proposed Project:

Quieter Equipment: A cost-effective way to reduce noise at a construction worksite is to buy quiet equipment. In addition, equipment in use should be the most suitable for the job. Avoid using equipment that is over-powered and, conversely, avoid using under powered equipment. Whenever possible the quietest equipment alternative should be used. In general, electronic powered equipment is quieter than diesel powered equipment and hydraulically powered equipment is quieter than pneumatic power.

Modifying Existing Old Equipment: The most common way to reduce the noise levels of common construction equipment is through worksite modifications. Some common worksite modifications consist of retro-fitting existing equipment with damping materials and mufflers.

Barrier Protection: An effective way of reducing noise is to locate noisy equipment behind purpose-built barriers. The barriers can be constructed on the work site from common construction building material (plywood, block, stacks or spoils) or the barriers can be constructed from commercial panels, which are lined with sound absorbing material to achieve the maximum shielding effect possible. To be effective, the length of the barrier should be greater than its height. The noise source should not be visible and barrier should be located as close as possible to either the noise source or the receiver.



Work Activity Scheduling: Work activity scheduling are administrative means to control noise exposure. Planning how noise sources are sited and organized on a work site can reduce noise hazards. Jobs can be rotated so that exposure time is limited. Transferring workers from a high exposure task to a lower exposure task could make the employee's daily noise exposure acceptable. Administrative controls include activity planning, for example, scheduling pavement breaking operations so as to reduce the number of work site workers exposed. In addition, noisy equipment should not be run for periods longer than necessary and should be switched off when not in use.

Maintenance: Increased attention to maintenance of tools and equipment will reduce worksite noise levels. Maintaining plant and equipment in good order not only increases its life, but makes it safer to use and quieter. Loose and worn parts should be fixed as soon as possible. Ideally, the worksite should have a system in place for checking and servicing the various machines and power tools.

Noise Perimeter Zones (NPZs): The NPZs are another administrative control to limit exposure to noisy processes or equipment to as few workers as possible. NPZs are areas where noise levels of 90 dB (A) or more are roped off and marked to keep out all workers who don't have to be there. NPZs can be set up using a sound level meter to find the safe distance from the source (90 dB (A)) and the NPZs can be set up at that distance. Noise does not radiate from the source at the same level in all directions. Noise from machinery can be higher in one direction than another because the noise can also be either absorbed or reflected from surfaces it contacts, such as the ground or a wall. Therefore, measurements should be taken at several points in an area where people might be working. Once noise levels that are 90 dB (A) or more are determined, rope off this area as the Noise Perimeter Zone. Exclude all workers who do not need to be in that zone. All workers who need to work within the zone must wear hearing protection.

Other mitigation measure includes:

- Residents in and around the area of influence of the proposed Project site will be notified earlier, before commencement of excavation operations;
- Horns will not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
- Contractors will comply with submitted work schedule, keeping noisy operations away from sensitive points; implement regular maintenance and repairs; and employ strict implementation of operation procedures;
- Sensitize truck drivers to avoid hooting, especially when passing through the residential area;
- Locating the concrete mixing and materials shipment yards at least two (02) kilometer away from sensitive area, will also help reduce local noise levels;
- The plants and equipment used for construction will strictly conform to noise standards specified in the PEQS, 2016;
- Timing of the construction works to be conducted during the recommended operational hours, to reduce vibration levels to residential and commercial properties;
- Residents to be pre-warned of high vibration events and any operations being undertaken outside recommended hours;



- Ensure vibration measurement during construction phase by the contractor near the settlements/sensitive receptor in AOI along the proposed Project sites;
- Timing of the construction works to be conducted during the recommended operational hours, to reduce vibration levels to residential and commercial properties;
- Residents to be pre-warned of high vibration events and any operations being undertaken outside recommended hours;
- The vibration from rolling and compacting activities would be considered intermittent and short-term, and likely to be tolerated if prior warning is given to potentially affected locals. Locals would therefore be pre-warned of high vibration events, and any operations being undertaken outside recommended hours. Public notification would be given a minimum of 72 hours prior to plan works. Locals would be made aware of the construction times and the duration they would likely be affected, through letter drops, personal meetings/phone calls as necessary; and
- The equipment operators to be made aware by the contractor of potential vibration issues problems and of techniques to minimize vibration effects during construction works.

6.4.2.10 Construction Camps / Camp Sites

Improper construction camp location and mismanagement of construction camp activities can lead to environmental and social impacts in the Project area comprising health and safety issues, traffic problems, soil degradation, loss of vegetation and assets on the selected land, solid waste and water pollution. Furthermore, cultural differences, behavior of construction workers, potential disregard for local cultural norms can lead to increased tension between local communities and workers residing in the construction camps. However, these impacts will be temporary and moderate in nature.

Mitigation Measures:

- The Project will seek to avoid sitting camps where their presence might contribute to any conflicts with locals;
- Implementation of employment policies which aim to maximize job opportunities for local people to minimize tensions caused by different socio-cultural values;
- Camps will be designed to be self-contained to reduce demand on infrastructure and services of nearby communities;
- A comprehensive safety and security plan for the camp will be prepared which will comprise of a training manual, use of safety equipment and emergency preparedness;
- Training will be provided to all staff on camp management rules and overall discipline and cultural awareness;
- Waste Management Plan (**Annexure-II**) will be implemented to ensure safe handling, storage, collection and disposal of construction wastes and the training of employees who handle waste;
- Site for construction camp will be selected to minimize the removal of existing macro-plants at camp sites;
- Photographical and botanical inventory of vegetation before clearing the site;
- Compensatory plantation to be done when construction work near ends; and
- The contractor(s) shall ensure the removal and rehabilitation of site upon completion.

6.4.2.11 Wastewater Generation at Construction Camps

The workers will generate wastewater at the construction camps. If the generated wastewater is not properly treated or disposed of, this may contaminate the surface water sources such as nullahs, drains, water channels, etc. apart from soil contamination. The wastewater generation is estimated to be 592 gallons/day¹ for 70 construction workers during construction phase of the proposed Project. This impact can be categorized as moderate

adverse, site- specific and temporary.

Mitigation Measures:

To dispose the liquid waste generated from the construction activities, the following steps will be taken by the Contractor:

- Domestic and chemical effluents from the construction camp will be disposed by the development of on-site sanitation systems i.e. septic tanks (as shown in **Figure 6-1**);

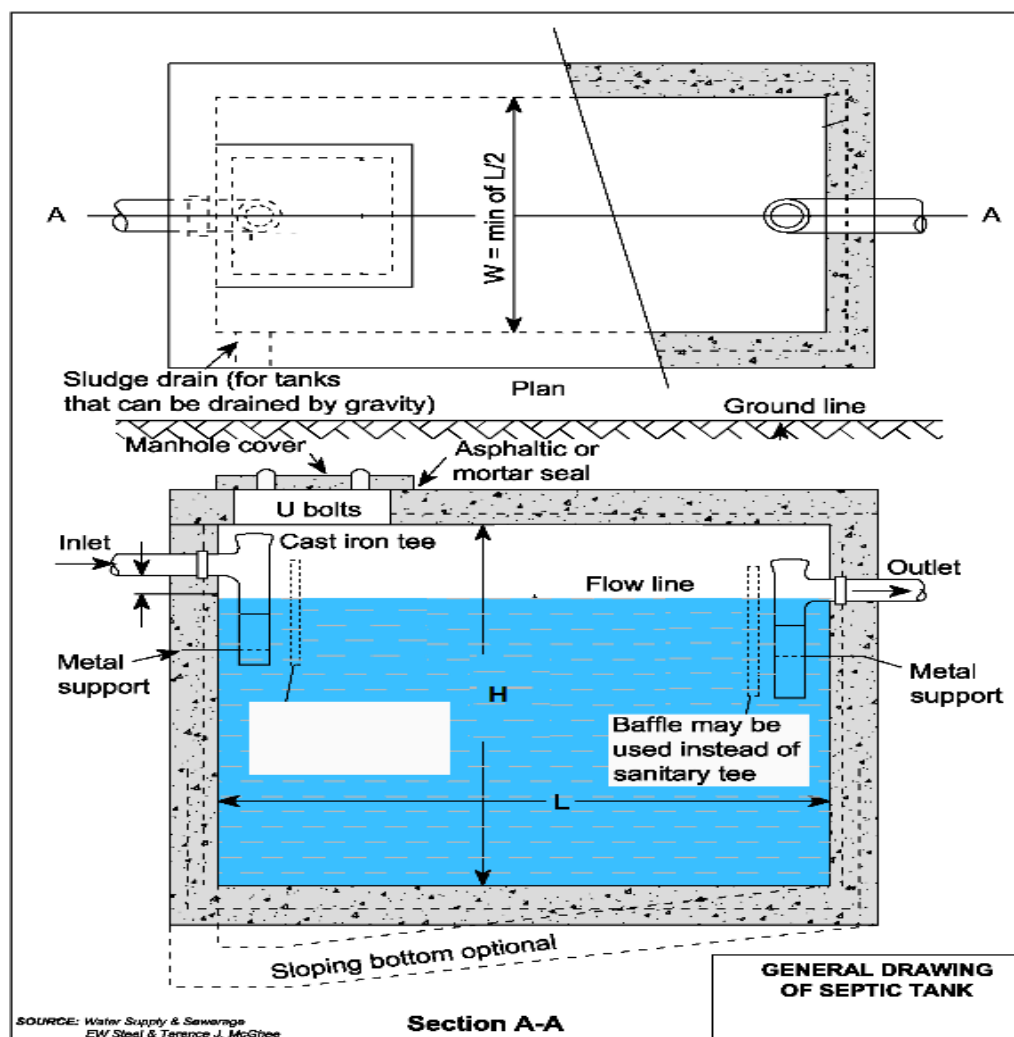


Figure 6-1: General Drawing of Septic Tank

- Proper monitoring to check the compliance of PEQS will be carried out;
- Sewage from construction camps will be disposed of after proper pre-treatment and processes such as soakage pit;
- Construction yards and material storage areas where vehicles operate or materials are stored will be established on well drained fill;
- Free-flowing points of discharge for storm water will be identified nearby the boundaries of materials storage/construction yards for gravity or pump-assisted dewatering and yard drainage;
- Wastewater discharged to drain shall contain a minimum quantity of suspended solids;



- Temporary worker quarters and erection yards will include self-contained waste treatment with removal of excess by vacuum truck or approved discharge point;
- Drainage from fuel storage tank locations, refueling areas, and equipment service areas will be segregated from other runoff; discharge shall be routed through an oil/water separator;
- Contractors will be required to observe drainage conditions during dewatering operations and storm events to assure positive drainage. If flooding occurs along roadways or in neighborhoods, or community complaints arise, the contractor will undertake a combination of the above mitigation measures to minimize drainage and water quality impacts; and
- The Contractor(s) will be responsible to submit details of site-specific wastewater management plan along with details of wastewater collection, transportation and its disposal.

A sanitation plan has been attached as **Annexure-VI**.

6.4.2.12 Solid Waste Generation at Construction Camps

The solid waste generation is estimated to be 39 kg/day for 70 construction workers during construction phase of the proposed Project. Different type of waste is likely to be generated during the construction phase of the proposed Project. The municipal waste will be in the form of food, cans, paper and wastewater from construction camps toilets and washing yards. Construction waste will include excavated soil, sand, gravel, rocks, asphalt, pieces of concrete, bricks, wood, metal pieces and electrical wires. Whereas, hazardous waste can be comprised of paints and construction chemicals. All these, if left unattended, can become a source of nuisance and environmental pollution in the Project area.

Insecure and unhygienic disposal of the solid wastes particularly garbage and trash may cause degradation of soil and land. Insecurely disposed off heaps of wastes containing kitchen garbage and food waste can serve as breeding grounds for the disease spreading vectors and rodents. Throwing away of solid wastes into water channels and the wastewater network can result into choking of the latter. These impacts are temporary and minor negative in nature.

Mitigation Measures:

- Solid Waste generated during construction and camp sites will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan;
- Training of work force in the storage and handling of hazardous materials and chemicals;
- Construction workers and supervisory staff will be encouraged and educated to practice waste minimization, reuse and recycling to reduce the quantity of the waste; proper labelling of containers, including the identification and quantity of the contents, hazard contact information, etc.;
- Waste disposal plan must be reviewed during the entire construction phase in the light of changing weather conditions;
- An emergency response plan shall be prepared to address the accidental spillage of fuels and hazardous goods;
- Immediate collection of spilt oils/fuels/lubricants by collection of contaminated soils and skipping oils from surface water by applying appropriate technologies;
- Reusing bitumen spillage; and disposing of non-usable bitumen spills in a deep trench providing clay linings at the bottom and filled with soil at the top (for at least 0.5 m);
- Used oil shall be collected in separate containers stored on the impervious platform with restricted access and shall be sold to the licensed contractor and the burning of waste oil shall be strictly restricted;



- Segregating and stockpiling scarified/ milled bituminous material and reusing this material in sub-grade/shoulders; and
- The contractor should ensure the implementation of the proposed Construction Waste Management Plan and it must be reviewed during the entire construction phase in the light of changing weather conditions.

6.4.2.13 Solid Waste (Construction, Municipal and Hazardous Waste)

Due to construction activities, municipal, construction and hazardous waste will be generated from construction activities and contractors' camps.

Insecure and unhygienic disposal of municipal solid waste particularly garbage and trash will cause degradation of soil and land. Insecurely disposed of heaps of waste containing kitchen garbage and food waste from construction camps can serve as breeding grounds for the disease spreading vectors and rodents. Throwing away of solid waste into nearby drain can result into choking of the latter.

Empty containers containing the toxic, flammable and corrosive materials will pose hazard to the workers. This may result in health risk to work force and public, if disposal site is improperly selected. Construction waste includes insulation, nails, electrical wiring, rebar, wood, plaster, scrap metal, paper bags, cement, and bricks. Improper dumping of waste may generate odor, soil and water pollution, and disease vectors.

Improper disposal of construction waste can also lead to nuisance and hazards towards environment and local population. The unspent materials and debris produced from consumed up materials, if left as such and allowed to mix with soil underneath, can degrade the quality of receiving soils and render them unfit for plantation. Leakages of oils, lubricants, chemicals, and other similar substances from their storage sites can spoil the receiving soils and may undermine ability of the spoiled soils to support growth of vegetation and plants. This impact can be categorized as direct, moderate, site-specific, short term, temporary and reversible.

Mitigation Measures:

- The waste generated from the camp site shall be disposed of at Rawalpindi Waste Management Company approved sites;
- Burning of waste shall be prohibited;
- Proper labeling of waste containers, including the identification and quantity of the contents, hazard contact information will be carried out;
- Method of storage at the construction site that will be applied for toxic or hazardous waste is presented below:

Sr. No.	Type of Waste	Method of Storage
1.	Paints (containing organic solvents and heavy metals)	Designated concreted area
2.	Cables, PVC Pipes, and Plastic films	Separate storage
3.	Waste Solvents (used acids or alkalis), Thinners and Paints	Labelled drums or containers and designated concreted area
4.	Empty Containers and Drums (used to contain chemicals, paint, solvents, thinners, pesticide,	Labelled drums or containers and designated concreted area

Sr. No.	Type of Waste	Method of Storage
	insecticide, anti-mosquito oil, and diesel)	
5.	Oil and Chemical Sludge	Designated concreted area

- Training of employees involved in the storage and transportation of hazardous materials and chemicals regarding emergency procedures will be ensured;
- Waste pile will be controlled so that it does not spread and start to impede other activities, and stays at a height that it does not become a safety hazard. Barricades will also be placed around the pile to delineate the safe distance for other workers;
- Residual and hazardous wastes such as oils, fuels, and lubricants will be disposed of via licensed third parties;
- Liquid waste such as grey water, sewage, slurry and other wastewater will be collected from source by a designated tanker, and taken off-site for disposal at safe disposal facility;
- If the waste pile contains plastic, paper and other light-weight material it shall be covered with a net, and tarpaulin or similar to stop waste from blowing around;
- If disposal is required, the site will be selected preferably from barren and infertile lands, and sites will be located away from residential areas, water bodies and any other sensitive land uses;
- Construction workers and supervisory staff will be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste;
- The contractor will develop specific environmental management plans for asphalt plants and concrete batching plants. These plans will incorporate the general measures as applicable to the entire Project, but will also have focused mitigations for solid waste from these plants;
- Waste disposal plan will be reviewed during the entire construction phase in the light of changing weather conditions;
- Waste containers with proper color coding will be provided on site to store different type of waste i.e.:
 - White: Gypsum – gypsum and plasterboard products;
 - Grey: Inert – clean concrete, rubble, hardcore, brick and block that will not decompose or create a hazard when buried;
 - Black: Mixed General Waste – any waste except contaminated waste that cannot be recycled in other skips on the site;
 - Blue: Metal – all types of clean metal, including rebar offcuts, and scrap metal;
 - Green: Wood – all types of clean, untreated timber and wood products;
 - Brown: Packaging – paper products; and
 - Orange: Hazardous – only for contaminated waste such as asbestos, paint tins, mastic tubes, and tarmac.
- Toxic waste will be handled, stored, transported and disposed-off separately. Safe handling precautions and product specific information found in Material Safety Data Sheets (MSDS), shall be posted on site and accessible to all workers; and
- The contractor will ensure implementation of proposed Construction Waste Management Plan (attached as **Annexure-II**) and it must be reviewed during the entire construction phase in the light of changing weather conditions.



6.4.2.14 Disruption/Traffic Management/Impacts of Heavy Vehicles on the Existing Road Network

Traffic load on Lehtrar Road, Kotli Sattian Road, Korang Road, Kotli Link Road, Tourism Highway, Islamabad Expressway, and Murree Expressway and connecting access roads would be increased due to the Project activities and due to the movement of heavy machinery especially during construction phase.



This will in turn cause traffic problems (jams and congestions) for the commuters and transporters using these roads for their daily activities. The movement of vehicles along the haulage routes will cause soil erosion, debris flow, dust emissions, vibrational impacts and will deteriorate the existing condition of the roads due to tearing and wearing. Considering these consequences, this impact can be categorized as moderate, site-specific, temporary and irreversible.

Mitigation Measures:

- Movement of vehicles carrying construction materials and equipment/machinery will be restricted during the daytime to reduce traffic load and inconvenience to the local population;
- Construction vehicles, machinery and equipment will be parked at designated areas (at construction camps site) to avoid un-necessary congestions along the major roads;
- Damages of roads due to construction vehicles will be instantly repaired and/or compensated after the completion of work;
- Proper sign boards will be provided for smooth flow of traffic;
- Period of construction and area / location of construction site shall be informed to public in general and specifically to local residents;
- The Contractor will ensure that the diversion and detour is always maintained in running condition, particularly during the intense rainfall events to avoid disruption to traffic flow;
- Contractor will adopt best construction practices i.e. vertical cutting approach with proper shoring and bracing, to limit the width of trench excavation;
- The temporary traffic detours will be kept free of dust by frequent application of water;
- Traffic controls and diversions marked with signs, lights and other measures (flags) will be provided as a warning of road hazards and other pertinent information to motorists and the general public;
- At work site, public information and caution boards will be provided including contact for public complaints;
- The Contractor will not use any vehicles either on or off road with grossly excessive noise pollution; and
- Any closure of the roads (especially main roads) and deviations / diversions proposed shall be informed to the riders through standard signs and displays; and
- In the light of Guideline Traffic Management Plan (**Annexure-IX**) a site specific TMP will be prepared by the contractor and implemented to avoid traffic accidents, jams/public inconvenience.

Ecological Environment

6.4.2.15 Flora

The Project may involve destruction of vegetation cover on construction areas. It is initially examined that approximately 100 numbers of trees may be disturbed. The provided number of trees is approximate and tentative. Moreover, small plants will be removed due to the layout of the Project for which compensation will be made to concerned parties, if any.



The following impacts are also expected on the floral species in the surrounding of Project area:

- During the construction dust laden polluted air will form a dust film on leaves thus blocking sunshine and stomata consequently hindering photosynthesis processes and causing detrimental effects on the plant health;
- Exhaust of noxious gases from the movement of heavy machinery will further pollute the air, which will adversely affect the health and vigor of plants;
- Establishment of contractors' camps and warehouses for storage of equipment and materials will involve clearing of shrubs and grasses from the area, causing a negative impact; and
- During construction activities, the contractor's workers may damage the ornamental plants and trees, for use as fire-wood to fulfill the camps requirements.

This impact is direct, local, permanent, irreversible and moderate significant.

Mitigation Measures:

- Trees that will be cut down during the establishment of paragliding club shall be transplanted wherever possible;
- A Tree Plantation Plan of 1,000 trees to be planted within the premises of project site has been formulated (**Annexure- IV**), which shall be implemented by the TDCP with the recommendations and technical support of the Forest Department;
- Due consideration shall be given to invasive/non-invasive species factors while plantation of trees;
- Implement tree protection measures (e.g., fencing, root zone preservation);
- To minimize dust emissions, regular water sprinkling will be strictly followed;
- Clearing of vegetation cannot be avoided at the areas specified for Project structures, but damage to the natural vegetation shall be minimized by establishing campsites, workshops and batching plants on waste/barren land rather than on productive land;
- Incorporate technical design measures to minimize removal of trees for the construction of contractor camps, if any;
- Construction vehicles, machinery and equipment will remain confined within their designated areas of movement;
- The Contractor's staff and labor shall be strictly directed not to damage any vegetation such as trees or bushes; and
- Contractor shall provide gas cylinders at the camps for cooking purposes and cutting of trees / bushes for fuel shall not be allowed.

6.4.2.16 Fauna

During construction phase, the existing population of mammals and reptiles of the construction areas will be affected due to disturbance arising from construction activities involving excavation, blasting, movement of machinery and vehicular traffic, movement of labor, camping, etc. The existing livestock of the study area in quest of fodder will leave the directly affected areas due to construction activities and human intervention. Some reptiles particularly species of snakes and lizards may get killed during the earthwork's operations. Moreover, the movements of mammals and reptiles will be restricted during the construction phase.

Birds will also tend to move away from the construction areas and find shelter and food elsewhere due to the activities mentioned above for fear of being hunted / trapped. Cutting of trees may adversely affect their habitat as trees provide nesting and resting sites to them.



Noise generated from construction machinery, particularly during the night hours will even scare the wildlife residing in habitats located at some distance from the construction areas. Food and refuse at the Contractor's camps will attract animals that might in turn be hunted by the workers. This impact is site-specific, temporary and medium significant.

Mitigation Measures:

- Where programmed construction activities permit, there should be no removal of trees, treelines or areas of semi-natural habitat during the bird-breeding season of March to August inclusive. Any works in the vicinity of active badger setts or any sett that requires exclusion, if unavoidable, will be conducted under NOC during the period July to October inclusive to avoid the cubing season and the winter period;
- If found any wild species during construction, it will be dealt carefully and local wildlife department officials will be called;
- The contractor in coordination with the wildlife department, to mitigate potential impacts on local fauna and ensure the conservation of key species and their habitats, should develop a Wildlife Management Plan (WMP) during the construction phase. This plan should include measures such as habitat restoration, wildlife movement corridors, restriction of construction activities in ecologically sensitive areas, and awareness programs for workers and visitors. Regular monitoring and collaboration with wildlife conservation authorities will be essential to minimize human-wildlife conflicts and promote long-term ecological sustainability;
- Hunting, poaching and harassing of animals shall be strictly prohibited, and Contractor shall be required to instruct and supervise its labor force accordingly and clear orders shall be given in this regard;
- The camps will be properly fenced and gated, to check the entry of birds and mammals in search of eatable goods. Similarly, wastes generated from camps will be properly disposed of, to prevent the chances of eating by animals, which may become hazardous to them;
- The contractor will make arrangements / measures to minimize vibration and noise pollution through good engineering practices;
- Noise control measures will be enforced during the construction phase such as provision of silencers on heavy construction vehicles especially near nesting areas and avoiding noise generating activities during the critical period of breeding;
- Efforts will be made to keep noise levels at acceptable levels (as per PEQS) produced by the construction activities;
- Over speeding of construction vehicles will be prohibited in the Project area, to avoid and minimize any accidental killing of birds, reptiles and mammals;
- Plantation of large number of trees along the proposed Project to regain the ecological habitat;
- Noisy work will not be carried out at night time so that there should be no disturbance to local birds and animals;
- Borrow pits will be fenced so that no animal can fall into these; and
- The Project will be completed timely to reduce the impacts.

6.4.2.17 Fisheries

As per the baseline provided in Chapter 4, Jhelum River is flowing along southern-eastern side of the Kotli Sattian. However, no construction activities will be required in and around the river. Therefore, no major impact on the fisheries is anticipated. However, during the construction of the proposed Project Site, activities such as the storage of chemicals and establishment of construction camps may trigger oil



spills and wastewater/solid waste discharge into the river. This impact is moderately significant.

Mitigation Measures:

- The contractor will be instructed to avoid the wastewater and the chemical spills into the Jhelum River;
- No solid waste will be dumped or thrown in the waters to avoid any negative impacts on aquatic biota;
- Ensure to start construction during low flow period to minimize the impact on downstream aquatic life;
- Cordon off the area with mesh while working to avoid the dispersion of construction material;
- Strict compliance and inspection of the construction activities along with continuous engagement of the Fisheries Department during the construction stage to control any water pollution;
- The awareness campaign among the labour is mandatory to avoid damage to the fisheries; and
- Labor will be aware of concerned fisheries and wildlife acts. Disturbance to the fisheries (if reported) during breeding season will be avoided to conserve the natural resources of the region.

Socio-economic Environment

6.4.2.18 Economic Activity

Due to the construction of the proposed Project, economic and commercial activities will be generated in the study area as the laborers and semi-skilled staff from nearby communities will have an opportunity to work for the construction of the proposed Project. The establishment of food shops/canteens, construction-related equipment shops, and raw material market may also improve their income due to the execution of the proposed Project. The impact is positive, local, medium, short term and definite.

6.4.2.19 Discovery of Heritage Sites/ Structures during Excavation

During excavation, there is a chance of finding artifacts. In case of finding any artifact, the contractor shall immediately report through PMU TDCP to Directorate General (DG) of Archeological Department, Government of Punjab to take further suitable action to preserve those antiques or sensitive remains. Chance find procedure (as given in **Annexure- V**) will be adopted in case of any accidental discover of cultural heritage.

6.4.2.20 Interference with Other Utilities

As discussed, the proposed Project may interfere with the existing transmission line passing through the boundary of study area, and will cause temporary disruption to this facility in the Project area.

Mitigation Measures:

- Contractor in liaison with Client shall consult with concerned department, to delineate their network locations and alignments;
- Proper compensation will be given to the concerned department, in case of utility disturbed or if need relocation;



- Inform local residents and business owners in advance about complete Project program, and disruption to utility service, while working; and
- Timely public notification of unexpected disruption of service.

6.4.2.21 Social / Cultural Conflicts

During the construction phase of the Project, conflicts may arise between labor force and local community. Use of local resources and products by the construction workers can generate stress on the local resources. Furthermore, difference in cultural values may also cause discomfort to local community. This impact is negative, local, low, short term and probable.

Mitigation Measures:

- Local labor especially from nearby communities will be given preference for the construction works;
- Careful planning and training of the workforce to minimize disturbance to the local people/community;
- During the construction phase, mobility of workers in the nearby areas will be strictly restricted by the contractor to avoid any inconvenience to the local communities, especially women's;
- The contractor will select specific timings for construction work to cause the least disturbance to the local population considering their peak movement hours;
- Public notification through print or electronic media and Masjid loudspeakers during the entire construction phase to avoid any inconvenience in accessibility to the locals; and
- Adequate training especially for the transitive workforce of the proposed Project (involved both in the construction process and in the commissioning) to regard the customs of the area so that the locals do not feel insecure.

6.4.2.22 Health and Safety

A. Occupational Health and Safety:

Occupational Health and Safety (OHS) related impacts will arise during construction phase activities comprising clearing of earth, levelling, compaction, carpeting, pavement finishing and testing & commissioning. Eye injury can be caused by stone or metal particles. Hazard of being hit by falling objects, major hand-arm and whole-body vibration hazards, skin and respiratory tract irritation from exposure to cement dust, overexertion and awkward postures, etc. will be another impact. Welding hazards include electric shock, fumes and gases, fire and explosions, falls from height, eye and head injuries, etc.

Other impacts will be fall from height due to imbalance, contact with heavy electrical and mechanical equipment, equipment failure, uncontrolled movement, unguarded moving mechanical equipment parts, fatigue, unbalanced load, falling objects, hand injury, slip and trip hazards, wind / storm activity, injury from releasing load too soon, etc. Operating mechanical and electrical equipment will trigger the OHS related issues e.g. struck by moving vehicles or other equipment, slips or trips, struck by flying objects, such as dirt or splashed fluids, caught in pinch points, shear points, crush points, falling from machine, etc. Considering these consequences, this impact can be categorized as direct, moderate, site-specific, medium term, temporary and irreversible.

Mitigation Measures:

Workers will be provided with safe and healthy working environment taking into account the following mitigation measures:

- Ensure the compliance of Occupational Safety and Health Act, 2018 at the workplace to protect the construction workers against risks arising out of occupational hazards;

- The construction contractor shall depute a safety officer with specified responsibilities to supervise all the construction activities at the proposed Project sites;
- Training of workers in construction safety procedures, environmental awareness, equipping all construction workers with safety boots, helmets, gloves and protective masks, goggles, shields and monitoring their proper and sustained usage;
- Providing basic medical training to specified work staff, and basic medical services and supplies to workers;
- Obligatory insurance against accidents for laborers and employees;
- Layout plan for campsite, indicating safety measures taken by the contractor, e.g. firefighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents;
- Work safety measures and good workmanship practices will be followed by the contractor to ensure no health risks for laborers;
- Protection devices (ear muffs) will be provided to the workers, doing the job in the vicinity of high noise generating machines;
- Disallow worker exposure to noise levels greater than 85 dBA for duration of more than eight hours per day without hearing protection. The use of hearing protection will be enforced actively;
- Provision of adequate sanitation, washing, cooking and dormitory facilities including light-up to satisfaction;
- Elaboration of contingency planning in case of major accidents;
- Ensure that the sites will be restricted from the entry of irrelevant people, particularly children, disabled and elderly peoples;
- Provision of protective clothing for laborers handling hazardous materials, e.g. helmet, adequate footwear for bituminous pavement works, protective goggles and gloves and ensure strict use of wearing these protective clothing during work activities;
- All trenches deeper than two (02) meters will be protected with wooden bracing to avoid safety risks to workers, public and nearby buildings and structures;
- Ensure the visibility of workers through their use of high-visibility vests when working in or walking through heavy equipment operating areas;
- Ensure moving equipment will be outfitted with audible back-up alarms;
- Ensuring the availability of a mobile dispensary at the active construction sites throughout the construction period to provide emergency treatment;
- Safety lookouts will be built to prevent people and vehicles from passing at the time of hot or cold work;
- Adequate lightning devices, barriers, yellow tape and safety signage will be posted at the Project sites; and
- Use of safety signs at the construction site, as shown below.





Occupational Health and Safety Plan is attached as **Annexure-VII** as a guideline for the implementation of OHS considerations during supervision phase.

B. Community Health and Safety:

The construction activities and vehicular movement at construction sites may result in roadside accidents particularly inflicting local communities who are not familiar with presence of heavy equipment. Quality of groundwater and surface water resources available in the nearby local communities may be affected due to the construction activities, oil spillage and leakage, roadside accidents, etc. The labor works with different transmittable diseases will cause spread out of those diseases in the local residents. Conflicts may arise between the local community and the construction workers, which may be related to religious, cultural or ethnic differences, or based on competition for local resources.

The proposed Project also have potential of air (dust pollution), noise and vibrational impacts on nearby community. During the construction activities, elevated air and noise levels may create short-term and long-term health issues such as respiratory diseases by air pollution and hearing impairment, hypertension, annoyance and sleep disturbance due to noise pollution among the local communities of the study area. Indirect effects on public health can include increased incidence of tuberculosis, asthma, chronic bronchitis, and gastrointestinal diseases. Considering these consequences, this impact can be categorized as site-specific, temporary, medium negative and irreversible.

Mitigation Measures:

- Provision of safe corridors along the proposed Project and construction areas, and safe crossings for pedestrians and bicyclists during the construction phase. Crossing locations will consider community preferences, including those related to convenience or personal safety;
- Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian facilities or bikeways;
- Setting of speed limits appropriate to the road and traffic conditions;
- Instruct foremen to strictly enforce the keeping out of non-working persons, particularly children, off work sites;
- Timely public notification on planned construction works;
- Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity and social links;
- 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, which includes: Prevention of larval and adult propagation of vectors through sanitary improvements and elimination of breeding habitat close to residential areas and by eliminating any unusable impounding of water;
- There will be proper control on construction activities and oil spillage of vehicles;
- The laborers with different transmittable diseases will be restricted within the construction site;
- Efforts will be made to create awareness about road safety among the drivers operating construction vehicles;
- Confine work areas and prevent public access especially for children and elderly people's to all areas where construction works are on-going through the use of barricading and security personnel;
- Attach warning signs, blinkers to the barricading to caution the public about the hazards associated with the works, and presence of deep excavation;



- Regular water sprinkling will be done on all construction active areas present close to sensitive receptor in order to reduce dust exposure;
- Traffic Management Plan and appropriate road safety measures will be implemented to avoid traffic accidents, jams/public inconvenience;
- Ramps will be placed on deep excavation sites so that accidents due to slips may be avoided;
- Provision of proper safety signage, particularly at sensitive and accident-prone spots;
- The communicable disease of most concern during construction phase, like sexually-transmitted disease (STDs) such as human immunodeficiency virus (HIV)/ Acquired Immunodeficiency Syndrome (AIDS) and COVID-19 will be prevented by successful initiative typically involving health awareness; education initiatives; training health workers in disease treatment; immunization program and providing health services;
- During construction work, pedestrian and vehicular passages will be provided for crossing near settlement;
- Contractor will take due care of the local community and observe sanctity of local customs and traditions by their staff. Contractor will warn the staff strictly not to involve in any un-ethical activities and to obey the local norms and cultural restrictions;
- Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity and social links; and
- Fencing around the camps will be strong enough so that it cannot be broken easily by local people for making passages.

C. Health Impacts (Diseases)

The health impacts that are envisaged to take place among employees and workers of the proposed Project are discussed below:

For the implementation of Project activities, skilled and unskilled labor is required by the contractor. Mostly, skilled and unskilled workers have been hired by the contractor on permanent and contract basics, belonging to different cultural backgrounds, which they utilize for different developmental projects. In this case, occurrence of communicable diseases like HIV/AIDs, COVID-19, respiratory diseases, and skin and eye infections are communal to take place during the execution of the proposed Project. This impact is negative and medium in nature.

Mitigation Measures:

- Proper checkup of skilled and unskilled workers before their hiring and twice annually during the construction phase;
- Labor camp will be away from the local communities and workers' management plan shall be formulated by Contractor to minimize the adverse impacts on local communities and workers due to communicable diseases;
- Trainings, awareness and campaigns shall be conducted for workers and surrounding communities on awareness and prevention of HIV/AIDs and COVID-19;
- Workers will be educated on personal hygiene and sanitation concerns, leading to communicable and non-communicable diseases;
- Water will not be allowed to stagnate even if clean, and measures will be taken to cover the area; and
- Insecticides will be periodically sprayed.



D. Accidental Risks

The proposed Project involves a number of operations simultaneously i.e. site clearing, excavation, piling, etc. This increases the probability of accidental injuries to workers and general public and residents. This impact can be categorized as site-specific, temporary, medium negative and irreversible

Mitigation Measures:

- Contractor will designate one of the staff members to act as lead person for emergency response and safety issues;
- Contractor will be responsible to provide first aid facilities at construction sites as well at camp sites;
- Contractor will provide safety equipment's such as helmets, goggles, ear plugs, gloves, safety harnesses, safety shoes, etc. to the workers;
- Safety signage will be erected at potentially dangerous working areas;
- Proper lighting arrangements will be ensured for night shift working;
- Contractor will be responsible to provide insurance against accidental death and injuries to workers and public; and
- Public and animal access to construction site will be restricted by providing fences.

E. Natural and Man-Made Disasters

Natural disasters (earthquakes, land sliding and floods) and accidents such as fire, falls, slips and trips can result in injuries, financial losses and may even lead to deaths. The workers shall be trained and facilitated to cope with such disasters. This impact can be categorized as site-specific, temporary, medium negative and irreversible

Mitigation Measures:

- An Emergency Response Plan (ERP) for earthquakes and manmade disasters will be developed by contractor in coordination with Client and will be implemented in close consultation with the RESCUE Services (1122) and concerned departments;
- Training of the contractor staff and employees regarding the emergency procedures and plans will be regularly conducted;
- Emergency numbers will be clearly posted at all construction locations; and
- Minor incidents and near misses will be reported, and preventive measures will be formulated, accordingly by the Client and Contractor.

The Emergency Response Plan is attached as **Annexure-VIII**.

6.4.3 Potential Environmental Impacts during the Operational Phase

The anticipated environmental impacts related to the proposed Project have been studied for the operational phase of the Project as discussed hereunder.

Impacts on Physical Parameters

6.4.3.1 Topography & Landscape Changes

During the operational phase, the proposed Project expected to bring substantial enhancements to the overall landscape of the Project area. A key benefit will be the establishment of the paragliding club which will contribute to the expansion of lush green



spaces, fostering a vibrant and sustainable tourism-driven economy. The paragliding club establishment will not only enhance the region's aesthetic appeal but also promote biodiversity, improve air quality, and provide recreational opportunities for visitors and local communities.

Mitigation Measures

- The saplings planted in the Project area will be properly maintained throughout their growth to maintain the aesthetics of the site;
- Proper segregation, collection, and disposal of waste generated within the Project area, including recyclable and organic waste management;
- Placement of waste bins at designated locations to encourage responsible waste disposal;
- Regular cleaning and maintenance of public spaces, pathways, and recreational facilities; and
- Awareness campaigns to educate visitors on responsible tourism and environmental conservation.

6.4.3.2 Air Quality and Climate Change Aspects

During operation phase, operation of paramotors, stand-by generator and un-necessary idling of diesel run engine of project site will result in the emission of pollutants (CO, Smoke, NO_x, SO_x CO₂ & PM₁₀) into the air, thus deteriorating air quality. Continuous exposure to these pollutants may pose respiratory and cardiovascular health risks, particularly for staff working in close proximity to these emission sources.

Additionally, emissions from commercial kitchens, as well as heating, ventilation, and air conditioning (HVAC) systems, will further contribute to the overall air quality deterioration. Cooking exhaust fumes, containing grease, volatile organic compounds (VOCs), and other airborne particles, may degrade air quality within and around the operational areas.

Another significant concern is the potential for airborne dust and particulate matter from disturbed and exposed soil surfaces, especially if greenbelts and vegetative cover are not adequately maintained. Soil erosion, combined with wind action, can lead to the suspension of dust particles, further degrading air quality and reducing visibility in the area.

Moreover, the open burning of food waste, organic debris, and yard trimmings can significantly contribute to local air pollution. The burning process releases harmful pollutants, including fine particulate matter (PM_{2.5} and PM₁₀), dioxins, and toxic gases, which not only compromise air quality but also pose serious health hazards to site workers and visitors.

This impact can be categorized as negative, local, medium, long term and definite.

Mitigation Measures:

- Periodic campaigns for educating the drivers shall be launched to keep their vehicles tuned up and in good running condition to reduce emission load and to promote conservative usage of the natural resource (natural gas and water);
- Open burning of all types of waste materials and the garden wastes will be strictly banned;
- Location of generators in facility will be carefully selected;
- Install high-efficiency kitchen exhaust hoods and filtration systems to capture airborne grease, smoke, and VOCs;



- Plantation of trees along the generators to create a buffer zone that will help in absorbing the emissions;
- Use of gas generators (if possible) will be preferred for low emissions;
- Use of solar panels (renewable energy source) for running generators, as it will save the energy;
- Un-necessary running of vehicle engines inside the project site will be banned and strictly monitored;
- Awareness should be raised among the staff and tourists regarding protection of environment through placement of signboards at appropriate places preferably on the roadsides, gazebos, kiosks, pool side, runway, distribution of leaflets, brochures and advertisements on social media;
- Provision of budget for regular monitoring of ambient air quality as specified in EMP of Chapter 7, in accordance with PEQS, 2016; and
- Ensure cleaning of ducts, filters, components of HVAC, replacing filters and measuring energy use and comfort. Performance measurements will be done monthly or at least quarterly, to provide operators with enough data to tell when systems are beginning to perform poorly.

A. Indoor Air Quality (IAQ)

Good IAQ in buildings is an important component of a healthy indoor environment. It contributes to a favorable and productive environment for building occupants, giving them a sense of comfort, health, and well-being.

IAQ Sources:

Each building has its own set of circumstances. Air quality may be determined by the site of the building, its original design, and renovations, whether air handling systems have been maintained, occupant densities, activities conducted within the building, and the occupants' satisfaction with their environment. IAQ problems can arise from a single source or any combination of factors. Inadequate IAQ may begin with poor building design or failure of the building enclosure or envelope (roof, facade, foundation, etc.). Other issues may be associated with the location of the building and mixed uses of the building. Improper temperature and relative humidity conditions will also present problems for staff and nearby residents

Health Effects:

The specific pollutant, the concentration of exposure, and the frequency and duration of exposure are all important factors in the type and severity of health effects resulting from poor IAQ. Symptoms related to poor IAQ are varied depending on the type of contaminant. Failure of management to respond quickly and effectively to IAQ problems can lead to numerous adverse health consequences. Symptoms will include irritation of the eyes, nose and throat, headaches, dizziness, rashes, muscle pain and fatigue.

Building dampness is associated with significant health effects. Numerous species of bacteria and fungi, in particular filamentous fungi (mold), can contribute significantly to indoor air pollution. Whenever sufficient moisture is present within building, these microbes can grow and affect the health of occupants in several ways. Occupants may develop respiratory symptoms, allergies, or asthma. Asthma, cough, wheezing, shortness of breath, sinus congestion, sneezing, nasal congestion, and sinusitis have all been associated with indoor dampness. This impact can be categorized as negative, local, medium, long term and definite.



Mitigation Measures:

- Inspect and assess the building envelope, including the roof, walls and foundation and promptly respond to identified problems. Routinely check the building for water leaks, seals around doors and windows, and any visible damp or moist parts of the building. Clean and dry any damp or wet building materials and furnishings within 24 to 48 hours after detection to prevent the growth of mold;
- Ensure and validate that the building is maintained under slight positive pressure (i.e., air comes out of the building when exterior doors are opened);
- IAQ will be monitored on a regular basis for parameters like CO, CO₂, NO₂, VOCs, etc. as per PEQS, 2016;
- Ensure good housekeeping practices in the offices, etc.;
- Ensure routine preventive maintenance and upkeep of the building. A preventive maintenance program provides care to all building systems and components that keep them operating at peak performance according to the manufacturer's specifications, and also allows for early detection of problems; and
- TDCP develops and implement an IAQ management plan (if required during O&M) to address, prevent, and resolve IAQ problems in the buildings of project site.

6.4.3.3 Noise and Vibration

During the operational phase, various sources of noise and vibration may contribute to environmental disturbances, potentially affecting staff, visitors, nearby residents, and local wildlife. These impacts can be particularly noticeable during peak visitor hours when activity levels are at their highest.

Primary Sources of Noise and Vibration

- The operation of standby generators will be a constant source of noise, particularly in areas where backup power is frequently required;
- Prolonged exposure to generator noise can become a nuisance for staff and visitors, affecting their comfort and overall experience;
- If not adequately mitigated, continuous generator noise may contribute to stress and hearing discomfort for individuals in close proximity;
- The movement of vehicles transporting visitors, equipment, and supplies to and from the site will generate noise and vibration;
- The use of horns, particularly in congested areas, can be a significant source of noise pollution, causing disturbances to nearby residential communities;
- During peak visitor hours, the cumulative noise from vehicle engines, tire friction, and honking can create an unpleasant environment for both visitors and local residents; and
- Paramotoring involves the use of motorized fans for propulsion, will lead to high noise levels during take-off and flight.

The impact is long and medium adverse in nature.

Mitigation Measures:

- Use of horns will not be allowed in the project site and access roads,;



- Implementing and adhering to local noise standards (PEQS, 2016) as specified in EMP of Chapter 7;
- Limit paragliding activities to specific times of the day to minimize disruption, especially during early mornings or late evenings when noise can be more intrusive for the nearby communities;
- Trees will be planted along the boundary of Project area as a noise barrier;
- Employees working close to generators for extended periods will be encouraged to wear ear protection;
- Install soundproof enclosures or acoustic barriers around standby generators to reduce noise emissions;
- To reduce the noise produced by loose vibrating parts all the noisy equipment's will be maintained and tuned periodically and will be housed in closed rooms or building;
- In the building, proper insulation will be provided to absorb the ambient noise;
- Traffic Signs / Rules will be installed/placed in and around the outskirts of project site and access roads, regarding parking of vehicles and honking of horns;
- Strict enforcement of speed limits inside the project site and access roads to minimize unnecessary acceleration and braking, which contribute to excessive noise;
- Engage with local communities to address concerns and develop guidelines that balance recreational use with the preservation of local tranquility; and
- Traffic Management Plan will be devised with traffic police to avoid heavy traffic jams and honking near project site and access roads.

6.4.3.4 Traffic Management / Parking Facilities

During the operational phase, the Project is expected to attract a significant influx of tourists, leading to a substantial increase in vehicular traffic accessing the area. This rise in visitor numbers will place added pressure on existing road infrastructure, potentially causing traffic congestion, delays, and bottlenecks, particularly during peak hours. The increased volume of private cars, tour buses, and service vehicles may strain parking facilities, resulting in overflow parking, illegal parking, and encroachment onto pedestrian pathways or green spaces. Without proper traffic management measures, this could lead to safety concerns, reduced accessibility, and an overall decline in the visitor experience.

Mitigation Measures:

- TDCP will prepare, implement and monitor traffic management plan to avoid traffic congestions and parking issues in and around the project site;
- Liaison with the City Traffic Police Department for traffic management on the roads, surrounding the Project area for continuous flow of traffic;
- Provide shuttle buses or electric carts from parking areas to the main tourist attractions, reducing the need for private vehicle access;
- Maintenance of designated vehicle registration and checkpoints inside the premise to avert unnecessary traffic snarl up along adjacent roads caused by vehicles waiting to access the project site;
- Promote carpooling and ride-sharing services among visitors and staff to reduce vehicle numbers;
- Use smart parking solutions, such as online booking and automated fee collection, to enhance efficiency;
- Deploy traffic wardens and law enforcement personnel during high-tourist periods to regulate movement and prevent congestion;
- Implementation of strict traffic rules regarding entrance and parking of vehicles in the paragliding club;



- Install clear signage, traffic signals, and road markings to guide drivers and ensure smooth movement within the area;
- Placement of sign boards for traffic diversions and proper implementation of traffic diversion plans; and
- Conduct awareness programs encouraging tourists to adopt sustainable transport options and responsible parking practices.

6.4.3.5 Drinking Water Quality

During the operational phase, the primary sources of drinking water at the project site will include a water filtration plant, electric dispensers, and the municipal water supply from TMA Kotli Sattian. However, the prolonged and increased water consumption due to high visitor inflow may strain the available water resources, potentially leading to shortages, particularly during peak seasons. Additionally, the risk of water contamination within the internal water supply network poses a significant health concern. If water pipes, overhead storage tanks, and filtration systems are not maintained and cleaned regularly, there is a high likelihood of bacteriological contamination, which can result in waterborne diseases and infections affecting both staff and visitors.

Furthermore, accidental leakages, bursts, or blockages in the water supply network could lead to temporary flooding of surrounding areas, causing disruptions to the park's infrastructure and impairing the quality of surface and sub-surface water sources. Contaminated runoff from these incidents can negatively impact nearby water bodies and groundwater reserves, further exacerbating water scarcity concerns.

Additionally, pollution originating from soakage pits presents a dual environmental threat. Bacterial pollution, while a direct health hazard, is generally neutralized by natural soil processes before reaching groundwater. However, chemical pollution, particularly nitrogenous contaminants such as nitrates, is a more persistent and severe issue. Elevated nitrate levels in groundwater can have long-term health implications, especially for vulnerable populations, and are significantly more challenging to remove compared to bacterial contaminants. If not managed properly, these pollution sources could compromise the safety and sustainability of water resources within the Project area. The impact is long and medium adverse in nature.

Mitigation Measures:

- Water storage tanks will be cleaned and disinfected on regular basis to remove grease, grit, and other debris;
- Leakage and dripping from faucets, pumps and toilets shall be immediately reported and regularly maintained;
- Install pressure monitoring systems to detect and repair leakages, bursts, and blockages in the supply network to prevent water loss and surface flooding;
- Utility bills will be kept in track for the consumption of water;
- Water-saving equipment such as low-flow shower heads, sinks with auto-shutoff mechanisms and water-saving toilets and urinals shall be installed;
- Use the suitable lining material to control the seepage and groundwater contamination;
- An effective training program will be conducted for the workers and staff about water conservation and cleaning and maintenance of internal water network;



- Prohibit the dumping of hazardous chemicals or waste materials near water sources to prevent long-term contamination;
- Establish artificial wetlands within paragliding club, which serves as an effective natural filtration system for treating wastewater and storm water runoff. These engineered ecosystems replicate the functions of natural wetlands, utilizing vegetation, soil, and microbial activity to remove pollutants from water before it is discharged into the environment;
- Maintain records; review previous water maintenance records to help identify “hot spots” or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of water supply lines as needed; and
- Water quality monitoring will be conducted on quarterly basis and the quality should be maintained according to PEQS, 2016 for Drinking Water as specified in EMP of Chapter 7.

6.4.3.6 Surface Water Contamination / Wastewater Generation

Improper discharge of wastewater from project site poses a significant environmental risk, potentially leading to the pollution of soil, groundwater, and nearby surface water bodies. If not managed properly, wastewater disposal can result in the deterioration of water quality, affecting aquatic life and posing health risks to workers, visitors, and nearby residents. Additionally, stagnant wastewater can create unpleasant odors and unhygienic conditions, negatively impacting the aesthetic value of the area and diminishing the overall visitor experience.

Furthermore, the operation of the sewerage system within the Project area carries inherent environmental risks, particularly from leaking or damaged sewer pipelines. If untreated sewage infiltrates the soil and groundwater, it can lead to severe contamination, making the water unsafe for consumption and increasing the risk of waterborne diseases such as cholera, dysentery, and gastrointestinal infections. Accidental leakages, bursts, or blockages in the sewerage system can cause the temporary flooding of surrounding areas, resulting in waterlogging, infrastructure damage, and disruption of public amenities.

Mitigation Measures:

- Regular maintenance checks will be carried out to check any bursting or chocking of internal sewer pipes;
- Wastewater could be broadly segregated into two categories namely Greywater and Blackwater. Greywater is gently used water from your bathroom sinks, showers, tubs, etc. It is not water that has come into contact with feces, either from the toilet or from washing diapers. Greywater may contain traces of dirt, food, grease, and cleaning products. Blackwater contains human waste and is unsafe. Therefore, Greywater and Blackwater shall be collected separately and treated mainly up to a level for reuse and irrigation purpose within the green area of project site;
- Inspection of the condition of sanitary sewer structures and identifying areas that need repair and maintenance comprising cracked and deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or exfiltration;
- Maintain records; review previous sewer maintenance records to help identify “hot spots” or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed;
- Develop an Emergency Response System for the sewerage system leaks, burst and overflows;



- Solid waste bins/containers should be placed at appropriate location within paragliding club to avoid entrance of solid waste into sewers and especially in Durnoyan Waterfall Kotli Sattian;
- Provide necessary health and safety training to the maintenance staff of paragliding club in sewer cleaning and maintenance; and
- Install eco-friendly signs at key locations to educate tourists about waste disposal, water conservation, and wildlife protection. Provide pamphlets, mobile app notifications, or QR codes linking to environmental guidelines for the sites.

6.4.3.7 Solid Waste Generation

During the operation phase of the proposed Project, municipal waste such as tissue papers, kitchen waste, paper, plastic bottles, and food scraps will be generated daily by visitors, staff, and operational activities. If not properly managed, the indiscriminate disposal of waste especially by waste pickers or careless visitors into green belts, vacant areas, and open spaces can lead to severe environmental and health risks.

One of the major concerns is the absence or insufficient availability of waste bins and designated waste storage points, which may result in improper dumping of waste. Accumulated waste can decompose, release foul odors, and attract pests and rodents, further deteriorating the cleanliness and aesthetic appeal of the paragliding club. Additionally, plastics and non-biodegradable materials left unattended may clog sewerage pipelines, leading to blockages, wastewater overflow, and contamination of water sources.

Furthermore, unregulated waste disposal in open areas can contribute to soil pollution as toxic substances from decomposing waste seep into the ground. Over time, harmful leachates may infiltrate groundwater sources, compromising water quality and posing a health hazard to both workers and tourists, who rely on local water supplies.

Therefore, this impact will be negative, local, medium, long term and definite.

Mitigation Measures:

- Waste collection bins will be provided within the paragliding club at suitable locations for collection of daily generated municipal waste and food waste;
- Assign color to collection bins according to the international standards;
- Recyclable wastes such as paper, cardboard, plastics, glass and metals could be separated for individual collection. Single stream collections may be more cost effective as the recyclables can be cheaper to collect and will reduce the volume of a costlier co-mingled dry recyclable collection;
- Waste minimization will be encouraged and regular training will be provided to solid waste management staff in correct identification and disposal of waste;
- Storage areas will be cleaned regularly to minimize odor, pests and nuisances and preserve visual amenity;
- Promote a strict "Leave No Trace" principle, encouraging tourists to carry back all waste or dispose of it in designated bins. Display educational signage throughout the sites, urging visitors to dispose of waste responsibly;
- Encourage tourists to bring reusable water bottles and avoid single-use plastics by providing eco-friendly alternatives at cafes and souvenir shops;



- Promote the use of eco-friendly packaging for food and beverages at cafes and kiosks;
- Waste bins will be emptied by sanitary workers on daily basis;
- Waste will be transferred to the properly covered purpose-built vehicle (truck / pick-up van) and then be carried out of the paragliding club to designated municipal disposal points by Rawalpindi Waste Management Company;
- All empty containers not suitable for reuse to be rinsed and punctured prior to disposal;
- Transfer routes from the bin storage area to the collection zone will be free of obstructions and steps; and
- A proper waste management plan shall be prepared by management for onsite storage, collection and disposal of waste.

6.4.3.8 Fire and Explosions Hazard

Improper handling, storage, and management of chemicals, fuel, and electrical installations at the paragliding club can pose significant fire and explosion hazards. If safety protocols are not strictly followed, accidental fuel or oil spills around standby generators and fuel storage areas can create a highly flammable environment, increasing the likelihood of fire outbreaks. The presence of combustible materials such as dry vegetation, paper waste, and improperly stored chemicals further exacerbates the risk.

Electrical installations, if not properly maintained, may develop short circuits, faulty wiring, or overheating components, which can serve as ignition sources for fires. Additionally, improper grounding of electrical equipment, overloaded circuits, and lack of fire suppression systems can escalate minor incidents into major fire emergencies. A fire or explosion in such a public setting could lead to severe injuries, fatalities, and extensive property damage, posing a serious threat to workers, staff, and visitors.

Mitigation Measures:

- Routine inspection will be carried out to check that the area around the generator is free of clutter and no flammable material is present;
- Workers will be trained on handling and controlling accidental spillage of flammable substances that will trigger fires;
- Ensure that fuel pipelines and storage tanks are checked regularly for leakages, rust, or damage;
- Ensure the availability of fire extinguishers (Class B for fuel fires and Class C for electrical fires) at fuel stations, generator rooms, and chemical storage areas;
- Regularly inspect electrical panels, wiring, and equipment to identify overloaded circuits, loose connections, and faulty insulation;
- Standard fire and smoke detection and protection devices such as fire alarms, fire hoses and hydrants will be installed in all critical areas of the proposed paragliding club;
- Equipment's will be regularly examined and maintained by a reputable fire safety and security company;
- "No smoking signs and policy" will be displayed, as appropriate and actions to be taken against those not adhering to this order;
- Conduct regular fire safety awareness sessions for workers, staff, and tourists; and
- Fire safety management plan shall be prepared and implemented by TDCP.



6.4.3.9 Emergency Preparedness and Response

The operation of the proposed Project may face various emergencies and natural disasters, including fire outbreaks, earthquakes, and floods, which could pose significant risks to human life, infrastructure, and the surrounding environment. Fire hazards may arise from electrical faults, fuel leaks, or improper handling of flammable materials as discussed, while earthquakes could cause structural damage to buildings, road networks, and essential facilities, leading to potential injuries and service disruptions.

Additionally, the site may be vulnerable to flooding, particularly during heavy rainfall or extreme weather events, which could result in waterlogging, erosion, and damage to facilities and pathways. Such emergencies can disrupt normal operations, pose health and safety risks to visitors and staff, and negatively impact the Project's sustainability

This impact is negative, temporary and moderate in nature.

Mitigation Measures:

- An Emergency Response Plans for floods, earthquakes, and manmade disasters shall be developed by the TDCP in close consultation with concerned departments;
- Training of staff regarding the emergency procedures and plans will be conducted regularly;
- Responsible person to implement the Emergency Response Plan will be clearly designated;
- Emergency numbers will be clearly posted, so that a quick action is taken when an emergency arises;
- Fire Fighting Systems will be calibrated and maintained regularly; and
- Conduct earthquake safety drills for workers and visitors.

6.4.3.10 Over Tourism

While tourism can serve as a significant driver of economic growth by creating job opportunities and boosting local businesses, it also poses several challenges and negative consequences for the environment, local communities, and infrastructure if not managed sustainably. The following are some of the key concerns associated with increased tourism at paragliding club:

Environmental Degradation: A surge in tourist activity can result in serious environmental degradation, particularly in ecologically sensitive areas. High foot traffic, especially in hiking trails, camping zones, and paragliding landing sites, may lead to:

- Soil erosion due to the trampling of vegetation and exposure of topsoil;
- Deforestation as a result of illegal logging for firewood or expansion of tourist facilities;
- Littering and waste accumulation, including plastic pollution in natural landscapes, harming wildlife and disrupting ecosystems;
- Disturbance to wildlife from increased human presence, excessive noise, and habitat encroachment; and
- If left unchecked, these impacts could degrade the natural beauty and ecological health of site and surrounding areas, ultimately reducing their attractiveness for future tourism.



Traffic Congestion and Increased Pollution: As more tourists visit the area, the influx of private vehicles, buses, and commercial transport can lead to:

- Traffic congestion, particularly during peak seasons, resulting in longer travel times and inconvenience for both tourists and local residents;
- Air pollution from vehicular emissions (CO₂, NO_x, PM₁₀), contributing to degraded air quality and potential respiratory issues for visitors and communities;
- Noise pollution from honking, vehicle engines, and tourism-related activities, disrupting peaceful surroundings and affecting the well-being of residents and wildlife; and
- Increased risk of road accidents, especially in areas with narrow roads, poor traffic management, or a lack of pedestrian-friendly infrastructure.

Overexploitation of Local Resources: An upsurge in tourism places considerable strain on local resources, which may lead to scarcity and increased costs for local communities. Some of the key pressures include:

- Higher demand for drinking water, sanitation, and recreational activities (e.g., swimming pools, artificial ponds) can deplete local water resources, leading to shortages for residents;
- Increased use of electricity for hotels, resorts, and tourism facilities raises pressure on the local power supply, leading to frequent power outages or reliance on polluting diesel generators; and
- High tourist demand may inflate food prices, making essential commodities less affordable for local residents and causing food security concerns.

Cultural Erosion and Loss of Local Identity: The commercialization of tourism can lead to the dilution and distortion of local cultural traditions. Some potential impacts include:

- Traditional crafts, and festivals may be altered or staged to meet tourist expectations rather than preserving their authenticity; and
- Unregulated tourism can lead to increased commercialization, urbanization, and foreign influence, causing traditional values and customs to fade over time.

Mitigation Measures:

Promote sustainable tourism practices such as responsible eco-tourism that contribute to the conservation of the environment and local culture i.e.:

- Implement visitor caps during peak seasons to prevent overcrowding and minimize soil erosion and habitat degradation;
- All adventure and recreational activities will be conducted within designated areas in and around the paragliding club site to minimize ecological disturbance;
- Tourism facility operating guidelines (facility specific), 'do's and don'ts etc., shall be formulated and tourists shall be made aware of such guidelines on their arrival at the facility;
- Implement resource management practices such as water conservation, waste management, and energy efficiency to ensure the sustainability of local resources;
- Promote the preservation of local culture and traditions, and involve local communities in tourism planning and decision-making;
- Educate tourists about local customs, traditions, and sustainable behaviors through informational boards, digital guides, and awareness campaigns; and



- All recommended mitigation measures concerning air pollution, soil degradation, water pollution, and solid waste management discussed in preceding sections will be strictly enforced to maintain the environmental integrity of the tourism sites.

These initiatives will ensure that tourism activities contribute positively to environmental conservation, cultural heritage preservation, and community well-being while enhancing the visitor experience.

Ecological Environment

6.4.3.11 Flora

Flora comprising 1,000 trees and ornamental plants will be planted in and around paragliding club site premises during the operational phase to enhance the aesthetics value, and to control noise and air pollution. It will provide the following benefits during the operation phase:

- Creates a visual barrier and enhances the appearance of the paragliding club;
- Providing nesting place for the birds;
- Captures and reduces odor concentrations by absorbing gases, if any emits from vehicles;
- Trees will act as wind speeds barrier to protect building structures during intense wind storms and intense rainfall.

However, mismanagement of green areas will result in clogging of drains, nuisance due to stagnant water and chemical pollution. This impact can be categorized as negative, local, low, short term and probable.

Mitigation Measures:

- The implementation of plantation plan recommended in compensation for cutting of trees will start working during operational phase, to ensure the ecological balance and to avoid any impact on local environment;
- Large scale planting with suitable indigenous fruit and forest trees, shrubs and ornamental plants in the form of trees. Linear plantation will be carried out in accordance with the Tree Plantation Plan to improve aesthetic value and offset the effect of removal of vegetation. It will help in absorbing flue gases, emitted from a large number of vehicles and public transport passing through the Project area, which shall improve the air quality;
- The saplings planted in the Project area against the trees affected should be properly maintained throughout their initial growth period in terms of water requirement and necessary nutrients by relevant department;
- Maintenance of the green areas and the protection of saplings for at least five (05) years to ensure better growth and environmental / aesthetics conditions;
- Keep green areas weed-free. Weeds will be monitored weekly and removed no less than every two weeks. The use of chemicals for weed control and suppression needs to be approved by the concerned authorities;
- Plantations raised must be maintained according to the silvicultural practices which include proper irrigation, cleaning, pruning, thinning at prescribed intensity, silt clearance and trench-opening; and
- Use of fertilizers will be strictly monitored in order to avoid any incident. Natural nutrients will be preferred.



6.4.3.12 Fauna

During the operation phase of the proposed site, wildlife and bird populations in and around Chevra Hill Top, Kotli Sattian may experience significant disturbances due to increased human activity, noise pollution, and habitat disruption such as:

- The operation of paramotors and other paragliding equipment produces high-decibel noise, which can disrupt wildlife communication, mating calls, and natural behaviors. This disturbance may force sensitive species to flee from their habitats, nesting areas, or feeding grounds;
- Frequent tourist visits, foot traffic, and adventure sports activities may stress local wildlife, leading to behavioral changes, migration, or habitat abandonment; and
- Birds, particularly raptors and migratory species (if any), may be highly sensitive to continuous disturbances from paragliders flying close to cliffs, trees, and nesting areas. This can lead to abandonment of nests, leaving eggs vulnerable to predation.

Mitigation Measures:

- Implement altitude restrictions to ensure paragliders and paramotors do not fly too low over nesting or feeding areas, minimizing noise impacts;
- Restrict paramotoring during critical breeding and migration periods to prevent disruption of seasonal nesting and feeding cycles of bird species;
- Conduct wildlife and avifauna surveys before initiating operations to identify sensitive habitats and ensure that no endangered or protected species are put at risk;
- Regularly monitor bird populations and wildlife movements in coordination with wildlife department to assess long-term impacts and modify activities accordingly;
- Develop a translocation plan for rare or endangered species to relocate affected species to a similar habitat in the nearby vicinity, if necessary;
- Educate paragliders, tourists, and operators about local wildlife protection laws, ethical flying practices, and the importance of biodiversity conservation;
- Prohibit reckless flying or unauthorized landing in ecologically sensitive areas to prevent direct wildlife disturbances;
- Display informational boards at key locations to raise awareness about the impact of tourism on local wildlife and the importance of responsible adventure sports;
- Establish operational guidelines in collaboration with the local wildlife department to ensure compliance with environmental protection regulations;
- Regularly assess the environmental impact of paragliding activities and adopt additional measures if significant disturbances are observed; and
- Limit the number of daily flights and visitors during peak wildlife activity periods to minimize ecological stress.

Socio-economic Environment

6.4.3.13 Economy Boost and Employment

During its operational phase, the proposed paragliding club site will serve as a catalyst for economic growth and regional development by fostering a thriving tourism industry. The integration of modern infrastructure and high-quality public amenities will significantly enhance the tourist experience, making the region more attractive to both domestic and international visitors. The positive benefits are:



- With an influx of tourists, local businesses will witness increased demand, leading to expanded economic opportunities in various sectors, including growth of hotels, guesthouses, and lodges, providing accommodations for tourists.
- Development of restaurants, cafés, and street food vendors, offering local and international cuisines;
- Boost in sales for local artisans, souvenir shops, and handicraft markets, promoting cultural heritage and local craftsmanship;
- Increased demand for taxis, rental vehicles, and shuttle services, facilitating travel within the region;
- The expansion of tourism-related activities will create direct and indirect job opportunities for local communities, leading to improved livelihoods and socio-economic development. These opportunities will include tourism and hospitality jobs (positions such as tour guides, hotel staff, event organizers, and park management personnel), employment in infrastructure development, landscaping, and facility upkeep, professional opportunities in paragliding training, safety instruction, and eco-tourism operations. Additionally, training programs and capacity-building initiatives can be introduced to enhance local workforce skills, ensuring that residents can fully participate in and benefit from the growing tourism sector.

6.4.3.14 Impact on Tranquility of Residential Area and Issues of Privacy

Due to the establishment of paragliding club land value of the surrounding areas will increase, which will be positive impacts for locals in terms of economic benefits. However, due to the presence of residential and commercial areas within the vicinity of Project site privacy issues for the residents and business owners will be raised, if mitigation measures suggested above will not be followed in true spirit.

This impact will be negative, local, long-term and definite.

Mitigation Measures:

- Awareness will be created among the staff and visitors to ensure privacy of the residents by not intervening in their matters; and
- Proponent will hire guards who ensure that staff and visitors will not interact and not come into verbal and physical spats with residents during peak working hours.

6.4.3.15 Occupational Health and Safety (OHS) Considerations

During the operation phase, health and safety issues will arise. Operation and maintenance of the paragliding club will cause safety risks to staff (i.e.: electrical and mechanical staff, solid waste management staff and maintenance staff), which includes injuries due to electric shocks, arc flash and arc blast, slipping and falling, poor handling and storage of hazardous substances and during handling of the solid waste. The impact will be considered as negative, local, medium, long-term and probable.

Mitigation Measures:

- Operation and maintenance of machinery and equipment shall be controlled and handled by efficient management and staff training;
- Provide fall protection for all maintenance personnel, especially for roof-mounted equipment such as HVAC;
- Proper storage and handling of generator fuel, chemicals and solvents by labelling and storing in their original containers;



- Clear signage will be posted alerting of possible danger at locations where dangerous and hazardous materials are present;
- Emergency numbers will be clearly posted and communicated to the staff, so that a quick action is taken when an emergency arises;
- Provision of PPE's to the skilled and unskilled labors including masks, gloves, safety jackets and ear muffs;
- Necessary health and safety rules will be enforced by the management to avert HSE issues and proper training will be given to workers on the same; and
- Cleaning and removal of stagnant water (if any) on roads and project site premises will be done on an immediate basis to avoid tripping and falling hazards.



7. INSTITUTIONAL ARRANGEMENTS AND ENVIRONMENTAL MONITORING PLAN (EMP)

7.1 GENERAL

Environmental Monitoring Plan (EMP) is a tool for the implementation of the all the suggested measures to make the Project environmentally sustainable. It provides an overall approach for managing and monitoring the environmental, ecological and socio-economic issues of the proposed Project, and describes the institutional framework and reporting mechanism to implement EMP for the proposed Project.

This chapter provides brief description of environmental issues, mitigation measures to eliminate or reduce environmental and social impacts to an acceptable level, institutional framework for the implementation of the mitigation measures and environmental monitoring plan for air quality, water quality, and noise pollution parameters during construction and operational phase. A budgetary plan is also developed, indicating estimated costs to be incurred to mitigate potential adverse impacts of the proposed Project.

7.2 EMP COMPONENTS

The EMP comprises the following main components:

- EMP Objectives;
- Scope of the EMP;
- Environmental Policy, Legislation and Framework;
- Institutional Requirements;
- Environmental Mitigation and Management Matrix;
- Environmental Monitoring Plan;
- Planning for EMP Implementation;
- Training and Capacity Building;
- Communication & Documentation;
- Management Plans;
- Chance Find Procedure;
- Public Disclosure;
- EMP Cost; and
- Summary of Environmental Cost.

7.3 OBJECTIVES OF EMP

The main objectives of the EMP are to:

- Provide the details of the Project impacts along with the proposed mitigation measures, and the corresponding implementation activities;
- To ensure that all necessary corrective actions are carried out and monitored in time to counter any adverse environmental impact under a systematic monitoring approach;
- Provide a procedure for timely action in the face of unanticipated environmental situation;
- Define the role and responsibilities of the Project Proponent (TDCP), Contractor(s), Supervisory Consultant(s) and other key players in order to effectively communicate environmental and social issues among them;
- Define a monitoring mechanism, reporting frequency and identify monitoring parameters to ensure that all the mitigation measures are completely and effectively implemented;
- Design the training and capacity building plan for enhancing the capacities of the Project Proponent



- (TDCP), Contractor(s), Supervisory Consultant(s) on environmental and social management;
- Identify the resources required to implement the EMP and outline the corresponding financing arrangements; and
 - Define the requirements necessary for documenting compliance with EMP and communicating it to all the concerned regulatory agencies.

7.4 INSTITUTIONAL REQUIREMENTS

The institutional requirements for the Construction and Operation & Maintenance (O&M) phases of the proposed Project are provided in below sections.

7.4.1 Institutional Setup for Implementation and Management of EMP

The key players involved during construction phase of the proposed Project are the TDCP as employer/proponent, Punjab-EP&CCD, the Supervisory Consultant (SC) and the Contractor. The roles and responsibilities of these organizations are outlined below.

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

- TDCP/Proponent/Employer;
- SC's; and
- Contractor's Environmental Manager.

The employer/proponent (TDCP) will make Contractor bond through contract documents to implement the EIA including EMP and other terms and conditions of the Environmental Permit. The EMP will be included as a clause of the contract documents. Construction camps will be established after necessary approvals and submission of Site-Specific EMP(s) to be developed in the light of the relevant agency's requirements, before the commencement of construction works. The organizational setup for the implementation of EMP during the construction phase is provided in **Figure 7-1**.

7.4.2 Overall Oversight Arrangements

A Project Steering Committee comprising of Managing Director TDCP, Project Director TDCP and Director Environment, TDCP, will provide overall guidance and oversight and will be responsible for ensuring effective implementation of the Project.

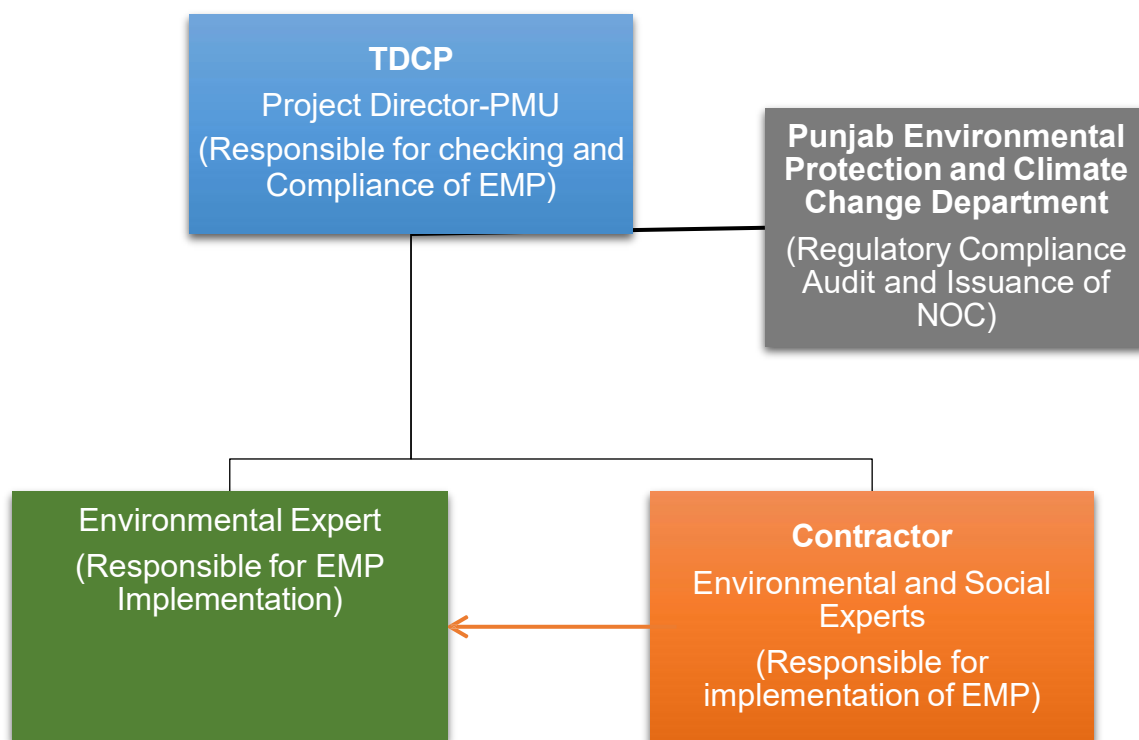


Figure 7-1: Organizational Setup for the Implementation of EMP at Construction Stage

7.4.3 Roles and Responsibilities for EMP Implementation during construction Phase

a. TDCP/ Employer Concerned Staff

The specific responsibilities are as follows:

- Setting up systems for environmental management;
- Ensuring that the Contractor(s) develop and carry out environmental implementation plans that are consistent with the EMP;
- Liaising between the Project staff and the Supervisory Consultant's staff to monitor environmental and social compliance during construction phase;
- Ensuring that the required environmental and social training is provided to the concerned staff;
- Responsible for carrying out random site visits to the construction site(s) to review the environmental performance of the contractors;
- Monitoring the progress of environment and social related activities;
- Make sure that the contractor is implementing the additional measures, suggested by the Supervisory Consultant in monthly environmental monitoring reports;
- Assessment of the trees, wildlife habitat, valuation of property (if any), public utilities and negotiation with the affectees for fixation of compensation to be paid for temporary acquisition of the land if required for the construction of contractor camps;
- To assist Contractor for obtaining necessary approvals from the concerned departments;
- Maintaining interface with the other lined departments/stakeholders; and
- Reporting through Contractor to the Punjab-EP&CCD on status of EMP implementation.



Environmental Expert (EE) will oversee the performance of the contractor to make sure that the contractor is carrying out the work in accordance with EMP as mentioned in the contract documents. She/he will provide guidance to the contractor's EE for implementing each of the activities as given in EMP. EE will be responsible for record- keeping, providing instruction through the Resident Engineer (RE) for corrective actions and will ensure compliance with various statutory and legislative requirements.

However, the overall responsibilities of EE are as follows:

- To oversee the performance of the Contractor to make sure that the Contractor is complying with EMP;
- Discussing various environmental and social issues and environmental mitigation, enhancement and monitoring actions with all concerned personnel's;
- Inspect, supervise and monitor all the construction and allied activities related to the EMP for the Project and oversee the performance of the Contractor to make sure that the Contractor is complying with EMP;
- Visiting construction site(s) including incomplete construction work site(s), where there are no contractor's activities, active construction work sites, completed areas of work sites as well as ancillary sites such as borrow areas, quarries, asphalt and crusher sites, hot mix plant sites, construction camps and work shop areas to ensure contractors compliance with EMP stipulations and conditions of statutory bodies;
- Assisting contractor in all matters related to public contacts including public consultation pertaining to environmental and community issues;
- To organize periodic environmental training programs and workshops for the consultant's and contractor's staff;
- Periodic reporting as mentioned in EMP; and
- Suggest any additional mitigation measures (if required).

b. Responsibilities of Contractor

Contractor will be bound through contract documents to appoint the Site Environmental and Social Expert with relevant educational background and experience. The experts of contractor will carry out the implementation of the mitigation measures at construction site(s). The responsibilities of ESEs of Contractor are as follows:



- Responsible for Implementation of the mitigation measures at construction site;
- Preparation of Site Specific Environmental and Management Plan (SSEMP) including Evacuation Plan, HSE Management Plan, Material Transportation Plan, Traffic Management Plan, Emergency Response Plan, Monitoring Plan, and Asphalt and Batching Plant Area Plans, and will submit all the plans to the SC;
- Implementation of EMP and to take effective measures against corrective actions plan;
- Prepare the monthly compliance and monitoring reports as per schedule and will submit it to the SC;
- Provision of proper Personal Protective Equipment's (PPEs) to the workers and train them for their proper use;
- ESEs will conduct the environmental, health and safety trainings for the staff and labors; and
- The Contractor shall submit the Code of Conduct that will apply to all of the contractor's staff. The contractor shall submit an outline of how the Code of Conduct will be implemented. The aspects to be addressed include:
 - Ensure compliance with applicable environment, health and safety standards and procedures associated with risks of Project activities;
 - Ensure compliance with all acquired approvals, applicable to the proposed Project;
 - Ensure protection of the local community (including vulnerable and disabled assemblies), and the Contractor's staff, sub-contractors and daily wage workers;
 - Ensure employment of full-time security guards, and necessary security measures and instruments (CCTV) at the site;
 - Ensure provision of adequately stocked first aid kit at site for dealing with accidental injuries, and natural hazards;
 - Prohibit the use of illegal items such as weapons, alcohol and drugs at site;
 - Ensure that Project property is protected against vandalism, theft, and noxious activity;
 - Ensure that a positive attitude of respect and warmth is given to staff and community members;
 - Ensure good housekeeping practices shall be adopted at site;
 - Ensure that employment decisions are not made on the basis of personal characteristics unrelated to inherent job requirements, including race, gender, nationality, religion or belief, disability, age, sexual orientation, or ethnic, social and indigenous origin;
 - Ensure establishment and strictly enforcement of "No Sexual Harassment Policy";
 - Ensure provision of necessary sanitation requirements for site workers (both for men and women);
 - Ensure workers only use specified sanitary facilities provided by their employer and not in open areas;
 - Restriction on burning solid waste;
 - Restriction on dumping solid and liquid waste into nearby water bodies;
 - Prohibition for cutting trees, and clearing vegetative areas for construction camps, and for cooking purpose as a source of fuel; and
 - Prohibition on illegal hunting of local fauna.

The Code of Conduct should be written in local and simple language (Urdu and English) and signed by each site staff to specify that they have received a copy of the code; code explained and clarified to them; acknowledged adherence to this Code of Conduct as a condition of employment; and understood that violations of the Code can result in serious consequences. A copy of the code shall be displayed at strategic location of the site, and mainly in the contractor's site office.



c. Punjab Environmental Protection and Climate Change Department (PEP&CCD)

PEP&CCD is the regulatory authority for issuance of NOC for the proposed Project. As part of its mandate, protection of environment is their responsibility. Therefore, the agency will undertake an audit (as and when required) of the activities of the Project (both phases i.e. Construction and Operation) with respect to the protocols as defined in EMP and in NOC. The specific responsibilities are as follows:

- Liaison with the Environmental Committee of TDCP on the proposed Project to ensure compliance of measures as given in the EMP and in NOC issued by them for the construction activities of the proposed Project; and
- Environmental Audit of the activities being undertaken by the Environmental Committee of TDCP and all other relevant stakeholders as provided in the EMP and NOC through random site visits and meetings.

7.4.4 Institutional Arrangement for Implementation of EMP during O&M Phase

The proposed Project will be administrated by the TDCP during the O&M phase. Therefore; it is suggested that the Project Director of the proposed Project shall depute/hire Environment and Social Experts to monitor and implement EMP during the operation phase.

The specific responsibilities of Environment and Social Experts are as follows:

- Coordinating with the operational staff working under the Project Director to monitor environmental compliance during the operation phase;
- Advising on, and monitoring tree plantations within Project boundary as suggested in EMP;
- Reporting on the progress of environmental compliance to the Project Director and Punjab-EP&CCD;
- Assess and propose mitigation measures for unforeseen long-term environmental and social impacts of operation; and
- Sustaining a working partnership among the TDCP, Punjab-EP&CCD, Forest and Wildlife departments of Kotli Sattian/Murree District to ensure compliance with EMP during the operation phase.

7.5 ENVIRONMENTAL MITIGATION AND MANAGEMENT MATRIX

Environmental Mitigation and Management Matrix (EMMM) is considered as one of the main elements of EMP. The EMMM provides the framework for the implementation of the mitigating measures against each identified potential adverse impacts, and management and monitoring of the same during the design, construction and operation phases of the proposed Project. **Table 7-1** shows impacts, mitigations and the responsible authority and organization for the implementation of the same during design, construction and operation phases.

The Contractor(s) will be responsible for the preparation of Site Specific EMP (SSEMP) along with the site-specific plans based on the guidelines provided in this Chapter.



Table 7-1: Environmental Mitigation and Management Plan

Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
Preconstruction / Design Phase					
1.	Technical Design and Layout Planning Incompatible layout plan and engineering design of the Project's structures (retaining walls, access road, buildings (administrative, tourist facilitation centre, etc.), offices, coffee shops, parking area, infrastructure facilities, etc.) can undermine the overall aesthetic beauty and ambience of the Project area. Also, low utilization of the available spaces and designing the structures without considering the prospective and futuristic needs can result in structures with low social acceptability and functionality.	• All structural, layout and engineering design will be in strict accordance with the applicable MDA bylaws, national & international bylaws and engineering parameters and will consider prospective and futuristic needs of social acceptability and functionality; • The proponent will review and validate all the design considering the possible impacts (as mentioned in succeeding sections) before the start of construction of the proposed Project; and • Design flight paths away from residential areas and ecologically sensitive zones to minimize environmental sustainability	• Audits and Checks	Design Consultant	Proponent
2.	Topography The topography of the Project area is hilly with some flat patches. As the proposed Project involves the establishment of paragliding club comprising glamping pods, tree houses, ghazeboos, and allied facilities, so topography of the Project area will be changed. In addition to this, construction activities will also result in significant changes in topography due to earthworks and excavation including land clearing and leveling.	• Due consideration will be given to aesthetic improvement during the design phase by avoiding excessive excavation and removal of vegetation and by adopting the best engineering practices; • Provision of green belts for the landscape in design to augment the overall ambience of the study area; and • Ground disturbances will be limited to only the areas necessary for Project related construction activities.	• Confirmation of design incorporation. • Audits and Checks	Design Consultant	Proponent



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				Implementation	Monitoring
3.	Seismic Hazard As per Building Code of Pakistan, Seismic Provisions, 2007, the Project area is located in Seismic Zone 3 (High Hazard), where 3 represents peak horizontal ground acceleration from 0.24g to 0.36g. In this Zone, the designing of various types of structures should be done on the basis of PGA. A high-intensity earthquake impacting the Project site can adversely impact the development. This factor requires special consideration of the designers keeping in view of the earthquake of October 08, 2005 and recent earthquakes. This will be a local and high adverse impact. However, no change (+/-) in the impact of seismology risk in the area is expected during the Project construction phase as none of the Project activities are expected to be of such a powerful extent to influence the tectonic risk.	- The proposed structures will be designed and constructed to withstand high intensity earthquakes. For seismic hazard analysis, updated structural, geotechnical and seismic studies will be conducted; and - To mitigate the seismic hazard, Seismic Building Code of Pakistan 2007 (SBC-07) will be adopted. This code specifies minimum requirements for seismic safety of buildings and has to be applied and used by engineers in conjunction with the necessary understanding of the concepts of structural, geotechnical and earthquake engineering.	- Confirmation of design incorporation. - Audits and Checks	Design Consultant	Proponent
4.	Ground Water / Drinking Water Contamination Stress will be generated on groundwater reservoirs due to the operation of paragliding club. Water consumption may lower the underground water table in the long run and affect water supply system of surrounding areas due to excessive withdrawal of water. Drinking water contamination can originate due to improper design of	- A detailed groundwater hydrological study should be conducted to foresee the impact of water extraction and recharge, so that there is no negative impact on the surrounding area and the delivery of services; - A water filtration plant of the required capacity will be proposed in the design of the proposed paragliding club in order to avoid any bacterial contamination in the drinking water;	- Confirmation of design incorporation. - Audits and Checks	Design Consultant	Proponent



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	internal water network of the proposed paragliding club. If the pipes and the overhead water storage tanks are not designed properly, it will lead to bacteriological contamination of the potable/drinking water and cause of infectious diseases/health problems in the employees, tourists, nearby residents and skilled and unskilled staff of the proposed project site.	- Location of water storage tanks will be planned carefully. Water storage tanks meant for drinking will not be located directly beneath any sanitary plumbing or any other pipes conveying non-potable water; - All the distribution pipes should be preferably laid one meter away or above the sewer lines; - Water storage tanks will be provided with a cover, designed to prevent the entry of dust, roof water, surface water, birds, animals or insects; - Selection of standard materials during the planning stage will be considered for efficient seepage control; - Proper designing of pressure head, flow and pipe diameter of water pipes as per national and international practices; and - Alternate arrangements will be suggested in design to cater over flow of water during construction and operational phases.			
5.	Surface Water Contamination / Pollutant Load on Receiving Body The main surface water bodies identified within the Project vicinity is Durnoyan Waterfall Kotli Sattian, Jhelum River and local nullah. Jhelum River is flowing along southern-eastern side of the Project Site.	- Avoid disposal of wastewater in water bodies by considering Septic Tanks/ Wastewater treatment Plants in the design for the treatment of wastewater prior to its disposal into the receiving body; - Introduction of dual flush system to reduce the wastage of water by excess use in the low or high level cistern will be planned;	- Confirmation of design incorporation. - Audits and Checks	Design Consultant	Proponent



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	The proposed Project may dispose of its untreated wastewater generated from the proposed paragliding club into this distributary, deteriorating its water quality and compromising its primary purposes.	- Design shall be sufficient to avoid surface runoff in case of over flow; and - Alternate arrangements will be suggested in design to cater the sewage flow during operation phase.			
6.	Water Quality Construction Site Runoff The potential sources of water pollution associated with the construction of the proposed Project are runoff from the construction works area that may contain increased loads of sediments, suspended solids and other contaminants. Potential sources of pollution from the site include: - Runoff and erosion from exposed soil surfaces, earthwork areas and stockpiles e.g. grouting and cement material with the rain; - Wash water from dust suppression sprays; - Fuel and lubricants from maintenance of construction vehicles and mechanical equipment; - Spillage of liquids stored on-site such as oil, diesel, solvents, etc. are likely to result in water pollution; and - Uncontrolled discharge of debris and rubbish such as packaging, construction material and refuse. Wastewater produced by On-Site Work Force	- Construction camp will be established in area with adequate natural drainage channels in order to facilitate the flow of the treated effluents after ensuring that PEQS are met; - Oils, fuel and chemicals will be stored at bunded fuel stores and mobile bunded stores; - Maintenance of vehicles and plant will be carried out only in impermeable areas where any oil spillages can be contained; - Construct temporary storm water retention basins to reduce the runoff to the drain and use permeable material for temporary roads; - Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; - The proponent will ensure that the construction work is confined within the Project boundary and that water bodies especially Durnoyan Waterfall Kotli Sattian, Jhelum River and local nullah are prevented from pollution during construction;	- Confirmation of design incorporation. - Audits and Checks	Design Consultant	Proponent



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	Wastewater will be generated from the workforce during the construction phase. However, wastewater can be adequately treated by interim sewage facilities, such as portable toilets, which can be installed within the construction site. Construction waste, if left unattended will result in forming leachate that will percolate through the soil strata and will reach the underground water table and hence, will end up contaminating groundwater. There is a probability that various materials like fuel, lubricant oil and other oily products, which are used during the construction phase may contaminate groundwater and channels carrying water.	- The solid waste will be disposed of in designated landfill sites to sustain the water quality for domestic requirements; - Regular water quality monitoring according to the determined sampling schedule; - Water required for construction shall be obtained in such a way that the water availability and supply to nearby communities remain unaffected; - The contractor will ensure that construction debris does not find their way into the drainage which may get clogged; - Wastes will be collected, stored and taken to approved disposal site; - Wastewater effluent from the Contractors' workshops and equipment washing yards will be passed through gravel/sand beds to remove oil/grease contaminants before discharging into the disposal point. According to the PEQS, the BOD concentration in sewage must be brought down to less or equal to 80 mg/l before being discharged into a natural stream having capacity to dilute the effluent. For wastewater apart from BOD, COD of 150 mg/l will also be checked; and - Similarly, if the sewage after treatment is to be discharged in to the			



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		land it will meet the requirements of the PEQS for disposal of wastewater.			
7.	Sewerage & Drainage System / Urban Flooding The construction of proposed Project may be subjected to urban flooding during monsoon season as Jhelum River and local nullah is passing along the Project, which may be inundated during the high flood passage. Large volumes of wastewaters are expected to be generated during the operational phase of the proposed Project, which needs to be managed properly through an efficient sewerage system. Improperly designed sewers may not carry the waste load, leading to failure and financial loss. The alignment of sewer lines and sewerage pumping station must be properly planned; else it may lead to both technical and social problems along with environmental issues of backflow creating foul smell and unhygienic conditions. Accumulation of silt in sewers in low areas over time, overflows, blockages, power outages, harmful working conditions for the workers cleaning sewers, etc. are some of the issues that needs to be critically looked into during the sewer system design. Improper design of drainage system of the proposed Project may result in	▪ Adequate designing of drainage systems that conforms to the methods and criteria set out within the current versions of national/international criteria's to avoid flooding especially during the monsoon seasons and intense rainfall events. Proper slopes shall be incorporated in design to avoid the stagnant water; ▪ All sewer lines including trunk, lateral and branch sewer lines must be designed considering the waste generation rate; ▪ In all cases, the sewer line should be laid deeper than the water pipeline (the difference between top of the sewer and bottom of water pipeline should be at least 300 mm); ▪ Proper slopes shall be incorporated in design to avoid the stagnant water on at-grade road surface; ▪ Proper paving shall be provided adjacent to the exterior walls of the structures. These arrangements would stop ingress of surface water into the ground in the vicinity of the proposed Project and would provide safety against any possible distress; ▪ Dense plantation around the Project boundary except at landing and taking off sites; and	• Confirmation of design incorporation. • Audits and Checks	Design Consultant	Proponent



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	stagnant water on the access road due to which following impacts are expected to arise: - Deterioration of road surface and reduction of its bearing capacity; - Inconvenience for tourists, employees, nearby residents and workers; - Stagnant water may provide the breeding ground for disease vectors; and - Foul odour may be generated. Inadequate drainage design or natural cloud burst will lead to ponding on impervious surfaces such as roofs of buildings, parking lots and landing and taking off sites, and consequently may cause damage to the infrastructure in addition to vector breeding.	Rainwater harvesting technique shall be planned for use of rainwater.			
8.	Building Illumination / Lighting Design of a good illumination is necessary for the offices, tourist facilitation center, shops and buildings as if a proposed Project is designed without taking into consideration for illumination, it will affect the safety of the people who are working and visiting the paragliding club and adversely affect the activities within the proposed Project boundary. Light can also have an adverse impact upon local environment, typically through the unwanted effects of exterior lighting at night, often referred to as Light Pollution or Obtrusive Light. It can also affect the	- Illumination/ lightning system will be designed in such a way so as to maximize the use of natural day light and minimize the use of electric lighting; - Special consideration will be given to control obtrusive light (light pollution) to safeguard the night time environment which can affect surroundings of the paragliding club; and - Care will be taken to ensure that lighting does not adversely impact upon nearby bats habitat (if any).	- Confirmation of design incorporation. - Audits and Checks	Design Consultant	Proponent



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				Implementation	Monitoring
	bats (if any) in the vicinity.				
9.	Improper Parking Facility / Traffic Congestion Kotli Sattian Road, Kotli Link Road, Tourism Highway, Islamabad Expressway, and Murree Expressway will be used as the main route to reach the paragliding club by employees and tourists after the construction of the proposed Project, which will increase the traffic volume on the roads. These roads are busy due to the presence of educational institutions, industrial units, recreational facilities, commercial facilities, health care facilities, religious places (mosques, shrines and graveyards), government & private offices and as a main route used by passerby's and commuters to reach their destinations. During the construction phase, there is also a high chance of traffic jams and congestion on these roads due to the movement of heavy and light vehicles for the transportation of construction materials to the Project site. Hence, this impact is temporary and moderate in nature. Improper parking facilities within the premises of the paragliding club can lead to illegal parking, reduced traffic speeds, congestion, idling of vehicles, etc. within the study area, which demands a proper parking facility.	- Adequate parking facilities has been planned within the paragliding club, to accommodate employees and tourists, thereby addressing illegal parking issues. These facilities will be designed in compliance with MDA By-Laws and international best engineering practices; and - A traffic study will be carried out during the design phase to calculate the existing and future capacity of the Kotli Sattian Road and Kotli Link Road, to evaluate the possible solutions to overcome the future traffic problems (if any) during the construction and operation phases.	- Confirmation of design incorporation. - Audits and Checks	Design Consultant	Proponent



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10.	Deterioration of Ambient Air Quality / Climate Change Air quality of the study area will be affected due to the movement of heavy vehicles (fuel sweltering in vehicles releases CO ₂ , NO _x , SO _x and particulate matters) and un-necessary idling of diesel run engines. In addition to this, construction activities (construction of contractor camps, excavation, footing reinforcement, shuttering, footing concrete, column casting, construction of walls, lintel, roofing, plastering work, fixing of electrical and plumbing works, painting, terrace water proofing and landscaping works) will emit CH ₄ , CO ₂ , N ₂ O, particulate matter, H ₂ S, CO, and HCFs that will contribute to the greenhouse effect in and around the Project area.	- Provision of green areas/plantations will be given in the design in order to absorb the emissions due to Project activities; and - The entire area of the paragliding club shall be paved at the design phase.	- Confirmation of design incorporation. - Audits and Checks	Design Consultant	Proponent
11.	Resource Efficiency and Pollution Prevention Resources involved in the construction of the proposed Project would include construction materials, water and fuel. Construction material to be used for construction activities includes coarse aggregates, fine aggregates, asphalt, cementitious materials, reinforced and structural steel, etc. Almost all the materials to be used in the construction of the proposed Project, access road and allied facilities are non-renewable and therefore their sustainable use is necessary for future use.	- Plan for use of solar panels and wind turbines at operation phase will be considered during design phase. It is strongly recommended to install solar panels at roof top of the buildings and LED lights; - Batching plants with insulation lining to reduce heat loss shall be designed or purchased from local vendor for construction activities; - A good camp design and an efficient worksite management plan will be prepared during design stage that may help the contractor to reduce the water demand, wastewater and solid	- Confirmation of design incorporation. - Audits and Checks	Design Consultant	Proponent



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	Excessive water consumption will pressurize water resources in the Project area because water will be used by the construction staff for drinking and washing purposes and for construction activities during the construction phase. In addition to that, during the operational phase, water will be utilized by occupants for drinking, bathing, cooking, watering plants, etc. Fuel (diesel, petrol) will be used to operate construction machinery, asphalt and batching plants. Sustainable use of energy resources is very important not only to continue future use but also to reduce air emissions.	waste volumes to the lowest levels; and ▪ Rainwater harvesting system shall be considered through collection of water from roofs and its proper usage to irrigate green areas and for domestic use with proper treatment during designing.			
12.	Emergency Management Emergency management in case of natural and man-made disaster is a major concern. Increased incidents of disasters especially act of terror, fire, earthquakes, etc. demand proper planning. Electrical Hazards The workers, tourists, employees and customers of the proposed Project can be exposed to electrical hazards including shocks, fires and burns caused by faulty electrical wiring, unsafe installations, frayed cords, substandard power trips, and defective equipment. Fire Fighting System Inefficient firefighting system and insufficient storage of fire water will pose	Electrical Hazards ▪ Appropriately grounded and double insulation of every single piece of equipment, machine, and device will be kept in the design; ▪ Proper installation check and periodic maintenance by a competent electrician will be planned; and ▪ All power strips will be planned in the design to place in well-ventilated areas for adequate heat dispersion. Fire Fighting System ▪ Buildings in paragliding club will be designed and constructed according to National Fire Protection Association (NFPA) standards for the prevention and control of fire and explosion hazards;	- Confirmation of design incorporation. - Audits and Checks	Design Consultant	Proponent



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	a severe threat to the human life and to the commercial facilities. Lightning Lightning is a constant hazard for buildings and equipment. One lightning strike can damage the paragliding club facilities and may cause failures to the electronic devices inside the buildings and facilities and sometimes it may even result in fire leading to human and financial loss.	- Provision of a firefighting pump will be kept by the design consultant in the design to maintain a constant pressure of 4.5 bars in the system; - A separate water storage tank will be designed for firefighting; - Fire Hose Cabinets connected to pressurized water lines at different locations of the facilities shall be considered in the design; - A separate fire alarm system will be designed for the buildings; and - Following provisions for fire safety will also be made in the proposed Project during the design phase. These should be: - Assigning of special number to be dialed to inform about the fire to emergency response team; and - Fire Extinguishers. Lightning - Design of an efficient Lightning Protection System (LPS) will be ensured to minimize the damage to buildings and facilities by creating a path (divert) for the lightning discharge to the ground.			
13.	Site Selection for Construction Camps Improper site selection and location of construction camp(s) and mismanagement of construction camp activities can lead to various social and environmental impacts, which include loss of vegetation due to setting up	- Construction camps should be designed to be self-contained to reduce demand on infrastructure and services of nearby communities and to minimize the removal of existing macro-plants; - There should be no resettlement issue for the location of the camps;	- Confirmation of design incorporation. - Audits and Checks	Design Consultant	Proponent



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	construction camps, indiscriminate generation of solid waste, and discharge of sanitary effluent, water pollution and health & safety issues. Furthermore, cultural differences, behavior of construction workers and potential disregard for local cultural norms can lead to increase tension between local communities and workers residing in the construction camps. If the sites left unclear after completion of construction phase, it will cause disturbance for the proponent and local community.	▪ Camp site should be away from the residential areas and sensitive receptors; ▪ Selection of sites for construction camps shall be near the Project area having proper access to the nearby main/link road; ▪ The camps must be located in a place where the drainage from and through the camps will not threaten any domestic or public water supply; ▪ Camp site must be adequate in size to prevent overcrowding of necessary structures; ▪ The camp site should consider avoiding any damage of property, vegetation, irrigation, and drinking water supply systems; ▪ The camp site must not be subject to periodic flooding; ▪ There should not be any ecological sensitive areas e.g. wildlife sanctuaries, game reserves, etc. near to the construction camp site; and ▪ Formulation of a comprehensive safety and security plan for the camps, which shall be comprised of a training manual, use of safety equipment, emergency preparedness and code of ethics.			
14.	Flora The establishment of paragliding club is located within the forest area. Therefore, facilities are planned without affecting trees in the area, though few	• Prioritize areas with sparse vegetation for construction to reduce habitat disturbance; • The camps, mobility of machinery and construction of temporary road	• Audits and Checks	Design Consultant	Proponent



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	pine trees and other species of trees may be affected due to the development. A few locations of wild shrubs may also be affected. Since it is being developed as eco-tourism destination, development is mostly on the patches with no or low tree cover. Moreover, any loss of trees, shrubs and other undergrowth will be compensated through replanting native species, enhancing both the green cover and visual appeal of the Project site. During the pre-construction phase, activities such as installation of construction camps, construction of temporary roads and mobility of construction staff may damage the local vegetation/trees. As the heavy machinery and camps will be moved and installed, which require significant space due to which available vegetation is expected to be removed.	shall be properly planned and well designed to avoid any loss to local green cover. It is recommended to establish the construction camps where minimum or no vegetation exists; - Similarly, the alternate routes for roads and points for camps are recommended where no loss of vegetation is expected; and - The location of construction camp will be selected so, as to have limited environmental effect during construction phase and to reduce the cost and land requirement.			
15.	Fauna The region hosts diverse wildlife, including Leopards (<i>Panthera pardus</i>), Barking Deer (<i>Muntiacus muntjak</i>), Wild Boars (<i>Sus scrofa</i>), Indian Pangolins (<i>Manis crassicaudata</i>), and bird species such as the Himalayan Monal (<i>Lophophorus impejanus</i>) and Kalij Pheasant (<i>Lophura leucomelanos</i>). Therefore, the development of paragliding club may impact local fauna due to habitat disturbance.	- Special consideration must be given in the planning of the paragliding club to species of fauna that are protected (if any), by national or international legislation or that are considered to be rare in a national or international context. It is an offence to damage or disturb a protected species and its habitat (including breeding and resting places); - Critical Habitat Assessment (CHA) should be conducted to identify and evaluate areas essential for the survival of wildlife species and	Audits and Checks	Design Consultant	Proponent



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	Moreover, movement and installations of machinery and vehicles during the construction phase will generate noise that will create nuisance for avi-fauna and domestic mammals. The habitats of avi-fauna and domestic mammals may also be affected due to construction camps set-up and due to cutting of trees	especially endangered or endemic species, if any during detailed design stage. Following the CHA, a Biodiversity Action Plan (BAP) may be formulated to outline strategies for conserving identified species and habitats in and around the Project area. The BAP would set measurable targets, such as achieving no net loss or a net gain in biodiversity, and detail actions like habitat restoration, species monitoring, and community engagement. For instance, the Murree Kahuta Kotli Sattian National Park Management Plan emphasizes the importance of such proactive measures in preserving regional biodiversity; • The overall ecological value of an area, through which the Project will be implemented occurs, must also be considered. This should include the interconnections between habitats in the vicinity of the paragliding site, which may be affected by fragmentation of habitat. Many species (particularly birds and mammals) have large, dynamic territories that extend beyond site boundaries, making them vulnerable to changes in external or local environmental conditions; • Design designated takeoff and landing zones to prevent habitat			



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		fragmentation and protect natural vegetation from excessive trampling; - The sites for the construction camps will be carefully selected keeping in mind the available faunal habitats along the study area. Moreover, the layout of camps needs to be designed while considering the faunal habitat of the area; - Prior to commencing any construction work, any works required outside the construction footprint verified will be referred to the Project Director of TDCP for advice on further assessment and approval requirements so that damage to any available habitat over there can be avoided at maximum; - The construction camp management plan during the planning stage will consider fencing and gating to check the entry of animals in search of eatable goods; - Similarly, the waste management plan of the camps will be considered at the planning stage to prevent wild animals and birds; and - The standard measures must be adopted to minimize noise due to machinery movements and installations.			
16.	Land Acquisition and Resettlement <u>Permanent Land Acquisition and Resettlement</u>	<u>Permanent Land Acquisition and Resettlement</u> Resettlement and relocation related impacts will be mitigated through	Audits and Checks	Design Consultant	Proponent



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	All activities related to the establishment of the paragliding club will take place on land owned by the Government of Punjab, ensuring that no additional land acquisition is required and eliminating any impacts related to permanent land acquisition. However, the establishment of paragliding club will necessitate acquiring land from private landowners, leading to resettlement-related impacts. These may include disruptions to livelihoods and commercial activities, displacement of people, and loss of income sources during the implementation of the Project. This impact can be categorized as moderate in nature. <u>Temporary Land Acquisition</u> The Contractors will require temporary land acquisition for the development of Contractor camps and other facilities i.e. storage, workshops, equipment parking and washing areas. The approximate area required for the establishment of one Contractor's camp facilities will be tentatively 1,500 m². Land utilization for Project activities and subsequent operation of Project may induce temporary changes in the existing land use pattern. This impact can be categorized as moderate in nature.	proper remuneration of the impacts and judicious compensation to the affected persons. <u>Temporary Land Acquisition</u> It is the foremost option to establish the construction camps at the acquired land to eliminate the issues of land leased etc. However, if this option is not feasible than the land for above mentioned facilities will be selected and leased prior to the start of construction phase. Land for above mentioned facilities will be directly rented from the private landowners by the Contractors. Rental terms will be negotiated to the satisfaction of the concerned landowners and the agreement will be in local language to make the process clear.			
17.	Public Utilities Due to the proposed Project, public utilities (transmission lines) may be	The design engineer will consider the adjustments of the proposed plans, where feasible and within acceptable	Audits and Checks	Design Consultant	Proponent



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	affected creating disruption of public service and inconvenience to the residents.	design standards to avoid relocation or adjustment of major or costly utilities without changing the scope of the Project; - Relocation of the utilities will be planned and approved before Project commencement by the Client (if any), to avoid inconvenience to the locals; - The provision in the design and budget for the relocation of the existing utility infrastructures wherever required shall be finalized in consultation with the concerned department; - All public utilities (e.g. transmission lines, water pipes, power/ telephone lines, etc.) likely to be affected by the proposed Project will be relocated well ahead of time before the actual commencement of the construction works; - Complete rehabilitation of affected public utilities will be ensured; and - Timely public notification of unexpected disruption of services.			
Construction Phase					
18.	Topography & Visual Intrusion Visual intrusion as one of the possible adverse impacts during construction phase activities are likely to arise from fugitive dust generated from site preparation, on-site storage of construction material, storage of construction debris, physical presence and operation of labor camps, etc.	- The area demarcated for proposed Project will be fenced and all construction activities will be restricted within the demarcated site; - Site approach road will be kept free of dust and mud through the implementation of dust suppression measures;	- Visual observation and photographic record - Site restoration and rehabilitation plan implementation	Construction Contractor	Proponent, SC



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	because commercial facilities nearby study area will remain open for access by public, presence of these activities and materials thereof will cause temporary visual blight and topographical changes at the construction site	- All temporary structures, surplus materials and wastes will be completely removed on completion of works; and - The contractor will ensure minimal footprint of construction activities.			
19.	Soil Erosion and Contamination Due to the proposed construction activities, soil erosion and contamination will occur. Soil erosion will occur on Project site and at contractors' camps because of removal of vegetation (loosen the soil and make it more susceptible to erosion due to wind and rain), uncontrolled run-off from equipment washing yards and excavation of earth/cutting operations. Erosion may increase during intense rainfall events and due to improper drainage systems at construction sites. During the rain, the eroded soil mix with stagnant water to transform into slush, which can affect the movement of vehicles and machinery and construction work as well as limit the movements of local people. Contamination of soil may be caused by oil and chemical spills at asphalt plant sites, equipment washing yards, campsites and temporary construction site offices. This normally happens when these materials are transported in open or loosely capped containers. Various types of machinery will be used at the	- Confining excavations to the specified spots as per the approved engineering drawings and unnecessary excavations will be avoided; - Loss of topsoil will be avoided by stripping and storing topsoil prior to construction, then re-using it for green areas of the paragliding club; - Stored excavated material (rock and soil) will be covered and preferably reused; - Prepare a plan for use and movement of construction vehicles within the area based on the nature of soil; - Vehicles and equipment movement will be confined to dry areas with hardened soil; no vehicle and equipment will enter the damp areas, water areas, vegetative areas and areas with soft soil; - Ensure sprinkling of water for reducing the erosion of soil; - Washing yards will be paved to avoid seepage of runoff from the yard;	- Visual observation and photographic record - Site restoration and rehabilitation plan implementation	Construction Contractor	Proponent, SC



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				Implementation	Monitoring
	construction sites. This machinery will not only pollute the atmosphere at the construction sites and adjacent communities but also have a negative impact on the soil surface layer resulting in soil pollution.	- Controlling runoff volumes and intercept runoff before it leaves the site; - Non-bituminous wastes from construction activities and solid waste generated at the camp sites will be dumped in approved sites, in line with the guidelines for dump sites, and must be covered; - Perennial grasses, sod, shrubs, and trees will be planted to control the runoff on the site; - Excess spoil will be reused where possible and residual spoil can be disposed of at designated site to prevent erosion; - Oil separators will be installed at equipment or machinery washing yards to prevent soil contamination from oily water; - Re-vegetation of exposed areas around the site (if any) will be carried out rapidly, in order to mitigate against erosion of soil through surface water runoff and wind erosion; - Septic tanks of adequate capacities will be constructed for receiving and treating wastewater from all temporary worksite toilets, and the temporary container offices. The toilet wastewater will not be discharged untreated onto the adjacent lands; - Regular inspection of the wastewater disposal from construction camps;			



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		- Construction work will be scheduled to be completed before monsoon season to avoid the soil erosion through surface run-off; - Jute erosion protection mats will be applied in areas where erosion is noticed during inspections; - Material Safety Data Sheets (MSDS) will be strictly followed during handling and storage of chemicals; - Provision of impervious platform with oil and grease trap for collection of spillage during equipment and vehicle maintenance; - All spoils shall be disposed of safely and the site shall be restored back to its original conditions; - Use of modern, well-maintained machinery and vehicles by the contractor to avoid leakages; and - Soils removed during construction will be stockpiled for reuse where possible.			
20.	Excavations Deep excavation and vibrations from the construction machinery and equipment may damage the structure stability of the existing infrastructure in and around the Project site and may result in foundation collapse of the structure. Borrow / open pits and associated excavation activities will result in soil erosion, loss of grasses and shrubs, landscape degradation, and damage to road embankments. Borrow / Open pits	- Confining excavations to the specified spots as per the approved engineering drawings and unnecessary excavations shall be avoided; - The base of foundation excavation should be properly proof rolled before pouring lean concrete; - During construction of foundation, the excavation should be inspected by an experienced Geotechnical Engineer before of pouring lean concrete;	- Visual observation and photographic record - Site restoration and rehabilitation plan implementation	Construction Contractor	Proponent, SC



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				Implementation	Monitoring
	may become potential sources of mosquito breeding and may prove hazardous to humans, livestock and wildlife, if not taken care properly. This will also degrade hygienic condition of the Project area.	• Confining excavations to the specified spots as per the approved engineering drawings and unnecessary excavations should be avoided; • Mat / pile foundation shall be used for transferring the loads of the proposed paragliding club and overhead water tank safely to the underlying soil stratum. However, spread foundation shall be used for lightly loaded structures; • Assure that proper sloping, benching, or shoring techniques are utilized in excavations of five (05) feet or greater in depth; • Use trench shields during trenching operations, when required; • Necessary permits will be obtained for any borrow pits from the competent authorities; • Soil erosion along the borrow pit will be regularly checked to prevent/ mitigate impacts on adjacent lands; • In case borrow pits are filled with water, measures have to be taken to prevent the creation of mosquito-breeding sites; • Borrow pits will be used for construction waste, but during the excavation, top 20 cm soil cover will be preserved for vegetation after the filling of the pits. This is the best way to restore the flora of the area; and			



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				Implementation	Monitoring
		Quarry Management Plan is attached as Annexure-I.			
21.	Air Quality and Dust Air quality will be affected by fugitive dust emissions from construction machinery; dust from the unpaved surface and construction vehicles. Emissions may be carried over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability. Besides, multifarious construction activities and increased vehicular traffic (construction vehicles) would also contribute to the localized airborne dust. The larger sized particles, under influence of gravity, tend to settle down in the immediate vicinity of the source. The Suspended Particulate Matter (SPM) tends to remain suspended in the environment for much longer and persistent time and is an environmental hazard. The objectionable impacts of settling the suspended dust would be its dry deposition on vegetation, motor vehicles, structures, and other exposed surfaces. Exhausts from fossil fuel burning in the construction machinery will also deteriorate local air quality. Similarly, exhausts from generators can also have impacts on air quality in the vicinity. The deteriorated ambient air quality may cause health hazards to the residents of nearby localities.	- All vehicles, machinery, equipment and generators used during construction activities will be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions; - Open burning of solid waste from the Contractor's camps and at construction site will be strictly banned; - Preventive measures against dust will be adopted for on-site mixing and unloading operations; - Construction materials (sand, gravel, and rocks) and spoil materials will be transported through trucks covered with tarpaulins and all vehicles (e.g., trucks, equipment, and other vehicles that support construction works) will comply with the PEQS for carbon emissions and noise; - Regular water sprinkling of the site will be carried out to suppress excessive dust emission(s); - Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair will be needed to minimize the hazardous emissions;	- Visual observation - Regular environmental monitoring, sampling and testing reports - Vehicle maintenance records - Water sprinkling records.	Construction Contractor	Proponent, SC



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				Implementation	Monitoring
	The operation of an asphalt plant causes the emission of many different pollutants. The most common pollutants emitted from hot mix asphalt plants are particulate matter (PM₁₀), sulfur dioxide (SO₂), nitrogen oxides (NO_x), volatile organic compounds (VOCs), and carbon monoxides (CO). Potential impacts on the air quality during the construction stage will be due to the fugitive dust and the exhaust gases generated in and around the construction sites. Dust is a major component of air pollution during road construction. Emissions are generated mainly from the following construction activities: • Site clearance and use of heavy vehicles and machinery/equipment etc. at construction sites; • Procurement and transport of construction materials such as sand, cement, etc. to the construction sites; • Other gaseous emissions during construction result from operating of construction vehicles, plant and equipment; • During construction, the continuous operation of machinery and movement of heavy trucks/vehicles including futuristic growth of traffic volume during the construction period on the road and traffic jams may generate increased gaseous	• Emissions from batching / asphalt plants will be controlled efficiently by the installation of cyclone / scrubbers. Diesel operated equipment will be equipped with well-maintained fuel filter and may be replaced timely (if required). In addition to that, regular maintenance activities comprising changing of lubricating oil, changing the air and fuel filter, cleaning the fuel system, draining the water separators and proper tuning may also help in reducing the emissions from diesel generators; • PEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery will be enforced during construction works; • Service roads (used for earthmoving equipment and general transport) will be regularly sprayed with water during dry weather; • All excavation work will be sprinkled with water; • Construction workers will be provided with masks for protection against the inhalation of dust; • Vehicles used for construction will be tuned properly and regularly to control emission of exhaust gases; • Vehicle speed in the Project area will be prescribed not more than 20 kilometer per hour and controlled accordingly;			



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	emissions and dust (PM ₁₀ and PM _{2.5}), which are already exceeded and will severely affect the health of locals including residents, road users and business owners and can lead to a range of respiratory issues. Children, the elderly, and individuals with pre-existing health conditions are more vulnerable to the health effects of PM pollution. Elevated levels of PM ₁₀ and PM _{2.5} reduce air quality, leading to decreased visibility and hazy conditions. The construction activities as well as futuristic growth of traffic volume during construction period may also result in increased air pollution in the area. Increase in air pollution levels without Project and with Project during construction period (for mobile & stationary sources) is predicted from construction machinery, equipment, which reveals that there shall not be significant contribution towards pollution due to the construction activity of the Project if mitigation plan will be implemented and monitored in proper sense; and Asphalt heating.	- Tires of all the vehicles leaving the site will be washed. No earth, mud and dust shall be deposited on the public road; - Immediately consolidate the backfilled soil and restore the road surface; if immediate road restoration is not possible, provide a layer of plain cement concrete (PCC) of suitable mix on the backfilled trench so that dust generation, and erosion are arrested and it will also provide a smooth riding surface for the traffic until the road is properly restored; - Contractors will be asked to provide maintenance records for their fleet as part of the contract bid and at regular intervals throughout the life of the contract; - Precautions shall be taken to minimize dust emissions from hot mix plants, crushers, and batching plants by installing protective canvases and dust extraction units where applicable. Mixing equipment will be well sealed and equipped as per existing standards; and - Regular monitoring of air quality in accordance with the formulated environmental monitoring plan (given in EMP).			
22.	Greenhouse Gases and Climate Change The main sources of greenhouse gases (CO ₂ , CH ₄ , NO _x , etc.) during the	Use construction machinery designed with suitable pollution abatement technology such as scrubbers;	Regular environmental monitoring, sampling and testing reports	Construction Contractor	Proponent, SC



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	construction activities of the proposed Project will include both mobile and stationary sources. The mobile source will be the construction and transportation vehicles while the stationary source will be the batching and asphalt plants and indirect emissions from purchased electricity from external provider. Emission of greenhouse gases causes global warming and other climatic changes on regional and global scale. Cutting of trees in and around the Project site due to construction activities will also reduce the carbon sequestering and overall increase the CO₂ content in atmosphere, which is one of the major GHGs.	• In order to control NO₂ emission at site, diesel engine equipment and machinery will be installed with catalytic converter, as it allows diesel engine to take advantage of the trade-off between NO₂, PM₁₀ and fuel consumption, and calibrate the engine in a lower area of fuel consumption; • Ensure plantation development as per the tree plantation/reforestation plan for the sequestration of CO₂; • Used and old electrical equipment will be banned to reduce air emissions; • Environmentally friendly fuel such as Liquefied Petroleum Gas (LPG) shall be used instead of diesel; • Using optimized transport routes and transportation of materials in bulk will lower the emissions; • Efficient and low carbon footprint materials will be used in the construction; • Burning of waste will be strictly prohibited at the site; • Awareness programs of causes and effects of climate change will be conducted for mitigating GHG emissions among workers and concerned personnel; • Regular motioning of the vehicles for engine efficiency; • Avoid idling of construction vehicles; • Alternative energy resources shall be considered where possible;	• Vehicle inspection record • Plantation record		



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		• PEQS, 2016 applicable to gaseous emissions generated by construction vehicles, equipment and machinery will be enforced during construction works; and • Use of solar panels (if possible) at construction campsites instead of diesel generators.			
23.	Issues of Smog Construction activities related to proposed Project can significantly contribute to smog issues, primarily due to various pollutants released during the construction phase i.e. Particulate Matter (PM), Vehicular Emissions, Incomplete Combustion and Lack of Dust Control Measures.	• Implement robust air quality monitoring systems to track pollution levels and take necessary actions accordingly; • Implement and enforce regulations regarding air emissions as per PEQS, dust control measures, and the use of cleaner technologies in construction machinery and vehicles; • Encourage the use of electric or hybrid machinery and vehicles to reduce air emissions; • Employ effective dust control measures, such as water sprinkling, covering materials, and using dust barriers, to minimize the release of particulate matter; • Educate construction workers and the public about the importance of adopting eco-friendly practices to reduce smog formation; and • Vehicle Inspection & Certification System (VICS) should be implemented in true letter & spirit to reduce environmental pollution caused by unfit motorized vehicles.	• Audits and Checks	Construction Contractor	SC, Proponent



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		The following SOPs shall be observed for the proposed Project as per Punjab-EPA Order U/S 6(1)(T) of the Punjab Environmental Protection Act 1997 for Dust Suppression and Control at Building Construction Sites: • Installation of proper mist sprinkler systems around construction sites before the start of construction; • The Mist Nozzles shall be mounted at a distance of 2 ft from one another on water pipe, in leak-free manner. The water pipe shall be mounted on a stable structure; • The capacity and efficacy of Mist Sprinkler System shall be designed as per the dust emission level of the construction Site. The height of the system shall be adjusted as per construction altitude; • The operation of Mist Sprinkler System shall be adjusted based on weather conditions, wind patterns, and dust generation levels; • Prevent water accumulation in areas where it may pose a slipping or electrical hazard or lead to breeding of dengue mosquito; • Install a curtain of at least 10 feet around the under construction building; • Reduce the speed of trucks and trolleys when transporting soil or debris to reduce spread of dust; and			



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		Display these guidelines prominently on a cloth banner at the construction site.			
24.	Carbon Sinks Climate change demands dramatic shifts in designing and construction of buildings. Currently, housing and supportive infrastructure continues to surge at record rates world widely. Buildings and their construction account for 39% of global carbon dioxide emissions; 28% of those emissions come from operational carbon (the energy used to power, heat and cool a building) and remaining 11% of carbon emissions are generated from building materials and construction. One important part of the solution is to convert the built environment from a carbon source to a carbon sink.	To mitigate climate change impacts from the buildings (tourist facilitation centre, administration, etc.), low-carbon and especially carbon-sink materials and products shall be considered as one of the most important mitigation opportunities: - Low-Carbon Bricks: The utilization of low-carbon bricks helps to reduce embodied carbon found in conventional bricks and reduce CO₂ release produced during its manufacturing; - Green Concrete: The raw materials to form conventional concrete can be substituted with byproducts of industrial processes and recycled materials i.e. Carbon Intensive Portland Cement can be substituted by fly ash and granulated blast-furnace slag. Aggregate or sand can be substituted by washed copper slag, and granite by recycled granite from demolished debris. - Wooden Materials: Wood is a natural, renewable, and sustainable material for buildings, with a lighter carbon footprint than steel or concrete. Maximizing wood use in construction will remove CO₂ from the atmosphere.	Audits and Checks	Construction Contractor	Proponent, SC
25.	Resource Efficiency and Pollution Prevention	Diesel and fuels with low sulphur content will be used to operate	Audits and Checks	Construction Contractor	Proponent, SC



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	The materials used in construction of proposed Project would include coarse aggregates (crush), fine aggregates (sand), steel, water, asphalt, reinforcement and cement. Almost all the materials to be used in the construction of proposed Project are non-renewable and therefore their sustainable use is necessary for the future use. Fuel will be used to operate construction machinery and asphalt and batching plants. Sustainable use of energy resources is very important not only to continue future use but also to help to reduce air emissions / pollutants. For conservation of energy, efficiency of the engines and burning processes is very important.	construction machinery and equipment's; • Efficient and well-maintained equipment and machinery shall be used for construction activities; • The equipment's and machinery will be turned off when not in use; • Regular maintenance of machinery to avoid fuel leakages; • Reduction of wastage of water through training of workers involved in water use will be planned; • Water jets and sprays will be used for watering surfaces rather than using overflow system; • Ensure adequate insulation to reduce heat loss through batching and asphalt plants; • Use minimum amount of bitumen for road surfacing; • Plan for reuse of construction waste materials will be formulated; • A good camp design and an efficient worksite management plan will be prepared that will help the contractor to reduce the water demand, wastewater and solid waste volumes to the lowest levels; • Use of solar panels at camp sites to conserve energy; • Careful selection of water source to minimize disturbances to existing community water supplies; and			



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		- Regularly monitor CO and CO₂ content of the flue gases to verify that combustion systems are using practical excess air volumes. - The Resources Conservation Plan is attached as Annexure-III.			
26.	Noise and Vibration The noise and vibration will be produced due to the operation of construction machinery equipment. Sources of noise and vibration during construction are heavy machinery such as bulldozers, excavators, stabilizers, concrete mixing plant, pneumatic drills, stone crushers, asphalt plants and other equipment. Noise and vibration are perceived as one of the most undesirable consequences of construction activity. The above machinery is expected to generate noise levels that would be severe in the Project area. The noise and vibration may cause health hazards to the residents of the study area. The noise produced by construction equipment is presented in Table 6-3. Vibration generated by construction activity has the potential to damage structures. This damage could be structural damage, such as cracking of floor slabs, foundations, columns, beams, or wells, or cosmetic architectural damage, such as cracked plaster, stucco, or tile. The predicted ground vibrations at various distances are shown in Table 6-4 for typical	- There are a variety of ways including Quieter Equipment; Modifying Existing Old Equipment; Barrier Protection; Work Activity Scheduling; Maintenance; Noise Perimeter Zones (NPZs) by which construction equipment and worksite noise can be controlled; - Residents in and around the area of influence of the proposed Project site will be notified earlier, before commencement of excavation operations; - Horns will not be used unless it is necessary to warn other road users or animals of the vehicle's approach; - Contractors will comply with submitted work schedule, keeping noisy operations away from sensitive points; implement regular maintenance and repairs; and employ strict implementation of operation procedures; - Sensitize truck drivers to avoid hooting, especially when passing through the residential area; - Locating the concrete mixing and materials shipment yards at least two (02) kilometer away from sensitive	- Physical observation - Regular environmental monitoring, sampling and testing reports - Vehicle maintenance records	Construction Contractor	Proponent, SC



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	equipment that will be used during proposed construction. The typical vibration from heavy trucks is generally low, and usually imperceptible in nearby buildings.	area, will also help reduce local noise levels; - The plants and equipment used for construction will strictly conform to noise standards specified in the PEQS, 2016; - Timing of the construction works to be conducted during the recommended operational hours, to reduce vibration levels to residential and commercial properties; - Residents to be pre-warned of high vibration events and any operations being undertaken outside recommended hours; - Ensure vibration measurement during construction phase by the contractor near the settlements/sensitive receptor in AOI along the proposed Project sites; - Timing of the construction works to be conducted during the recommended operational hours, to reduce vibration levels to residential and commercial properties; - Residents to be pre-warned of high vibration events and any operations being undertaken outside recommended hours; - The vibration from rolling and compacting activities would be considered intermittent and short-term, and likely to be tolerated if prior warning is given to potentially affected locals. Locals would			



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		therefore, be pre-warned of high vibration events, and any operations being undertaken outside recommended hours. Public notification would be given a minimum of 72 hours prior to plan works. Locals would be made aware of the construction times and the duration they would likely be affected, through letter drops, personal meetings/phone calls as necessary; and The equipment operators to be made aware by the contractor of potential vibration issues problems and of techniques to minimize vibration effects during construction works.			
27.	Construction Camps/Camp Sites Improper construction camp location and mismanagement of construction camp activities can lead to environmental and social impacts in the Project area comprising health and safety issues, traffic problems, soil degradation, loss of vegetation and assets on the selected land, solid waste and water pollution. Furthermore, cultural differences, behavior of construction workers, potential disregard for local cultural norms can lead to increased tension between local communities and workers residing in the construction camps.	- The Project will seek to avoid sitting camps where their presence might contribute to any conflicts with locals; - Implementation of employment policies which aim to maximize job opportunities for local people to minimize tensions caused by different socio-cultural values; - Camps will be designed to be self-contained to reduce demand on infrastructure and services of nearby communities; - A comprehensive safety and security plan for the camp will be prepared which will comprise of a training manual, use of safety equipment and emergency preparedness;	- Visual observation and photographic record. - Waste Management plan implementation	Construction Contractor	Proponent, SC



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		• Training will be provided to all staff on camp management rules and overall discipline and cultural awareness; • Waste Management Plan (Annexure-II) will be implemented to ensure safe handling, storage, collection and disposal of construction wastes and the training of employees who handle waste; • Site for construction camp will be selected to minimize the removal of existing macro-plants at camp sites; • Photographical and botanical inventory of vegetation before clearing the site; • Compensatory plantation to be done when construction work near ends; and • The contractor(s) shall ensure the removal and rehabilitation of site upon completion.			
28.	Wastewater Generation at Construction Camps The workers will generate wastewater at the construction camps. If the generated wastewater is not properly treated or disposed of, this may contaminate the surface water sources such as nullahs, drains, water channels, etc. apart from soil contamination. The wastewater generation is estimated to be 592 gallons/day for 70 construction workers during construction phase of the proposed Project.	• Domestic and chemical effluents from the construction camp will be disposed by the development of on-site sanitation systems i.e. septic tanks (as shown in Figure 6-1); • Proper monitoring to check the compliance of PEQS will be carried out; • Sewage from construction camps will be disposed of after proper pre-treatment and processes such as soakage pit; • Construction yards and material storage areas where vehicles operate	• Visual observation and photographic record. • Waste Management plan implementation	Construction Contractor	Proponent, SC



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		or materials are stored will be established on well drained fill; - Free-flowing points of discharge for storm water will be identified nearby the boundaries of materials storage/construction yards for gravity or pump-assisted dewatering and yard drainage; - Wastewater discharged to drain shall contain a minimum quantity of suspended solids; - Temporary worker quarters and erection yards will include self-contained waste treatment with removal of excess by vacuum truck or approved discharge point; - Drainage from fuel storage tank locations, refueling areas, and equipment service areas will be segregated from other runoff; discharge shall be routed through an oil/water separator; - Contractors will be required to observe drainage conditions during dewatering operations and storm events to assure positive drainage. If flooding occurs along roadways or in neighborhoods, or community complaints arise, the contractor will undertake a combination of the above mitigation measures to minimize drainage and water quality impacts; and - The Contractor(s) will be responsible to submit details of site-specific			



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		wastewater management plan along with details of wastewater collection, transportation and its disposal.			
29.	Solid Waste Generation at Construction Camps The solid waste generation estimated to be 39kg/day for 70 construction workers during construction phase of the proposed Project. Different type of waste is likely to be generated during the construction phase of the proposed Project. The municipal waste will be in the form of food, cans, paper and wastewater from construction camps toilets and washing yards. Construction waste will include excavated soil, sand, gravel, rocks, asphalt, pieces of concrete, bricks, wood, metal pieces and electrical wires. Whereas, hazardous waste can be comprised of paints and construction chemicals. All these, if left unattended, can become a source of nuisance and environmental pollution in the Project area. Insecure and unhygienic disposal of the solid wastes particularly garbage and trash may cause degradation of soil and land. Insecurely disposed off heaps of wastes containing kitchen garbage and food waste can serve as breeding grounds for the disease spreading vectors and rodents. Throwing away of solid wastes into water channels and the wastewater network can result into choking of the latter.	• Solid Waste generated during construction and camp sites will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan; • Training of work force in the storage and handling of hazardous materials and chemicals; • Construction workers and supervisory staff will be encouraged and educated to practice waste minimization, reuse and recycling to reduce the quantity of the waste; proper labelling of containers, including the identification and quantity of the contents, hazard contact information, etc.; • Waste disposal plan must be reviewed during the entire construction phase in the light of changing weather conditions; • An emergency response plan shall be prepared to address the accidental spillage of fuels and hazardous goods; • Immediate collection of spilt oils/fuels/lubricants by collection of contaminated soils and skipping oils from surface water by applying appropriate technologies;	• Visual observation and photographic record. • Waste Management plan implementation	Construction Contractor	Proponent, SC



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		- Reusing bitumen spillage; and disposing of non-usable bitumen spills in a deep trench providing clay linings at the bottom and filled with soil at the top (for at least 0.5 m); - Used oil shall be collected in separate containers stored on the impervious platform with restricted access and shall be sold to the licensed contractor and the burning of waste oil shall be strictly restricted; - Segregating and stockpiling scarified/milled bituminous material and reusing this material in sub-grade/shoulders; and - The contractor should ensure the implementation of the proposed Construction Waste Management Plan and it must be reviewed during the entire construction phase in the light of changing weather conditions.			
30.	Solid Waste (Construction, Municipal and Hazardous Waste) Due to construction activities, municipal, construction and hazardous waste will be generated from construction activities and contractors' camps. Insecure and unhygienic disposal of municipal solid waste particularly garbage and trash will cause degradation of soil and land. Insecurely disposed of heaps of waste containing kitchen garbage and food waste from construction camps can serve as breeding grounds for the disease	- The waste generated from the camp site shall be disposed of at Rawalpindi Waste Management Company approved sites; - Burning of waste shall be prohibited; - Proper labeling of waste containers, including the identification and quantity of the contents, hazard contact information will be carried out; - Training of employees involved in the storage and transportation of hazardous materials and chemicals regarding emergency procedures will be ensured;	- Visual observation and photographic record. - Waste Management plan implementation	Construction Contractor	Proponent, SC



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	spreading vectors and rodents. Throwing away of solid waste into nearby drain can result into choking of the latter. Empty containers containing the toxic, flammable and corrosive materials will pose hazard to the workers. This may result in health risk to work force and public, if disposal site is improperly selected. Construction waste includes insulation, nails, electrical wiring, rebar, wood, plaster, scrap metal, paper bags, cement, and bricks. Improper dumping of waste may generate odor, soil and water pollution, and disease vectors. Improper disposal of construction waste can also lead to nuisance and hazards towards environment and local population. The unspent materials and debris produced from consumed up materials, if left as such and allowed to mix with soil underneath, can degrade the quality of receiving soils and render them unfit for plantation. Leakages of oils, lubricants, chemicals, and other similar substances from their storage sites can spoil the receiving soils and may undermine ability of the spoiled soils to support growth of vegetation and plants.	- Waste pile will be controlled so that it does not spread and start to impede other activities, and stays at a height that it does not become a safety hazard. Barricades will also be placed around the pile to delineate the safe distance for other workers; - Residual and hazardous wastes such as oils, fuels, and lubricants will be disposed of via licensed third parties; - Liquid waste such as grey water, sewage, slurry and other wastewater will be collected from source by a designated tanker, and taken off-site for disposal at safe disposal facility; - If the waste pile contains plastic, paper and other light-weight material it shall be covered with a net, and tarpaulin or similar to stop waste from blowing around; - If disposal is required, the site will be selected preferably from barren and infertile lands, and sites will be located away from residential areas, water bodies and any other sensitive land uses; - Construction workers and supervisory staff will be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste; - The contractor will develop specific environmental management plans for asphalt plants and concrete batching plants. These plans will incorporate			



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		the general measures as applicable to the entire Project, but will also have focused mitigations for solid waste from these plants; - Waste disposal plan will be reviewed during the entire construction phase in the light of changing weather conditions; - Waste containers with proper color coding will be provided on site to store different type of waste i.e.: - White: Gypsum – gypsum and plasterboard products; - Grey: Inert – clean concrete, rubble, hardcore, brick and block that will not decompose or create a hazard when buried; - Black: Mixed General Waste – any waste except contaminated waste that cannot be recycled in other skips on the site; - Blue: Metal – all types of clean metal, including rebar offcuts, and scrap metal; - Green: Wood – all types of clean, untreated timber and wood products; - Brown: Packaging – paper products; and - Orange: Hazardous – only for contaminated waste such as asbestos, paint tins, mastic tubes, and tarmac. - Toxic waste will be handled, stored, transported and disposed-off			



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		separately. Safe handling precautions and product specific information found in Material Safety Data Sheets (MSDS), shall be posted on site and accessible to all workers; and The contractor will ensure implementation of proposed Construction Waste Management Plan (attached as Annexure-II) and it must be reviewed during the entire construction phase in the light of changing weather conditions.			
31.	Disruption / Traffic Management / Impacts of Heavy Vehicles on the Existing Road Network Traffic load on Lehtrar Road, Kotli Sattian Road, Korang Road, Kotli Link Road, Tourism Highway, Islamabad Expressway, and Murree Expressway and connecting access roads would be increased due to the Project activities and due to the movement of heavy machinery especially during construction phase. This will in turn cause traffic problems (jams and congestions) for the commuters and transporters using these roads for their daily activities. The movement of vehicles along the haulage routes will cause soil erosion, debris flow, dust emissions, vibrational impacts and will deteriorate the existing condition of the roads due to tearing and wearing.	- Movement of vehicles carrying construction materials and equipment/machinery will be restricted during the daytime to reduce traffic load and inconvenience to the local population; - Construction vehicles, machinery and equipment will be parked at designated areas (at construction camps site) to avoid un-necessary congestions along the major roads; - Damages of roads due to construction vehicles will be instantly repaired and/or compensated after the completion of work; - Proper sign boards will be provided for smooth flow of traffic; - Period of construction and area / location of construction site shall be informed to public in general and specifically to local residents;	- Vehicle maintenance record - Training record - Implementation of TMP - Regular visual observations	Construction Contractor	Proponent, SC



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		• The Contractor will ensure that the diversion and detour is always maintained in running condition, particularly during the intense rainfall events to avoid disruption to traffic flow; • Contractor will adopt best construction practices i.e. vertical cutting approach with proper shoring and bracing, to limit the width of trench excavation; • The temporary traffic detours will be kept free of dust by frequent application of water; • Traffic controls and diversions marked with signs, lights and other measures (flags) will be provided as a warning of road hazards and other pertinent information to motorists and the general public; • At work site, public information and caution boards will be provided including contact for public complaints; • The Contractor will not use any vehicles either on or off road with grossly excessive noise pollution; and • Any closure of the roads (especially main roads) and deviations / diversions proposed shall be informed to the riders through standard signs and displays; and • In the light of Guideline Traffic Management Plan (Annexure-IX) a site specific TMP will be prepared by			



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		the contractor and implemented to avoid traffic accidents, jams/public inconvenience.			
32.	Flora The Project may involve destruction of vegetation cover on construction areas. It is initially examined that approximately 100 numbers of trees may be disturbed. The provided number of trees is approximate and tentative. Moreover, small plants will be removed due to the layout of the Project for which compensation will be made to concerned parties, if any. The following impacts are also expected on the floral species in the surrounding of Project area: - During the construction dust laden polluted air will form a dust film on leaves thus blocking sunshine and stomata consequently hindering photosynthesis processes and causing detrimental effects on the plant health; - Exhaust of noxious gases from the movement of heavy machinery will further pollute the air, which will adversely affect the health and vigor of plants; - Establishment of contractors' camps and warehouses for storage of equipment and materials will involve clearing of shrubs and grasses from the area, causing a negative impact; and	- Trees that will be cut down during the establishment of paragliding club shall be transplanted wherever possible; - A Tree Plantation Plan of 1,000 trees to be planted within the premises of Paragliding club has been formulated (Annexure-IV), which shall be implemented by the TDCP with the recommendations and technical support of the Forest Department; - Due consideration shall be given to invasive/non-invasive species factors while plantation of trees; - Implement tree protection measures (e.g., fencing, root zone preservation); - To minimize dust emissions, regular water sprinkling will be strictly followed; - Clearing of vegetation cannot be avoided at the areas specified for Project structures, but damage to the natural vegetation shall be minimized by establishing campsites, workshops and batching plants on waste/barren land rather than on productive land;	- Implementation of Tree Plantation Plan - Visual Observations	Construction Contractor in association with Forest Department	Proponent, SC



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	During construction activities, the contractor's workers may damage the ornamental plants and trees, for use as fire-wood to fulfill the camps requirements.	- Incorporate technical design measures to minimize removal of trees for the construction of contractor camps, if any; - Construction vehicles, machinery and equipment will remain confined within their designated areas of movement; - The Contractor's staff and labor shall be strictly directed not to damage any vegetation such as trees or bushes; and - Contractor shall provide gas cylinders at the camps for cooking purposes and cutting of trees / bushes for fuel shall not be allowed.			
33.	Fauna During construction phase, the existing population of mammals and reptiles of the construction areas will be affected due to disturbance arising from construction activities involving excavation, blasting, movement of machinery and vehicular traffic, movement of labor, camping, etc. The existing livestock of the study area in quest of fodder will leave the directly affected areas due to construction activities and human intervention. Some reptiles particularly species of snakes and lizards may get killed during the earthwork's operations. Moreover, the movements of mammals and reptiles will be restricted during the construction phase.	- Where programmed construction activities permit, there should be no removal of trees, treelines or areas of semi-natural habitat during the bird-breeding season of March to August inclusive. Any works in the vicinity of active badger setts or any sett that requires exclusion, if unavoidable, will be conducted under NOC during the period July to October inclusive to avoid the cubing season and the winter period; - If found any wild species during construction, it will be dealt carefully and local wildlife department officials will be called; - Hunting, poaching and harassing of animals shall be strictly prohibited, and Contractor shall be required to instruct and supervise its labor force	Visual Observations	Construction Contractor in contact with Wildlife Department	Proponent, SC



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	Birds will also tend to move away from the construction areas and find shelter and food elsewhere due to the activities mentioned above for fear of being hunted / trapped. Cutting of trees may adversely affect their habitat as trees provide nesting and resting sites to them. Noise generated from construction machinery, particularly during the night hours will even scare the wildlife residing in habitats located at some distance from the construction areas. Food and refuse at the Contractor's camps will attract animals that might in turn be hunted by the workers.	accordingly, and clear orders shall be given in this regard; • The camps will be properly fenced and gated, to check the entry of birds and mammals in search of eatable goods. Similarly, wastes generated from camps will be properly disposed of, to prevent the chances of eating by animals, which may become hazardous to them; • The contractor will make arrangements / measures to minimize vibration and noise pollution through good engineering practices; • Noise control measures will be enforced during the construction phase such as provision of silencers on heavy construction vehicles especially near nesting areas and avoiding noise generating activities during the critical period of breeding; • Efforts will be made to keep noise levels at acceptable levels (as per PEQS) produced by the construction activities; • Over speeding of construction vehicles will be prohibited in the Project area, to avoid and minimize any accidental killing of birds, reptiles and mammals; • Plantation of large number of trees along the proposed Project to regain the ecological habitat; • Noisy work will not be carried out at night time so that there should be no			



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		disturbance to local birds and animals; • Borrow pits will be fenced so that no animal can fall into these; and • The Project will be completed timely to reduce the impacts.			
34.	Fisheries As per the baseline provided in Chapter 4, Jhelum River is flowing along southern-eastern side of the Project Site. However, no construction activities will be required in and around the river. Therefore, no major impact on the fisheries is anticipated. However, during the construction of the proposed paragliding club, activities such as the storage of chemicals and establishment of construction camps may trigger oil spills and wastewater/solid waste discharge into the river.	• The contractor will be instructed to avoid the wastewater and the chemical spills into the Jhelum River; • No solid waste will be dumped or thrown in the waters to avoid any negative impacts on aquatic biota; • Ensure to start construction during low flow period to minimize the impact on downstream aquatic life; • Cordon off the area with mesh while working to avoid the dispersion of construction material; • Strict compliance and inspection of the construction activities along with continuous engagement of the Fisheries Department during the construction stage to control any water pollution; • The awareness campaign among the labour is mandatory to avoid damage to the fisheries; and • Labor will be aware of concerned fisheries and wildlife acts. Disturbance to the fisheries (if reported) during breeding season will be avoided to conserve the natural resources of the region.	• Visual Observations	Construction Contractor in contact with Fisheries Department	Proponent, SC



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35.	Discovery of Heritage Sites/ Structures during Excavation During excavation, there is a chance of finding artifacts. In case of finding any artifact, the contractor shall immediately report through PMU TDCP to Directorate General (DG) of Archeological Department, Government of Punjab to take further suitable action to preserve those antiques or sensitive remains.	Chance finds procedure (given in Annexure-V) shall be adopted in case of any accidental discovery of cultural heritage.	Implementation of chance find procedure	Construction Contractor	SC, Proponent
36.	Interference with Other Utilities As discussed, the proposed Project may interfere with the existing transmission line passing through the boundary of study area, and will cause temporary disruption to this facility in the Project area.	- Contractor in liaison with Client shall consult with concerned department, to delineate their network locations and alignments; - Proper compensation will be given to the concerned department, in case of utility disturbed or if need relocation; - Inform local residents and business owners in advance about complete Project program, and disruption to utility service, while working; and - Timely public notification of unexpected disruption of service.	- Visual observation and photographic record. - Regular monitoring, audit and checks.	Construction Contractor	Proponent, SC
37.	Social/ Cultural Conflicts During the construction phase of the Project, conflicts may arise between labor force and local community. Use of local resources and products by the construction workers can generate stress on the local resources. Furthermore, difference in cultural values may also cause discomfort to local community.	- Local labor especially from nearby communities will be given preference for the construction works; - Careful planning and training of the workforce to minimize disturbance to the local people/community; - During the construction phase, mobility of workers in the nearby areas will be strictly restricted by the contractor to avoid any	- Visual observations - Regular monitoring, audit and checks	Construction Contractor	Proponent, SC



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		inconvenience to the local communities, especially women's; - The contractor will select specific timings for construction work to cause the least disturbance to the local population considering their peak movement hours; - Public notification through print or electronic media and Masjid loudspeakers during the entire construction phase to avoid any inconvenience in accessibility to the locals; and - Adequate training especially for the transitive workforce of the proposed Project (involved both in the construction process and in the commissioning) to regard the customs of the area so that the locals do not feel insecure.			
38.	Health Impacts (Diseases) The health impacts that are envisaged to take place among employees and workers of the proposed Project are discussed below: For the implementation of Project activities, skilled and unskilled labor is required by the contractor. Mostly, skilled and unskilled workers have been hired by the contractor on permanent and contract basics, belonging to different cultural backgrounds, which they utilize for different developmental projects. In this case, occurrence of communicable diseases like HIV/AIDs,	- Proper checkup of skilled and unskilled workers before their hiring and twice annually during the construction phase; - Labor camp will be away from the local communities and workers' management plan shall be formulated by Contractor to minimize the adverse impacts on local communities and workers due to communicable diseases; - Trainings, awareness and campaigns shall be conducted for workers and surrounding communities on	- Implementation of HSE Plan - Use of PPEs - Community concerns record - Medical reports of worker	Construction Contractor	Proponent, SC



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	COVID-19, respiratory diseases, and skin and eye infections are communal to take place during the execution of the proposed Project.	awareness and prevention of HIV/AIDs and COVID-19; - Workers will be educated on personal hygiene and sanitation concerns, leading to communicable and non-communicable diseases; - Water will not be allowed to stagnate even if clean, and measures will be taken to cover the area; and - Insecticides will be periodically sprayed.			
39.	Occupational Health and Safety Occupational Health and Safety (OHS) related impacts will arise during construction phase activities comprising clearing of earth, levelling, compaction, carpeting, pavement finishing and testing & commissioning. Eye injury can be caused by stone or metal particles. Hazard of being hit by falling objects, major hand-arm and whole-body vibration hazards, skin and respiratory tract irritation from exposure to cement dust, overexertion and awkward postures, etc. will be another impact. Welding hazards include electric shock, fumes and gases, fire and explosions, falls from height, eye and head injuries, etc. Other impacts will be fall from height due to imbalance, contact with heavy electrical and mechanical equipment, equipment failure, uncontrolled movement, unguarded moving mechanical equipment parts, fatigue,	- Ensure the compliance of Occupational Safety and Health Act, 2018 at the workplace to protect the construction workers against risks arising out of occupational hazards; - The construction contractor shall depute a safety officer with specified responsibilities to supervise all the construction activities at the proposed Project sites; - Training of workers in construction safety procedures, environmental awareness, equipping all construction workers with safety boots, helmets, gloves and protective masks, goggles, shields and monitoring their proper and sustained usage; - Providing basic medical training to specified work staff, and basic medical services and supplies to workers; - Obligatory insurance against accidents for laborers and employees;	- Implementation of HSE Plan - Use of PPEs - Training Records - Work permits - Implementation of Emergency response plan and disaster management plan in case of natural disaster occurrence	Construction Contractor	Proponent, SC



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	unbalanced load, falling objects, hand injury, slip and trip hazards, wind / storm activity, injury from releasing load too soon, etc. Operating mechanical and electrical equipment will trigger the OHS related issues e.g. struck by moving vehicles or other equipment, slips or trips, struck by flying objects, such as dirt or splashed fluids, caught in pinch points, shear points, crush points, falling from machine, etc.	- Layout plan for campsite, indicating safety measures taken by the contractor, e.g. firefighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents; - Work safety measures and good workmanship practices will be followed by the contractor to ensure no health risks for laborers; - Protection devices (ear muffs) will be provided to the workers, doing the job in the vicinity of high noise generating machines; - Disallow worker exposure to noise levels greater than 85 dBA for duration of more than eight hours per day without hearing protection. The use of hearing protection will be enforced actively; - Provision of adequate sanitation, washing, cooking and dormitory facilities including light-up to satisfaction; - Elaboration of contingency planning in case of major accidents; - Ensure that the sites will be restricted from the entry of irrelevant people, particularly children, disabled and elderly peoples; - Provision of protective clothing for laborers handling hazardous materials, e.g. helmet, adequate footwear for bituminous pavement			



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		works, protective goggles and gloves and ensure strict use of wearing these protective clothing during work activities; • All trenches deeper than two (02) meters will be protected with wooden bracing to avoid safety risks to workers, public and nearby buildings and structures; • Ensure the visibility of workers through their use of high-visibility vests when working in or walking through heavy equipment operating areas; • Ensure moving equipment will be outfitted with audible back-up alarms; • Ensuring the availability of a mobile dispensary at the active construction sites throughout the construction period to provide emergency treatment; • Safety lookouts will be built to prevent people and vehicles from passing at the time of hot or cold work; • Adequate lightning devices, barriers, yellow tape and safety signage will be posted at the Project sites; and • Occupational Health and Safety Plan is attached as Annexure-VII as a guideline for the implementation of OHS considerations during supervision phase.			
40.	Community Health and Safety The construction activities and vehicular movement at construction sites may	• Provision of safe corridors along the proposed Project and construction areas, and safe crossings for	• Implementation of HSE Plan • Use of PPEs	Construction Contractor	Proponent, SC



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	result in roadside accidents particularly inflicting local communities who are not familiar with presence of heavy equipment. Quality of groundwater and surface water resources available in the nearby local communities may be affected due to the construction activities, oil spillage and leakage, roadside accidents, etc. The labor works with different transmittable diseases will cause spread out of those diseases in the local residents. Conflicts may arise between the local community and the construction workers, which may be related to religious, cultural or ethnic differences, or based on competition for local resources. The proposed Project also have potential of air (dust pollution), noise and vibrational impacts on nearby community. During the construction activities, elevated air and noise levels may create short-term and long-term health issues such as respiratory diseases by air pollution and hearing impairment, hypertension, annoyance and sleep disturbance due to noise pollution among the local communities of the study area. Indirect effects on public health can include increased incidence of tuberculosis, asthma, chronic bronchitis, and gastrointestinal diseases.	pedestrians and bicyclists during the construction phase. Crossing locations will consider community preferences, including those related to convenience or personal safety; • Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian facilities or bikeways; • Setting of speed limits appropriate to the road and traffic conditions; • Instruct foremen to strictly enforce the keeping out of non-working persons, particularly children, off work sites; • Timely public notification on planned construction works; • Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity and social links; • 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, which includes: Prevention of larval and adult propagation of vectors through sanitary improvements and elimination of breeding habitat close to residential areas and by eliminating any unusable impounding of water;	• Community concerns record • Medical reports of worker		



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		• There will be proper control on construction activities and oil spillage of vehicles; • The laborers with different transmittable diseases will be restricted within the construction site; • Efforts will be made to create awareness about road safety among the drivers operating construction vehicles; • Confine work areas and prevent public access especially for children and elderly people's to all areas where construction works are on-going through the use of barricading and security personnel; • Attach warning signs, blinkers to the barricading to caution the public about the hazards associated with the works, and presence of deep excavation; • Regular water sprinkling will be done on all construction active areas present close to sensitive receptor in order to reduce dust exposure; • Traffic Management Plan and appropriate road safety measures will be implemented to avoid traffic accidents, jams/public inconvenience; • Ramps will be placed on deep excavation sites so that accidents due to slips may be avoided;			



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		- Provision of proper safety signage, particularly at sensitive and accident-prone spots; - The communicable disease of most concern during construction phase, like sexually-transmitted disease (STDs) such as human immunodeficiency virus (HIV)/ Acquired Immunodeficiency Syndrome (AIDS) and COVID-19 will be prevented by successful initiative typically involving health awareness; education initiatives; training health workers in disease treatment; immunization program and providing health services; - During construction work, pedestrian and vehicular passages will be provided for crossing near settlement; - Contractor will take due care of the local community and observe sanctity of local customs and traditions by their staff. Contractor will warn the staff strictly not to involve in any unethical activities and to obey the local norms and cultural restrictions; - Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity and social links; and - Fencing around the camps will be strong enough so that it cannot be broken easily by local people for making passages.			



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41.	Accidental Risks The proposed Project involves a number of operations simultaneously i.e. site clearing, excavation, piling, etc. This increases the probability of accidental injuries to workers and general public and residents.	- Contractor will designate one of the staff members to act as lead person for emergency response and safety issues; - Contractor will be responsible to provide first aid facilities at construction sites as well at camp sites; - Contractor will provide safety equipment's such as helmets, goggles, ear plugs, gloves, safety harnesses, safety shoes, etc. to the workers; - Safety signage will be erected at potentially dangerous working areas; - Proper lighting arrangements will be ensured for night shift working; - Contractor will be responsible to provide insurance against accidental death and injuries to workers and public; and - Public and animal access to construction site will be restricted by providing fences.	- Implementation of HSE Plan - Use of PPEs	Construction Contractor	Proponent, SC
42.	Natural and Man-Made Disasters Natural disasters (earthquakes, land sliding and floods) and accidents such as fire, falls, slips and trips can result in injuries, financial losses and may even lead to deaths. The workers shall be trained and facilitated to cope with such disasters.	- An Emergency Response Plan (ERP) for earthquakes and manmade disasters will be developed by contractor in coordination with Client and will be implemented in close consultation with the RESCUE Services (1122) and concerned departments; - Training of the contractor staff and employees regarding the emergency	- Trainings, drills, record keeping - ERP implementation - Visual observation and photographic record.	Construction Contractor	Proponent, SC



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		procedures and plans will be regularly conducted; - Emergency numbers will be clearly posted at all construction locations; and - Minor incidents and near misses will be reported, and preventive measures will be formulated, accordingly by the Client and Contractor. - The Emergency Response Plan is attached as Annexure-VIII.			
O&M Phase					
43.	Air Quality and Climate Change Aspects During operation phase, operation of paramotors, stand-by generator and unnecessary idling of diesel run engine of paragliding club will result in the emission of pollutants (CO, Smoke, NO_x, SO_x CO₂ & PM₁₀) into the air, thus deteriorating air quality. Continuous exposure to these pollutants may pose respiratory and cardiovascular health risks, particularly for staff working in close proximity to these emission sources. Additionally, emissions from commercial kitchens, as well as heating, ventilation, and air conditioning (HVAC) systems, will further contribute to the overall air quality deterioration. Cooking exhaust fumes, containing grease, volatile organic compounds (VOCs), and other airborne particles, may degrade air	- Periodic campaigns for educating the drivers shall be launched to keep their vehicles tuned up and in good running condition to reduce emission load and to promote conservative usage of the natural resource (natural gas and water); - Open burning of all types of waste materials and the garden wastes will be strictly banned; - Location of generators in facility will be carefully selected; - Install high-efficiency kitchen exhaust hoods and filtration systems to capture airborne grease, smoke, and VOCs; - Plantation of trees along the generators to create a buffer zone that will help in absorbing the emissions; - Use of gas generators (if possible) will be preferred for low emissions;	- Regular monitoring, sampling and testing - Audit and checks	Proponent	



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	quality within and around the operational areas. Another significant concern is the potential for airborne dust and particulate matter from disturbed and exposed soil surfaces, especially if greenbelts and vegetative cover are not adequately maintained. Soil erosion, combined with wind action, can lead to the suspension of dust particles, further degrading air quality and reducing visibility in the area. Moreover, the open burning of food waste, organic debris, and yard trimmings can significantly contribute to local air pollution. The burning process releases harmful pollutants, including fine particulate matter (PM_{2.5} and PM₁₀), dioxins, and toxic gases, which not only compromise air quality but also pose serious health hazards to site workers and visitors. Indoor Air Quality (IAQ) The specific pollutant, the concentration of exposure, and the frequency and duration of exposure are all important factors in the type and severity of health effects resulting from poor IAQ. Symptoms related to poor IAQ are varied depending on the type of contaminant. Failure of management to respond quickly and effectively to IAQ problems can lead to numerous adverse health consequences. Symptoms will include irritation of the eyes, nose and	• Use of solar panels (renewable energy source) for running generators, as it will save the energy; • Un-necessary running of vehicle engines inside paragliding club will be banned and strictly monitored; • Awareness should be raised among the staff and tourists regarding protection of environment through placement of signboards at appropriate places preferably on the roadsides, gazebos, kiosks, pool side, runway, distribution of leaflets, brochures and advertisements on social media; • Provision of budget for regular monitoring of ambient air quality as specified in EMP of Chapter 7, in accordance with PEQS, 2016; and • Ensure cleaning of ducts, filters, components of HVAC, replacing filters and measuring energy use and comfort. Performance measurements will be done monthly or at least quarterly, to provide operators with enough data to tell when systems are beginning to perform poorly. Indoor Air Quality (IAQ) ▪ Inspect and assess the building envelope, including the roof, walls and foundation and promptly respond to identified problems. Routinely check the building for water leaks, seals around doors and windows, and			



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	throat, headaches, dizziness, rashes, muscle pain and fatigue. Building dampness is associated with significant health effects. Numerous species of bacteria and fungi, in particular filamentous fungi (mold), can contribute significantly to indoor air pollution. Whenever sufficient moisture is present within building, these microbes can grow and affect the health of occupants in several ways. Occupants may develop respiratory symptoms, allergies, or asthma. Asthma, cough, wheezing, shortness of breath, sinus congestion, sneezing, nasal congestion, and sinusitis have all been associated with indoor dampness.	any visible damp or moist parts of the building. Clean and dry any damp or wet building materials and furnishings within 24 to 48 hours after detection to prevent the growth of mold; - Ensure and validate that the building is maintained under slight positive pressure (i.e., air comes out of the building when exterior doors are opened); - IAQ will be monitored on a regular basis for parameters like CO, CO₂, NO₂, VOCs, etc. as per PEQS, 2016; - Ensure good housekeeping practices in the tourist facilitation centre, pilot facilitation centre, offices, etc.; - Ensure routine preventive maintenance and upkeep of the building. A preventive maintenance program provides care to all building systems and components that keep them operating at peak performance according to the manufacturer's specifications, and also allows for early detection of problems; and - TDCP develops and implement an IAQ management plan (if required during O&M) to address, prevent, and resolve IAQ problems in the buildings of paragliding club.			
44.	Noise and Vibration During the operational phase, various sources of noise and vibration may contribute to environmental	Use of horns will not be allowed in the paragliding club site and access roads,	- Regular monitoring, sampling and testing - Audit and checks	Proponent	



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	disturbances, potentially affecting staff, visitors, nearby residents, and local wildlife. These impacts can be particularly noticeable during peak visitor hours when activity levels are at their highest. <u>Primary Sources of Noise and Vibration</u> - The operation of standby generators will be a constant source of noise, particularly in areas where backup power is frequently required; - Prolonged exposure to generator noise can become a nuisance for staff and visitors, affecting their comfort and overall experience; - If not adequately mitigated, continuous generator noise may contribute to stress and hearing discomfort for individuals in close proximity; - The movement of vehicles transporting visitors, equipment, and supplies to and from the site will generate noise and vibration; - The use of horns, particularly in congested areas, can be a significant source of noise pollution, causing disturbances to nearby residential communities; - During peak visitor hours, the cumulative noise from vehicle engines, tire friction, and honking can create an unpleasant environment for both visitors and local residents; and	- Implementing and adhering to local noise standards (PEQS, 2016) as specified in EMP of Chapter 7; - Limit paragliding activities to specific times of the day to minimize disruption, especially during early mornings or late evenings when noise can be more intrusive for the nearby communities; - Trees will be planted along the boundary of Project area as a noise barrier; - Employees working close to generators for extended periods will be encouraged to wear ear protection; - Install soundproof enclosures or acoustic barriers around standby generators to reduce noise emissions; - To reduce the noise produced by loose vibrating parts all the noisy equipment's will be maintained and tuned periodically and will be housed in closed rooms or building; - In the building, proper insulation will be provided to absorb the ambient noise; - Traffic Signs / Rules will be installed/placed in and around the outskirts of paragliding club and access roads, regarding parking of vehicles and honking of horns;			



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	Paramotoring involves the use of motorized fans for propulsion, will lead to high noise levels during take-off and flight.	- Strict enforcement of speed limits inside the paragliding club site and access roads to minimize unnecessary acceleration and braking, which contribute to excessive noise; - Engage with local communities to address concerns and develop guidelines that balance recreational use with the preservation of local tranquility; and - Traffic Management Plan will be devised with traffic police to avoid heavy traffic jams and honking near, paragliding club and access roads.			
45.	Traffic Management / Parking Facilities During the operational phase, the Project is expected to attract a significant influx of tourists, leading to a substantial increase in vehicular traffic accessing the area. This rise in visitor numbers will place added pressure on existing road infrastructure, potentially causing traffic congestion, delays, and bottlenecks, particularly during peak hours. The increased volume of private cars, tour buses, and service vehicles may strain parking facilities, resulting in overflow parking, illegal parking, and encroachment onto pedestrian pathways or green spaces. Without proper traffic management measures, this could lead to safety concerns,	- TDPC will prepare, implement and monitor traffic management plan to avoid traffic congestions and parking issues in and around the paragliding club; - Liaison with the City Traffic Police Department for traffic management on the roads, surrounding the Project area for continuous flow of traffic; - Provide shuttle buses or electric carts from parking areas to the main tourist attractions, reducing the need for private vehicle access; - Maintenance of designated vehicle registration and checkpoints inside the premise to avert unnecessary traffic snarl up along adjacent roads caused by vehicles waiting to access	- Implementation of Traffic Management Plan - Monitoring, Audit and checks	Proponent	



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	reduced accessibility, and an overall decline in the visitor experience.	the paragliding club; - Promote carpooling and ride-sharing services among visitors and staff to reduce vehicle numbers; - Use smart parking solutions, such as online booking and automated fee collection, to enhance efficiency; - Deploy traffic wardens and law enforcement personnel during high-tourist periods to regulate movement and prevent congestion; - Implementation of strict traffic rules regarding entrance and parking of vehicles in paragliding club; - Install clear signage, traffic signals, and road markings to guide drivers and ensure smooth movement within the area; - Placement of sign boards for traffic diversions and proper implementation of traffic diversion plans; and - Conduct awareness programs encouraging tourists to adopt sustainable transport options and responsible parking practice			
46.	Drinking Water Quality During the operational phase, the primary sources of drinking water at the paragliding club will include a water filtration plant, electric dispensers, and the municipal water supply from TMA Kotli Sattian. However, the prolonged and increased	- Water storage tanks will be cleaned and disinfected on regular basis to remove grease, grit, and other debris; - Leakage and dripping from faucets, pumps and toilets shall be immediately reported and regularly maintained;	- Regular monitoring, sampling and testing - Regular audit and checks	Proponent	



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	water consumption due to high visitor inflow may strain the available water resources, potentially leading to shortages, particularly during peak seasons. Additionally, the risk of water contamination within the internal water supply network poses a significant health concern. If water pipes, overhead storage tanks, and filtration systems are not maintained and cleaned regularly, there is a high likelihood of bacteriological contamination, which can result in waterborne diseases and infections affecting both staff and visitors. Furthermore, accidental leakages, bursts, or blockages in the water supply network could lead to temporary flooding of surrounding areas, causing disruptions to the park's infrastructure and impairing the quality of surface and sub-surface water sources. Contaminated runoff from these incidents can negatively impact nearby water bodies and groundwater reserves, further exacerbating water scarcity concerns. Additionally, pollution originating from soakage pits presents a dual environmental threat. Bacterial pollution, while a direct health hazard, is generally neutralized by natural soil processes before reaching groundwater. However, chemical pollution, particularly nitrogenous contaminants such as	• Install pressure monitoring systems to detect and repair leakages, bursts, and blockages in the supply network to prevent water loss and surface flooding; • Utility bills will be kept in track for the consumption of water; • Water-saving equipment such as low-flow shower heads, sinks with auto-shutoff mechanisms and water-saving toilets and urinals shall be installed; • Use the suitable lining material to control the seepage and groundwater contamination; • An effective training program will be conducted for the workers and staff about water conservation and cleaning and maintenance of internal water network; • Prohibit the dumping of hazardous chemicals or waste materials near water sources to prevent long-term contamination; • Establish artificial wetlands within paragliding club, which serves as an effective natural filtration system for treating wastewater and storm water runoff. These engineered ecosystems replicate the functions of natural wetlands, utilizing vegetation, soil, and microbial activity to remove pollutants from water before it is discharged into the environment;			



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	nitrates, is a more persistent and severe issue. Elevated nitrate levels in groundwater can have long-term health implications, especially for vulnerable populations, and are significantly more challenging to remove compared to bacterial contaminants. If not managed properly, these pollution sources could compromise the safety and sustainability of water resources within the Project area.	- Maintain records; review previous water maintenance records to help identify “hot spots” or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of water supply lines as needed; and - Water quality monitoring will be conducted on quarterly basis and the quality should be maintained according to PEQS, 2016 for Drinking Water as specified in EMP of Chapter 7.			
47.	Surface Water Contamination / Wastewater Generation Improper discharge of wastewater from the paragliding club poses a significant environmental risk, potentially leading to the pollution of soil, groundwater, and nearby surface water bodies, including the Jhelum River and the local nullah project site. If not managed properly, wastewater disposal can result in the deterioration of water quality, affecting aquatic life and posing health risks to workers, visitors, and nearby residents. Additionally, stagnant wastewater can create unpleasant odors and unhygienic conditions, negatively impacting the aesthetic value of the area and	- Waste collection bins will be provided within the paragliding club at suitable locations for collection of daily generated municipal waste and food waste; - Assign color to collection bins according to the international standards; - Recyclable wastes such as paper, cardboard, plastics, glass and metals could be separated for individual collection. Single stream collections may be more cost effective as the recyclables can be cheaper to collect and will reduce the volume of a costlier co-mingled dry recyclable collection; - Waste minimization will be encouraged and regular training will be provided to solid waste	- Regular monitoring, sampling and testing - Regular audit and checks	Proponent	



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	diminishing the overall visitor experience. Furthermore, the operation of the sewerage system within the Project area carries inherent environmental risks, particularly from leaking or damaged sewer pipelines. If untreated sewage infiltrates the soil and groundwater, it can lead to severe contamination, making the water unsafe for consumption and increasing the risk of waterborne diseases such as cholera, dysentery, and gastrointestinal infections. Accidental leakages, bursts, or blockages in the sewerage system can cause the temporary flooding of surrounding areas, resulting in waterlogging, infrastructure damage, and disruption of public amenities.	management staff in correct identification and disposal of waste; - Storage areas will be cleaned regularly to minimize odor, pests and nuisances and preserve visual amenity; - Promote a strict “Leave No Trace” principle, encouraging tourists to carry back all waste or dispose of it in designated bins. Display educational signage throughout the sites, urging visitors to dispose of waste responsibly; - Encourage tourists to bring reusable water bottles and avoid single-use plastics by providing eco-friendly alternatives at cafes and souvenir shops; - Promote the use of eco-friendly packaging for food and beverages at cafes and kiosks; - Waste bins will be emptied by sanitary workers on daily basis; - Waste will be transferred to the properly covered purpose-built vehicle (truck / pick-up van) and then be carried out of the paragliding club to designated municipal disposal points by Rawalpindi Waste Management Company; - All empty containers not suitable for reuse to be rinsed and punctured prior to disposal;			



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		- Transfer routes from the bin storage area to the collection zone will be free of obstructions and steps; and - A proper waste management plan shall be prepared by management for onsite storage, collection and disposal of waste.			
48.	Solid Waste Generation During the operation phase of the proposed Project, municipal waste such as tissue papers, kitchen waste, paper, plastic bottles, and food scraps will be generated daily by visitors, staff, and operational activities. If not properly managed, the indiscriminate disposal of waste especially by waste pickers or careless visitors into green belts, vacant areas, and open spaces can lead to severe environmental and health risks. One of the major concerns is the absence or insufficient availability of waste bins and designated waste storage points, which may result in improper dumping of waste. Accumulated waste can decompose, release foul odors, and attract pests and rodents, further deteriorating the cleanliness and aesthetic appeal of the paragliding club. Additionally, plastics and non-biodegradable materials left unattended may clog sewerage pipelines, leading to blockages, wastewater overflow, and contamination of water sources.	- Waste collection bins will be provided within the market at suitable locations for collection of daily generated municipal waste and food waste; - Assign color to collection bins according to the international standards; - Recyclable wastes such as newspaper, cardboard, plastics, glass and metals could be separated for individual collection. Single stream collections may be more cost effective as the recyclables can be cheaper to collect and will reduce the volume of a costlier co-mingled dry recyclable collection; - Waste minimization will be encouraged and regular training will be provided to solid waste management staff in correct identification and disposal of waste; - Storage areas will be cleaned regularly to minimize odor, pests and nuisances and preserve visual amenity; - Waste bins will be emptied by sanitary workers on daily basis;	- Implementation of WMP - Regular monitoring, sampling and testing - Regular audit and checks	Proponent	



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	Furthermore, unregulated waste disposal in open areas can contribute to soil pollution as toxic substances from decomposing waste seep into the ground. Over time, harmful leachates may infiltrate groundwater sources, compromising water quality and posing a health hazard to both workers and tourists, who rely on local water supplies.	- Waste will be transferred to the properly covered purpose-built vehicle (truck / pick-up van) and then be carried out of the market to nearby municipal disposal points; - All empty containers not suitable for reuse to be rinsed and punctured prior to disposal; - Transfer routes from the bin storage area to the collection zone will be free of obstructions and steps; and - A proper waste management plan shall be prepared by management for onsite storage, collection and disposal of waste.			
49.	Fire and Explosions Hazard Improper handling, storage, and management of chemicals, fuel, and electrical installations at paragliding club can pose significant fire and explosion hazards. If safety protocols are not strictly followed, accidental fuel or oil spills around standby generators and fuel storage areas can create a highly flammable environment, increasing the likelihood of fire outbreaks. The presence of combustible materials such as dry vegetation, paper waste, and improperly stored chemicals further exacerbates the risk. Electrical installations, if not properly maintained, may develop short circuits, faulty wiring, or overheating components, which can serve as ignition	- Routine inspection will be carried out to check that the area around the generator is free of clutter and no flammable material is present; - Workers will be trained on handling and controlling accidental spillage of flammable substances that will trigger fires; - Ensure that fuel pipelines and storage tanks are checked regularly for leakages, rust, or damage; - Ensure the availability of fire extinguishers (Class B for fuel fires and Class C for electrical fires) at fuel stations, generator rooms, and chemical storage areas; - Regularly inspect electrical panels, wiring, and equipment to identify overloaded circuits, loose connections, and faulty insulation;	- Implementation of ERP - Plans for staff Training - Regular audit and checks	Proponent	



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	sources for fires. Additionally, improper grounding of electrical equipment, overloaded circuits, and lack of fire suppression systems can escalate minor incidents into major fire emergencies. A fire or explosion in such a public setting could lead to severe injuries, fatalities, and extensive property damage, posing a serious threat to workers, staff, and visitors.	- Standard fire and smoke detection and protection devices such as fire alarms, fire hoses and hydrants will be installed in all critical areas of the proposed paragliding club; - Equipment's will be regularly examined and maintained by a reputable fire safety and security company; "No smoking signs and policy" will be displayed, as appropriate and actions to be taken against those not adhering to this order; - Conduct regular fire safety awareness sessions for workers, staff, and tourists; and - Fire safety management plan shall be prepared and implemented by TDCP.			
50.	Emergency Preparedness and Response The operation of the proposed Project may face various emergencies and natural disasters, including fire outbreaks, earthquakes, and floods, which could pose significant risks to human life, infrastructure, and the surrounding environment. Fire hazards may arise from electrical faults, fuel leaks, or improper handling of flammable materials as discussed, while earthquakes could cause structural damage to buildings, road networks, and essential facilities, leading to potential injuries and service disruptions.	- An Emergency Response Plans for floods, earthquakes, and manmade disasters shall be developed by the TDCP in close consultation with concerned departments; - Training of staff regarding the emergency procedures and plans will be conducted regularly; - Responsible person to implement the Emergency Response Plan will be clearly designated; - Emergency numbers will be clearly posted, so that a quick action is taken when an emergency arises;	- Implementation of ERP - Plans for staff Training - Regular audit and checks	Proponent	



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	Additionally, the site may be vulnerable to flooding, particularly during heavy rainfall or extreme weather events, which could result in waterlogging, erosion, and damage to facilities and pathways. Such emergencies can disrupt normal operations, pose health and safety risks to visitors and staff, and negatively impact the Project's sustainability	• Fire Fighting Systems will be calibrated and maintained regularly; and • Conduct earthquake safety drills for workers and visitors.			
51.	Over Tourism While tourism can serve as a significant driver of economic growth by creating job opportunities and boosting local businesses, it also poses several challenges and negative consequences for the environment, local communities, and infrastructure if not managed sustainably. The following are some of the key concerns associated with increased tourism at the paragliding club: Environmental Degradation: A surge in tourist activity can result in serious environmental degradation, particularly in ecologically sensitive areas. High foot traffic, especially in hiking trails, camping zones, and paragliding landing sites, may lead to: • Soil erosion due to the trampling of vegetation and exposure of topsoil; • Deforestation as a result of illegal logging for firewood or expansion of tourist facilities;	• Implement visitor caps during peak seasons to prevent overcrowding and minimize soil erosion and habitat degradation; • All adventure and recreational activities will be conducted within designated areas in and around the paragliding club site to minimize ecological disturbance; • Tourism facility operating guidelines (facility specific), 'do's and don'ts etc., shall be formulated and tourists shall be made aware of such guidelines on their arrival at the facility; • Implement resource management practices such as water conservation, waste management, and energy efficiency to ensure the sustainability of local resources; • Promote the preservation of local culture and traditions, and involve local communities in tourism planning and decision-making;	• Implementation of Visitor Management Plan • Plans for staff Training • Regular audit and checks	Proponent	



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	- Littering and waste accumulation, including plastic pollution in natural landscapes, harming wildlife and disrupting ecosystems; - Disturbance to wildlife from increased human presence, excessive noise, and habitat encroachment; and - If left unchecked, these impacts could degrade the natural beauty and ecological health of the park and surrounding areas, ultimately reducing their attractiveness for future tourism. Traffic Congestion and Increased Pollution: As more tourists visit the area, the influx of private vehicles, buses, and commercial transport can lead to: - Traffic congestion, particularly during peak seasons, resulting in longer travel times and inconvenience for both tourists and local residents; - Air pollution from vehicular emissions (CO₂, NO_x, PM₁₀), contributing to degraded air quality and potential respiratory issues for visitors and communities; - Noise pollution from honking, vehicle engines, and tourism-related activities, disrupting peaceful surroundings and affecting the well-being of residents and wildlife; and - Increased risk of road accidents, especially in areas with narrow	- Educate tourists about local customs, traditions, and sustainable behaviors through informational boards, digital guides, and awareness campaigns; and - All recommended mitigation measures concerning air pollution, soil degradation, water pollution, and solid waste management discussed in preceding sections will be strictly enforced to maintain the environmental integrity of the tourism sites.			



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	roads, poor traffic management, or a lack of pedestrian-friendly infrastructure. Overexploitation of Local Resources: An upsurge in tourism places considerable strain on local resources, which may lead to scarcity and increased costs for local communities. Some of the key pressures include: • Higher demand for drinking water, sanitation, and recreational activities (e.g., swimming pools, artificial ponds) can deplete local water resources, leading to shortages for residents; • Increased use of electricity for hotels, resorts, and tourism facilities raises pressure on the local power supply, leading to frequent power outages or reliance on polluting diesel generators; and • High tourist demand may inflate food prices, making essential commodities less affordable for local residents and causing food security concerns. Cultural Erosion and Loss of Local Identity: The commercialization of tourism can lead to the dilution and distortion of local cultural traditions. Some potential impacts include: • Traditional crafts, and festivals may be altered or staged to meet tourist expectations rather than preserving their authenticity; and				



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	Unregulated tourism can lead to increased commercialization, urbanization, and foreign influence, causing traditional values and customs to fade over time.				
52.	Flora Flora comprising 1,000 trees and ornamental plants will be planted in and around the paragliding club site premises during the operational phase to enhance the aesthetics value, and to control noise and air pollution. It will provide the following benefits during the operation phase: - Creates a visual barrier and enhances the appearance of the paragliding club; - Providing nesting place for the birds; - Captures and reduces odor concentrations by absorbing gases, if any emits from vehicles; - Trees will act as wind speeds barrier to protect building structures during intense wind storms and intense rainfall. - Captures and reduces odor concentrations by absorbing gases, if any emits from vehicles; - Trees will act as wind speeds barrier to protect building structures during intense wind storms and intense rainfall. However, mismanagement of green areas will result in clogging of drains,	- The implementation of plantation plan recommended in compensation for cutting of trees will start working during operational phase, to ensure the ecological balance and to avoid any impact on local environment; - Large scale planting with suitable indigenous fruit and forest trees, shrubs and ornamental plants in the form of trees. Linear plantation will be carried out in accordance with the Tree Plantation Plan to improve aesthetic value and offset the effect of removal of vegetation. It will help in absorbing flue gases, emitted from a large number of vehicles and public transport passing through the Project area, which shall improve the air quality; - The saplings planted in the Project area against the trees affected should be properly maintained throughout their initial growth period in terms of water requirement and necessary nutrients by relevant department; - Maintenance of the green areas and the protection of saplings for at least five (05) years to ensure better growth and environmental / aesthetics conditions;	- Tree plantation plan - Visual observations - Audit and Checks	Proponent in association with Forest Department	



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	nuisance due to stagnant water and chemical pollution.	- Keep green areas weed-free. Weeds will be monitored weekly and removed no less than every two weeks. The use of chemicals for weed control and suppression needs to be approved by the concerned authorities; - Plantations raised must be maintained according to the silvicultural practices which include proper irrigation, cleaning, pruning, thinning at prescribed intensity, silt clearance and trench-opening; and - Use of fertilizers will be strictly monitored in order to avoid any incident. Natural nutrients will be preferred.			
53.	Fauna During the operation phase of the proposed paragliding club, wildlife and bird populations in and around Chevra Hill Top, Kotli Sattian may experience significant disturbances due to increased human activity, noise pollution, and habitat disruption such as: The operation of paramotors and other paragliding equipment produces high-decibel noise, which can disrupt wildlife communication, mating calls, and natural behaviors. This disturbance may force sensitive species to flee from their habitats, nesting areas, or feeding grounds;	- Implement altitude restrictions to ensure paragliders and paramotors do not fly too low over nesting or feeding areas, minimizing noise impacts; - Restrict paramotoring during critical breeding and migration periods to prevent disruption of seasonal nesting and feeding cycles of bird species; - Conduct wildlife and avifauna surveys before initiating operations to identify sensitive habitats and ensure that no endangered or protected species are put at risk; - Regularly monitor bird populations and wildlife movements in coordination with wildlife department	- Wildlife Management plan - Visual observations - Audit and Checks	Proponent in association with Wildlife Department	



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	- Frequent tourist visits, foot traffic, and adventure sports activities may stress local wildlife, leading to behavioral changes, migration, or habitat abandonment; and - Birds, particularly raptors and migratory species (if any), may be highly sensitive to continuous disturbances from paragliders flying close to cliffs, trees, and nesting areas. This can lead to abandonment of nests, leaving eggs vulnerable to predation.	- to assess long-term impacts and modify activities accordingly; - Develop a translocation plan for rare or endangered species to relocate affected species to a similar habitat in the nearby vicinity, if necessary; - Educate paragliders, tourists, and operators about local wildlife protection laws, ethical flying practices, and the importance of biodiversity conservation; - Prohibit reckless flying or unauthorized landing in ecologically sensitive areas to prevent direct wildlife disturbances; - Display informational boards at key locations to raise awareness about the impact of tourism on local wildlife and the importance of responsible adventure sports; - Establish operational guidelines in collaboration with the local wildlife department to ensure compliance with environmental protection regulations; - Regularly assess the environmental impact of paragliding activities and adopt additional measures if significant disturbances are observed; and - Limit the number of daily flights and visitors during peak wildlife activity periods to minimize ecological stress.			
54.	Impact on Tranquility of Residential Area and Issues of Privacy	Awareness will be created among the staff and visitors to ensure privacy of	Staff Training	Proponent	



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	Due to the establishment of the paragliding club, land value of the surrounding areas will increase, which will be positive impacts for locals in terms of economic benefits. However, due to the presence of residential and commercial areas within the vicinity of paragliding club site privacy issues for the residents and business owners will be raised, if mitigation measures suggested above will not be followed in true spirit.	the residents by not intervening in their matters; and Proponent will hire guards who ensure that staff and visitors will not interact and not come into verbal and physical spats with residents during peak working hours.	Community Consultations		
55.	Occupational Health and Safety (OHS) Considerations During the operation phase, health and safety issues will arise. Operation and maintenance of the paragliding club will cause safety risks to staff (i.e.: electrical and mechanical staff, solid waste management staff and maintenance staff), which includes injuries due to electric shocks, arc flash and arc blast, slipping and falling, poor handling and storage of hazardous substances and during handling of the solid waste.	- Operation and maintenance of machinery and equipment shall be controlled and handled by efficient management and staff training; - Provide fall protection for all maintenance personnel, especially for roof-mounted equipment such as HVAC; - Proper storage and handling of generator fuel, chemicals and solvents by labelling and storing in their original containers; - Clear signage will be posted alerting of possible danger at locations where dangerous and hazardous materials are present; - Emergency numbers will be clearly posted and communicated to the staff, so that a quick action is taken when an emergency arises; - Provision of PPE's to the skilled and unskilled labors including masks, gloves, safety jackets and ear muffs;	- Trainings, drills, record keeping - Implementation of HSE Plan - Use of PPEs	Proponent	



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		- Necessary health and safety rules will be enforced by the management to avert HSE issues and proper training will be given to workers on the same; and - Cleaning and removal of stagnant water (if any) on roads and paragliding club premises will be done on an immediate basis to avoid tripping and falling hazards.			
56.	Safety (OHS) Considerations for Paragliders and Pilots Paragliding is an adventure sport that comes with inherent risks, and ensuring the safety of paragliders and pilots is crucial for preventing accidents and injuries. The operational phase of the paragliding club at Chevra Hill Top, Kotli Sattian presents several safety challenges that need to be addressed i.e.: - Faulty or poorly maintained paragliding gear (harness, canopy, carabiners, risers, and reserve parachutes) can increase the likelihood of mid-air failures, leading to crashes or emergency landings; - Lack of pre-flight safety inspections may result in undetected damage to essential equipment, compromising flight stability; - Unpredictable weather, including strong winds, turbulence, thermal	- Higher Pilots that have appropriate certifications that validate their competence and adherence to safety standards; - Ensure all pilots and instructors undergo rigorous training through recognized paragliding schools, emphasizing safety protocols and emergency procedures; - Before each flight, pilots must meticulously inspect their equipment, including the glider, harness, helmet, and reserve parachute, to identify and address any signs of wear or damage; - Implement a regular maintenance schedule for all equipment to ensure optimal functionality and safety; - Paragliding activities should only be conducted during daylight hours and in visual meteorological conditions, ensuring pilots remain clear of clouds and maintain ground visibility at all times;	- Trainings, drills, record keeping - Implementation of HSE Plan - Use of PPEs	Proponent	



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	activity, rain, and sudden downdrafts, can make takeoffs and landings dangerous; - Pilots may misjudge wind speed and direction, leading to loss of control or unexpected course deviations; - Mid-air collisions may occur due to multiple paragliders flying in the same airspace without proper coordination; - Obstacles such as trees, power lines, communication towers, and buildings near flight paths pose hazards during landing or emergency maneuvers; - Inadequate training or lack of certification for pilots and tandem flight instructors can result in poor decision-making and mishandling of equipment; - Errors in takeoff, landing, or mid-flight maneuvering can lead to uncontrolled descents or crashes; - Pilots or paragliders may experience altitude sickness, dizziness, dehydration, or sudden health complications, leading to loss of consciousness while airborne; - Lack of emergency medical response mechanisms at the site could delay assistance in case of accidents; - Uneven, rocky, or poorly maintained takeoff and landing sites can lead to tripping, falls, or improper launches;	- Pilots should stay informed about current and forecasted weather conditions to avoid adverse situations; - Establish clear SOPs that outline safety protocols, emergency response plans, and operational guidelines to standardize practices and enhance safety; - Conduct pre-flight briefings to reinforce safety measures and ensure all paragliders are aware of protocols; - Create designated takeoff, flight, and landing zones to minimize the risk of collisions and ensure a controlled environment; - Coordinate with local aviation authorities to manage airspace effectively and prevent conflicts with other air traffic; - Ensure all pilots and tandem passengers are equipped with helmets, reserve parachutes, and other necessary safety equipment; - Establish clear procedures for handling emergencies, including rapid response protocols and coordination with local emergency services; - Encourage pilots to engage in ongoing education and advanced courses to enhance their skills and adapt to new safety practices;			



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	• Overcrowding of flight zones with inexperienced paragliders may increase risks of flight path interference and landing accidents; and • Birds, especially large raptors and migratory species, may perceive paragliders as threats, leading to aggressive encounters or bird strikes that could destabilize the glider mid-flight.	• Organize drills to practice emergency scenarios, ensuring pilots are prepared to handle unexpected situations effectively.			

KEY

DC

Design Consultant

CC

Construction Contractor

TDCP

Tourism Development Corporation of Punjab (The Proponent)

7.6 ENVIRONMENTAL MONITORING PLAN

Environmental monitoring provides timely and useful information to the Project management and implementation agencies. It helps in timely identification/analysis and removal of the bottlenecks and expedites actions. Environmental monitoring will be undertaken during both the construction and operational phases, to ensure the effectiveness of the proposed mitigation measures against identified adverse environmental impacts in this EIA report.

The main objectives of the construction phase monitoring plan will be to:

- Monitor the actual impact of the works on the Project site physical, biological and socio-economic receptors and evaluate the effectiveness of the mitigation measures proposed in the EMP against the actual impact and recommend improvements in EMP, if required;
- Recommend mitigation measures for any unexpected impact or where the impact level exceeds the anticipated impact;
- Ensure compliance with legal and community obligations including safety during construction and O&M phases;
- Ensure the safe disposal of excess construction materials, solid waste, water and wastewater and gaseous emissions;
- Monitor the rehabilitation of borrow areas and the restoration of construction campsites as described in the EMP; and
- Compile periodic incidents/accidents data to support analyses that will help to minimize future risks.

The main objectives of monitoring during the operational phase will be to:

- Appraise the adequacy of the EIA with respect to the Project's predicted long-term impacts of operation on physical, biological and socio-economic environment;
- Evaluate the effectiveness of the mitigation measures proposed in the EMP and recommend improvements, if and when necessary; and
- Compile periodic Environmental Monitoring reports on the basis of recommendations in EMP.

7.6.1 Monitoring Strategy

Under the proposed monitoring strategy, it is recommended TDCP will be responsible for all the monitoring activities. All the findings and results in the form of monitoring report will be finally shared with Punjab-EP&CCD. The monitoring program has been designed carefully considering the identified impacts mentioned in **Chapter-6. Table 7-2** provides environmental monitoring schedule for construction and operations stages of the proposed Project.

7.6.2 Responsibilities for Environmental Testing and Reporting

The Contractor will be responsible for environmental monitoring and reporting throughout the construction phase in coordination with Project Director and Director Environment, TDCP. During construction phase, environmental testing reports will be prepared on quarterly basis and one comprehensive report will be prepared at the end of the construction phase and will be submitted to each of the following authorities and institutions: (i) TDCP and (ii) EP&CCD-Punjab.



During the first year of the Project operation, concessionaire / TDCP will be responsible to conduct environmental testing and monitoring through Punjab-EP&CCD certified lab by hiring a third-party contractor. The reports will be prepared biannually and one comprehensive report will be prepared annually and submitted to the Punjab-EP&CCD. Contents of the final report will include results of environmental monitoring in comparison to the standards for the various parameters, location and sampling time along with recommendations for the future environmental testing and monitoring.

7.6.3 Budget Estimate for Environmental Monitoring and Compliance

Budget Estimate for Environmental Monitoring and Compliance during the Construction and Operation Phases has been summarized in **Table 7-3**.

Table 7-2: Environmental Monitoring Schedule

Sr. No.	Receptors	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
1.	Water Resources/ Water Quality	Monitoring of Physical, Chemical and Biological parameters and its compliance with PEQS, 2016 for surface water and drinking water.	- Major receptors are and commercial / residential areas within the AOI of the proposed Project. - Other proposed effluent discharge points are: - Jhelum River; - Local Nullah; - Contractors camps; - Concrete preparation plants; - Fuel (Petrol. Oil and Grease) products storages; and - Vehicle and machines repairing and servicing yards.	- Visual checks of laboratory activities; and - Discrete grab sampling and laboratory testing of water samples by EPA-Punjab Certified Laboratory for monitoring.	- Once before the start of construction activities; - On a quarterly basis during the construction phase; - Bi-annually for at least one year during the O&M phase; and - Visual inspection daily.	• TDCP • Contractor • TDCP
2.	Soil Contamination	Soil contamination due to effluent / surface runoff and uncontrolled solid waste disposal activities at sites.	- Along Access Roads (proposed Project); and - Other proposed sampling sites are: - Construction camps; - Equipment washing yards; and - Spillage points of fuel, chemicals and lubricants.	- Visual observations and checking of laboratory activities; and - Sampling and laboratory testing for soil samples.	- Once before the start of construction activities; - On quarterly basis during the construction phase; - Bi-annually for at least one year during O&M phase; and - Visual inspection daily.	• TDCP • Contractor • TDCP



Sr. No.	Receptors	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
3.	Dust Emissions	Monitoring of PM ₁₀ and PM _{2.5} and its compliance with PEQS, 2016 for Ambient Air.	Sensitive receptors (residential area, religious places and construction camps) within the AOI of the proposed Project. However; estimated sampling points are six (06) which will be verified during construction stage	• Visual checks of laboratory activities; • Onsite Ambient Air Monitoring Equipment; and • Daily visual monitoring of dust emissions at construction route.	• Once before the start of construction activities; • On quarterly basis during the construction phase; and • Bi-annually for at least one year during O&M phase.	• TDCP • Contractor • TDCP
4.	Noise Pollution	Monitoring of Noise Level and its compliance with PEQS 2016 for Noise.	Sensitive receptors (residential area, religious places and construction camps) within the AOI of the proposed Project. However; estimated sampling points are six (06) which will be verified during construction stage	• Visual checks of laboratory activities; and • Onsite Noise Monitoring using Sound Meter.	• Once before the start of construction activities; • On quarterly basis during the construction phase; and • Bi-annually for at least one year during O&M phase.	• TDCP • Contractor • TDCP
5.	Fumes and gases	Monitoring of CO, CO ₂ , SO _x , NO _x , Lead and PM _{2.5} PM ₁₀ , Vehicular emissions and its compliance with PEQS 2016.	Sensitive receptors (concrete plants, construction camps and vehicular emissions) within the AOI of the proposed Project. However; estimated sampling points are six (06) which will be verified during construction stage	• Visual checks of laboratory activities; • Onsite Ambient Air Monitoring Equipment; and • Daily visual monitoring of gaseous emissions at construction route.	• Once before the start of construction activities; • On quarterly basis during the construction phase; and • Bi-annually for at least one year during O&M phase.	• TDCP • Contractor • TDCP



Sr. No.	Receptors	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
6.	Ecological Resources	Disturbance to natural habitat and uncontrolled floral cutting which can be avoidable.	Natural habitats within the AOI of the proposed Project and construction camps.	- Visual checks to ensure that only marked trees are cut within the Project corridor; and - Monitoring of Wildlife / birds hunting.	- Once before the start of construction activities; - Visual inspection daily / weekly during construction phase; and - Visual inspection weekly for at least one year during O&M.	- TDCP - Contractor - TDCP
7.	Safety of workers	Medical record of workers.	Construction site.	- Checking of accident/ near miss records; and - Medical surveillance of Construction workers	On quarterly basis during the construction phase.	Contractor
8.	Restoration of work sites	Site cleared and no solid and construction waste in the study area.	Construction site and camp sites.	Visual inspection	After completion of construction work	- Contractor - TDCP



Table 7-3: Budget Estimate for Environmental Monitoring and Compliance during the Construction and Operation Phase

Components	Parameters	Quantity (No. of samples x No. of Locations x Frequency)	Frequency	Responsibility	Duration	Cost (Rs.)
A) Construction Phase (12 Months)						
Ambient Air Quality	CO, NO ₂ , SO ₂ , Lead, SPM, PM _{2.5} and PM ₁₀	1x1x3= 3	Quarterly @ PKR 40,000 per sample	CC	24 hours	120,000/-
Noise Level	Day and night time levels on dB (A) Scale (min-max)	1x2x3= 6	Quarterly @ PKR 2,000 per point	CC	24 hours	80,000/-
Drinking Water Quality	Physical Parameters: Color, pH, Taste, Odour, Turbidity, Total Hardness as Calcium Carbonate and Total Dissolved Solids Biological Parameters: E. Coliform, Fecal Coliform and Total Coliform Chemical Parameters: Aluminum, Antimony, Arsenic, Barium, Cadmium, Chloride, Chromium, Copper, Cyanide, Fluoride, Lead, Manganese, Mercury, Nickel, Nitrate, Nitrite, Selenium, Residual Chlorine, Zinc and Phenolic Compounds	1x1x3= 3	Quarterly @ PKR 20,000 per sample	CC	-	60,000/-
Surface Water/ Wastewater Quality	Physical Parameters: Temperature, pH, Color, Total Dissolved Solids, and Total Suspended Solids Biological Parameters:	1x2x3= 6	Quarterly @ PKR 20,000 per sample	CC	-	120,000/-



Components	Parameters	Quantity (No. of samples x No. of Locations x Frequency)	Frequency	Responsibility	Duration	Cost (Rs.)
	Biochemical Oxygen Demand and Chemical Oxygen Demand Chemical Parameters: Grease and Oil, Lead, Phenolic compounds, Cyanide, Chloride, Fluoride, Anionic Detergents, Sulphate, Sulphide, Ammonia, Calcium, Cadmium, Chromium, Copper, Mercury, Selenium, Nickel, Silver, Zinc, Arsenic, Barium, Iron, Manganese, Boron and Total chloride					
TOTAL (A) =						380,000/-
B) Operation Phase (12 Months)						
Ambient Air Quality	CO, NO ₂ , SO ₂ , Lead, SPM, PM _{2.5} and PM ₁₀	1x2x2 = 4	Biannually @ PKR 40,000 per sample	TDGP	24 hours	160,000/-
Noise Level	Day and night time levels on dB (A) Scale (min-max)	1x1x2 = 2	Biannually @ PKR 2,000 per point	TDGP	24 hours	4,000/-
Drinking Water Quality	Physical Parameters: Color, pH, Taste, Odour, Turbidity, Total Hardness as Calcium Carbonate and Total Dissolved Solids Biological Parameters: E. Coliform, Fecal Coliform and Total Coliform	1x2x2= 4	Biannually @ PKR 20,000 per point	TDGP	-	80,000/-



Components	Parameters	Quantity (No. of samples x No. of Locations x Frequency)	Frequency	Responsibility	Duration	Cost (Rs.)
	Chemical Parameters: Aluminum, Antimony, Arsenic, Barium, Cadmium, Chloride, Chromium, Copper, Cyanide, Fluoride, Lead, Manganese, Mercury, Nickel, Nitrate, Nitrite, Selenium, Residual Chlorine, Zinc and Phenolic Compounds					
Surface Water/ Wastewater Quality	Physical Parameters: Temperature, pH, Color, Total Dissolved Solids, and Total Suspended Solids Biological Parameters: Biochemical Oxygen Demand, Chemical Oxygen Demand, and Fecal Coli Chemical Parameters: Grease and Oil, Lead, Phenolic compounds, Cyanide, Chloride, Fluoride, Anionic Detergents, Sulphate, Sulphide, Ammonia, Calcium, Cadmium, Chromium, Copper, Mercury, Selenium, Nickel, Silver, Zinc, Arsenic, Barium, Iron, Manganese, Boron and Total chloride	1x2x2= 4	Biannually @ PKR 20,000 per point	TDCP	-	80,000/-
TOTAL (B) =						324,000/-



Components	Parameters	Quantity (No. of samples x No. of Locations x Frequency)	Frequency	Responsibility	Duration	Cost (Rs.)
GRAND TOTAL (A+B) =						704,000/-

KEY

CC Construction Contractor

TDCP Tourism Development Corporation of Punjab (The Proponent)

Notes:

- Provision must be given in annual budget of construction and operation phases for environmental monitoring. For this, the cost of monitoring must be considered with an annual increment of 10%.
- All the environmental parameters will be analyzed as per Punjab Environmental Quality Standards (PEQS), 2016.



7.7 TREE PLANTATION

It is important to note that 100 trees may be affected on site, and efforts will be made to transplant or relocate it rather than cutting it down. To further mitigate the negative impacts of tree removal and promote ecological sustainability, additional planting will be undertaken where possible, particularly within the Project boundary and any available spaces around the paragliding club.

Plantation Plan shall be carried out by the Client in coordination with the Forest Department, which has the requisite expertise and experience for such tasks.

Trees recommended for planting are 1,000 for compensation and area enhancement. The tentative cost for the plantation is about PKR 1,932,000/-. The detailed Tree Plantation Plan is attached as **Annexure-IV**.

7.8 TRAINING AND CAPACITY BUILDING

An environmental and social training and technical assistance (TA) program is to be carried out before the implementation of the proposed Project as it strengthens the institutional capacity required to manage environmental and social issues. The contractor's environmental awareness and appropriate knowledge of environmental protection is critical to the successful implementation of the EMP because, without appropriate environmental awareness, knowledge, and skills required for the implementation of the mitigation measures, it would be difficult for the Contractor(s) workforce to implement effective environmental protection measures.

TDCP will be responsible for engaging TA consultants to conduct environmental and social training programs. The objective of the TA will be as follows:

- To help in establishment of appropriate systems;
- To train senior TDCP staff, Contractor and Sub-Contractor workers, responsible for managing environment and social tasks and planning during construction and post construction phases; and
- Training courses on specialized areas such as air, water and noise pollution monitoring.

Table 7-4 provides brief detail of the capacity building and training plan for the proposed Project.

Table 7-4: Capacity Building Programs and Technical Assistance Services

Provided by	Contents	Trainees	Duration
TA Individuals, Consultants and Organizations specializing in Environmental Management and Monitoring	Short Seminars and Courses on: • Environmental laws and regulations; • Environmental Sustainability; • Wildlife Conservation and • Environmental Management and Monitoring Plan (EMMP)	Environmental Staff of Contractor and SC, and TDCP Staff	3 Days
TA Individuals, Consultants and Organizations specializing in	Short Seminars and Courses on:	Environmental Staff of	3 Days



Provided by	Contents	Trainees	Duration
Social Management and Monitoring, and Occupational Health and Safety	• Occupational Health and Safety Plan (OHS); • Basic First Aid; • Occupational and Community Health and Safety Management; • Wildlife Conservation; • Labour Camp Management; • Traffic Management; • Use and Importance of Personal Protective Equipment's (PPEs); and • Fire Safety and Emergency Response Measures.	Contractor and SC, and TDCP Staff	
TA Individuals, Consultants and Organizations specializing in Environmental and Social Management and Monitoring	Short Seminars and Courses on: • Environmental Management Plan (EMP); • Environment Health and Safety Management; • Wildlife Conservation; • Occupational Health and Safety; • Basic First Aid; • Waste Management; • Fire Safety and Emergency Response Measures; • Electrical Safety; and • Use and Importance of Personal Protective Equipment's (PPEs).	Operation and Maintenance Staff of TDCP	3 Days

7.9 COMMUNICATION & DOCUMENTATION

Communication and documentation are an essential feature of EMP. The key features of such mechanism are:

7.9.1 Data Recording and Maintenance

All forms to be used for recording information during the environmental monitoring will follow a standard format, which will correspond to the database in to which all the gathered information will be placed. Check boxes will be used as much as possible to facilitate data entry. Tracking system will be developed for each form.

7.9.2 Database

The database may include the following information:

- Training programs;
- Staff deployment;
- Non-compliances;
- Corrective actions;
- List of environmental data; and



- List of environmental data to be maintained:
 - Soil and land pollution;
 - Disposal of waste;
 - Water resources;
 - Fuel oil and chemical spills;
 - Vegetation record;
 - Noise pollution;
 - Air and dust pollution;
 - Socio-economic data; and
 - Ecological sensitivities.

7.9.3 Meetings and Reporting

Monthly meetings will be held at the site during the construction phase. The purpose of these meetings will be to discuss routine activities, non-compliance and their remedial measures. Various reports will also be produced at periodic time intervals, as provided in **Table 7-5** along with information regarding persons responsible for report preparation and review process. Additionally, minutes of meetings will also be submitted as part of routine environmental reports.

Table 7-5: Periodic Reporting Mechanism

Sr. No.	Report Category	Prepared by	Reviewed by
1.	Monthly	Contractors' environmental staff	TDGP / PMU
2.	Quarterly	Contractors' environmental staff	TDGP / PMU
3.	Semi-Annual Environmental Monitoring Report (SAEMR)	Contractors' environmental staff	TDGP / PMU
4.	Annual Report	Contractors' environmental staff	TDGP / PMU
5.	Completion Report	Contractors' environmental staff	TDGP / PMU

7.9.4 Social Complaint Register

The Contractor will maintain a register of complaints records from local communities and measures taken to mitigate these concerns.

7.9.5 Photographic Records

Contractors will maintain photographic records during the implementation of the proposed Project. As a minimum, the photographic records will include the site photographs, all the roads, campsites, monitoring activities, etc.

7.9.6 Non-Compliance of the EMP

The implementation of the proposed EMP involves inputs from various functionaries. The Contractor will be primarily responsible for ensuring implementation of the mitigation measures proposed in the EMP, which will be part of the contract documents. The provision of the environmental mitigation cost will be made in the total cost of Project, for which the Contractor will be paid on the basis of monthly compliance reports. However, if the Contractor fails to comply with the implementation of EMP and submission of the monthly compliance



reports, deductions will be made from the payments to the Contractor claimed under the heads of environmental components.

7.9.7 Review of Recorded Data

All the data and communication recorded and maintained by the Contractor will be periodically reviewed and checked by TDCP and necessary action will be recommended to Contractor to improve the recording and documentation.

7.10 MANAGEMENT PLANS

Various site-specific management plans will be prepared by Contractor as a part of EMP for the better management and implementation of EMP during all phases of the proposed Project. However, approval of these site-specific plans from TDCP shall be sought before start of construction activities. These site-specific plans are listed below but not limited to these:

- Tree Plantation / Reforestation Plan;
- Health, Safety and Environment (HSE) Management Plan;
- Emergency Preparedness and Response Plan;
- Site Restoration and Rehabilitation Plan;
- Waste Management Plan;
- Disaster Management Plan;
- Drinking Water Supply and Sanitation Plan;
- Solid Waste Management Plan;
- Traffic Management Plan;
- Change Management Plan; and
- Resource Conservation Plan.

7.11 PUBLIC DISCLOSURE

TDCP will disclose this EIA to all the stakeholders prior to the start of the construction. This report will be made available to the stakeholders at places designated by the Punjab-EP&CCD. In addition, executive summary of the Report will be translated into Urdu language and made available to the affected communities and locals. The copies will also be kept at construction site for ease in accessibility of the locals. This will ensure the locals to be aware of the Project impacts, its mitigation, responsible staff and mode of implementation. In addition, the executive summary will also be published on TDCP website.

7.12 EMP COST

The contractor will be responsible for implementation of mitigation measures and environmental monitoring during construction phase, whereas TDCP will be responsible for implementation of mitigation measures and environmental monitoring during operation phase. For an effective implementation of environmental mitigation measures during construction and operational phases, it is very important to provide sufficient funds for the implementation of environmental and social mitigation measures, monitoring and training. The estimated cost of environmental and social mitigation measures, monitoring and training is given in the **Table 7-6**.



The cost for EMP will be part of the contract document with the Contractor. The same may also be included in the total Project cost for the implementation of EMP. 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.

Table 7-6: Environmental and Social Testing, Mitigation and Training Cost

Sr. No.	Activity	Description	Cost (PKR)	Rationale
1.	Medical screening for workers	PKR 7,000 per person for 70 employees $70 \times 7,000 \times 1 = 490,000$ <i>Once during Construction Phase</i>	490,000/-	Medical screening of the workers before deployment on site and once during construction period.
2.	Material Storage, handling and use	Includes cost of Twelve (12) Numbers of tarpaulins (PKR 20,000 each) and storage at separate area and installment of barricading. $12 \times 20,000 = 240,000$ Lump sum = 300,000	540,000/-	Twelve tarpaulins are proposed during the whole construction phase for the protection of material and dust control.
3.	Water Sprinkling	Sprinkling of water to control dust at the sites on alternate days @ 25,000/Month $12 \times 25,000 = 300,000$	300,000/-	Sprinkling of water to control dust emissions at site during whole construction period.
4.	Handling of solid waste	Includes the cost of collection, segregation, transportation, disposal and management of domestic, commercial and construction wastes	120,000/-	PKR 10,000 per month for 12 months to collect construction waste from all the active sites on daily basis.
5.	Health and Safety of Workers	For 70 employees for the provision of dust masks, safety shoes, gloves, first aid box, ear plugs, safety helmets and safety jackets (Hi Vis) and provision of dust bins, warning tap, safety cones and safety sign boards.	950,500/-	For detail, please refer to Annexure-X .
6.	Environmental Testing Cost	Ambient air, drinking water, surface water and noise	704,000/-	Refer to Table 7-3 for detailed schedule and



Sr. No.	Activity	Description	Cost (PKR)	Rationale
				cost of environmental testing during construction and operation phases.
8.	Cost of environmental and social training	Short Seminars, Courses, Trainings and Lectures on Environment, Social and Occupational, Health and Safety constituents and components. For Awareness material, leaflets, Brouchers etc.	400,000/-	Refer to Table 7-4 for details.
9.	Environmental Audit	Environmental Auditing through third party thrice times during construction phase and twice during operational phase <i>Construction Phase:</i> 1x 200,000 = 200,000 <i>Operational Phase:</i> 1 x 200,000 = 200,000	400,000/-	Cost for at least two auditors along with logistics, travels and accommodation charges.
10.	Tree Plantation	100 Trees may be cut down during construction phase. Therefore, 1,000 trees planned to be planted in and around the Project area to enhance the aesthetics and landscaping of the Project Site in lieu of 1: 10.	1,932,000/-	For detail, please refer to Annexure–IV .
Total =			5836,500/-	

The total estimated cost for the environmental management, monitoring and auditing during construction and O&M comes to about **PKR 5.8365 Million**.

8. CONCLUSION AND RECOMMENDATIONS

8.1 GENERAL

The EIA report has been prepared in accordance with the requirements of the Punjab Environmental Protection Act, 2012 and 2017 (Amended) and Punjab-EP&CCD Regulations, 2022 for review of IEE and EIA and Pakistan EIA procedures.

8.2 CONCLUSION

The primary objective of the Project is to develop a sustainable tourism infrastructure that promotes economic growth while safeguarding the natural and cultural heritage of the Kotli Sattian region. It seeks to address challenges posed by unregulated tourism, such as environmental degradation, inadequate facilities, and limited socio-economic benefits for local communities. By integrating sustainability principles into its design and development, the Project aims to establish Kotli Sattian as a premier eco-tourism destination in Punjab, serving as a model for responsible and inclusive tourism development that benefits both visitors and the local community.

Other objectives include:

- **Enhance Recreational Infrastructure:** Develop safe and accessible amenities, including designated paragliding club site with walking trails, picnic areas, camping zones, etc., to attract a diverse range of visitors.
- **Promote Environmental Conservation:** Implement sustainable design strategies that minimize ecological impact, preserve biodiversity, and raise awareness about environmental stewardship among tourists and local communities.
- **Utilize Eco-Friendly Landscaping:** Incorporate native plant species and environmentally conscious landscaping techniques to maintain ecological balance and minimize environmental degradation.
- **Encourage Adventure Tourism:** Host annual paragliding festivals and competitions, along with certification programs, to position Kotli Sattian as a hub for adventure sports.
- **Provide Training and Skill Development:** Offer introductory courses and professional training in paragliding, safety protocols, and eco-tourism management to enhance local expertise and engagement in the tourism sector.
- **Boost Local Economic Growth:** Generate employment and business opportunities for local residents by promoting tourism-related enterprises such as guided tours, hospitality services, and handicrafts.
- **Enhance Community Engagement:** Encourage local participation in tourism planning and development to ensure that economic and social benefits are equitably distributed.
- **Improve Accessibility and Connectivity:** Upgrade transportation and infrastructure facilities to ensure seamless access for visitors while maintaining environmental sustainability.
- **Support Cultural and Heritage Preservation:** Promote and safeguard the region's cultural heritage, local traditions, and historical landmarks through tourism initiatives and awareness campaigns.
- **Provide a Relaxing and Therapeutic Environment:** Establish serene and scenic spaces that promote relaxation, mental well-being, and nature-based wellness experiences for visitors.
- **Diversifying Tourism to Reduce Overcrowding in Murree:** Murree, being a popular hill station, experiences excessive tourist influx, leading to issues like traffic congestion, environmental degradation, strain on local resources, and infrastructure overuse. By promoting Kotli Sattian as an



eco-tourism and adventure sports hub, the Project seeks to offer visitors a sustainable and less congested alternative, thereby alleviating pressure on Murree.

Significant efforts were made to identify the main physical, ecological, social, cultural and environmental issues related to the construction and operation of the proposed Project. Various stakeholders including government departments and agencies were also contacted to obtain salient information in this regard along with that from area residents.

During the pre-construction, construction and operational phases, the following are the main issues and concerns:

- The region is home to a diverse range of wildlife, including Leopards (*Panthera pardus*), Barking Deer (*Muntiacus muntjak*), Wild Boars (*Sus scrofa*), Indian Pangolins (*Manis crassicaudata*), and various bird species such as the Himalayan Monal (*Lophophorus impejanus*) and Kalij Pheasant (*Lophura leucomelanos*). Establishment of paragliding club at Chevra Hill Top may lead to habitat disturbances, potentially affecting local fauna;
- Disturbance to the public movement and cultural norms during construction;
- Reduction in the daily routine activities of local residents during construction;
- Noise and air pollution due to the traffic jams and construction machinery during the construction and operation phases of the Project;
- Solid waste and wastewater generation during the construction phase;
- Oil spillages from construction machinery, resulting in soil and groundwater contamination;
- Cutting of trees/bushes/crops falling within the proposed AOI;
- Occupational and community health and safety issues;
- Excessive tourism during the operational phase may strain natural resources and disrupt the local ecosystem; and
- Solid waste handling and disposal and wastewater generation and treatment during operation phase.

The Environmental Impact Assessment (EIA) study has determined that the proposed Project will have low to moderate impacts on the physical and social environment. However, several ecological concerns have been identified that require careful mitigation measures. These impacts can be minimized through the strict implementation of the Environmental Management Plan (EMP), which will ensure compliance with environmental regulations and best practices. A well-planned and meticulously designed paragliding club site will help reduce ecological disturbances while preserving the natural landscape. Additionally, implementing a comprehensive tree plantation strategy and a structured wildlife management plan will play a crucial role in maintaining and enhancing biodiversity. Given the increasing pressure on natural and economic resources, integrating sustainable development practices into the Project is vital. A responsible approach to infrastructure development will not only improve the quality of life but also safeguard natural ecosystems for future generations.

8.3 RECOMMENDATIONS

An Environmental Monitoring/Management Plan (EMP) for both phases (construction and operation) has been developed as part of the report, which provides a detailed mitigation matrix that covers impacts, mitigation measures, roles and responsibilities and timings to avoid, minimize or mitigate the adverse impacts of the proposed Project.



Based on the field visit and analysis of primary and secondary data, the following recommendations have been conferred so that the Proponent gets the necessary direction and clarity to ensure efficient environment-friendly and compliant operation:

- To safeguard biodiversity and sensitive ecosystems, a Critical Habitat Assessment (CHA) may be conducted during detailed design stage, as the region supports a diverse range of flora and fauna. The CHA will identify and evaluate critical habitats that sustain endangered or ecologically significant species, providing essential guidance on habitat conservation, species protection, and ecological safeguards. Additionally, a Biodiversity Action Plan (BAP) will be necessary to mitigate potential impacts on local wildlife, promote habitat restoration, and enhance ecological connectivity. Integrating CHA and BAP into the Project's planning and implementation will ensure effective management of environmental risks while promoting sustainable development;
- The contractor in coordination with the wildlife department, to mitigate potential impacts on local fauna and ensure the conservation of key species and their habitats, should develop a Wildlife Management Plan (WMP) during the construction phase. This plan should include measures such as habitat restoration, wildlife movement corridors, restriction of construction activities in ecologically sensitive areas, and awareness programs for workers and visitors. Regular monitoring and collaboration with wildlife conservation authorities will be essential to minimize human-wildlife conflicts and promote long-term ecological sustainability;
- Proper location(s) for construction camps shall be selected by the contractor in close coordination with TDCP that cause minimal/no damage to the prevailing environmental conditions of the Project area;
- All structural, layout and engineering designing of Project will be in strict accordance with the applicable bylaws and engineering parameters;
- Formulation and implementation of a comprehensive safety and security plan by the contractor before the start of the construction activities for the camps which shall be comprised of a training manual, use of safety equipment, emergency preparedness and code of ethics;
- Wearing of Personal Protective Equipment (PPEs) such as helmet, masks, adequate footwear for bituminous pavement works, protective goggles and gloves shall be made compulsory during construction activities and formulation and implementation of Health and Safety Plan (HSP) for construction workers;
- Preparation and implementation of Solid Waste Management Plan during the construction stage by contractor in close coordination with concerned authorities for collection, reuse, recycling and disposal of waste;
- Ensuring consultations with local communities and relevant stakeholders throughout the construction phase and during the first year of the operational phase to ensure their effective participation, to address their concerns regarding construction activities and amalgamation of their suggestions in construction activities schedules;
- Employment opportunities will be provided to local people for skilled and unskilled work during the construction stage;
- Monitoring of ambient air, noise level and water quality (surface, wastewater and drinking water) to assess the impacts on these parameters before and after the implementation of Project interventions will be carried out during the detailed design stage;
- A provision of adequate budget in the overall cost of the Project and on-site space for plantation as per guidelines of the concerned departments shall be provided in the design of proposed Project to compensate tree cutting and to eradicate air pollution. Moreover, tree plantation plan must also be implemented;
- Soil contamination will be controlled by proper storage of chemicals;



- Surface runoff and wastewater generated during construction stage will be controlled and collected in septic tanks and soakage pits;
- Dust and fugitive emissions will be controlled by maintenance of equipment, fine tuning of the vehicles and regular sprinkling of water on soil;
- Noise and vibration will be controlled by equipment maintenance, by providing noise barrier and by scheduling the construction activities to avoid peak activity hours in the area;
- A comprehensive solid waste management plan to cater the waste during operation phase; and
- The EMP, its mitigation and monitoring programs, contained herewith, will be included within the bidding documents for Project works for all Project components. The bidding documents state that the Contractor will be responsible for the implementation of the requirements of the EMP through their own site specific EMP (SSEMP), which will adopt all of the conditions of the EMP and add site specific elements that are not currently known, such as the Contractor's borrow pit locations and contractor camps. This will ensure that all potential bidders are aware of the environmental and social requirements of the Project and its associated environmental and social costs.

The EMP and all its requirements will then be added to the Contractor's Contract, thereby making implementation of the EMP a legal requirement according to the Contract. The Contractor will then prepare its SSEMP, which will be approved and monitored by the Supervisory Consultant. The Supervisory Consultant shall note any non-conformance with the SSEMP and the conditions of environmental approval by Punjab-EP&CCD. The Contractor will be held liable for breach of the contractual obligations of the EMP. In order to ensure compliance with the SSEMP, the Contractor will employ an Environmental and Social Management Experts to monitor and report Project activities throughout the Project construction phase.

The implementation of these steps will ensure that the Project is executed in an environmentally sustainable manner.

Annexures

Annexure-I

Quarry Management Plan

QUARRY MANAGEMENT PLAN

1. INTRODUCTION

After the completion of construction phase of the proposed Project, it is the responsibility of the contractor to restore the site that has been disturbed due to construction activities. TDCP should ensure that the environmental value of the Project area is maintained for future generations to appreciate.

2. GENERAL QUARRY PLANNING AND PROGRESSIVE REHABILITATION

A well-considered quarry development plan prior to starting work, or when opening up new areas will greatly reduce the effort required to achieve appropriate leading practice environmental and safety outcomes for quarry rehabilitation and closure.

The selection of a site, sequencing of quarrying and rehabilitation and final land-use should all be carefully planned prior to commencement of work at a quarry or borrow pit.

2.1. Progressive Rehabilitation

Progressive rehabilitation refers to the rehabilitation of completed parts of a quarry while extractive operations continue in other parts of the quarry. As new quarry sections are opened, worked out areas should be progressively rehabilitated to avoid increasing the total disturbed area of a quarry. Overburden and topsoil can be stripped from areas being opened up and placed directly onto worked out areas, which are being rehabilitated. This will avoid double handling of materials and prevent degradation of the topsoil.

Progressive rehabilitation helps to minimize the visual impact of a quarry, control dust and erosion. It also assists in fostering good landowner and community relations.

Recommended progressive rehabilitation practices are:

- Agree on the final landform and use of a site with the relevant authority.
- Rehabilitate in accordance with the intended final use of the land.
- Plan and develop the quarry at the Project site for the commencement of construction works.
- Once the final landform is established, re-vegetate areas to stabilize the landform and to give the vegetation maximum time to establish while the quarry is still in operation.

2.2. Re-vegetation

Establishing a self-sustaining cover of vegetation is the best way to stabilize disturbed sites in the long term. Re-vegetation also minimizes the visual impact of quarries. Generally, the vegetation type, which existed before the disturbance, or a similar vegetation type will regenerate most successfully.

Prior to the commencement of a quarrying activity the type of re-vegetation should be agreed with the Proponent, and should be consistent with the proposed final land-use.

Some indigenous plant species may not thrive in areas where soil conditions are substantially different after quarrying. If this is the case, and the objective is to re-establish vegetation, which fulfils the function of the original native vegetation, then some species from outside the

quarry area, may have to be introduced. Care must be taken to avoid introducing a species, which could become an unacceptable fire hazard, invade surrounding areas of native vegetation or become agricultural weeds.

Where agriculture is the planned land-use then the species planted should be those commonly used for pasture or crops known to be successful on soils of similar texture, drainage status, pH and fertility. Suitable legumes should always be considered for their ability to improve soil fertility.

3. REHABILITATION OF BORROW PITS

Borrow pits are areas either in a road reserve or adjacent land holdings that have been used to extract materials such as gravels and soils. They can vary considerably in size, depending on the quantity of material taken and the borrow pits' reserve body of remaining material. The variable size, shape and nature of borrow pits preclude very specific recommendations; however the following general conditions apply:

- Before extraction commences, licenses and permits should be checked and limits of disturbance and/or clearing must be clearly marked out on the site before any ground disturbing activity takes place; and
- At the completion of extraction, the former borrow pit must be made stable and safe. This usually requires the sides of the pit to be reshaped with gentle safe grades. All disturbed areas associated with borrow pits must be re-top soiled, seeded, fertilized and mulched (if appropriate) as part of the restoration plan.

Reinstatement of Borrow Pits

Reinstatement will be completed prior to handover of the completed proposed Project. This may include the following:

- Fill excavated site with overburden stockpiles and perimeter berms, and graded to the desired slope and drainage path;
- Spread topsoil on top of the overburden;
- Develop/construct suitable surface slopes, drainage ditches and conduits to prevent water from collecting at the sites;
- Establish a vegetation cover corresponding to at least 75%⁹ of the cover present prior to excavation (supporting photographs) and maintain following the first rains after reinstatement;
- Minimize erosion by focusing vegetation cover on side slopes of the excavated area; and
- Any required seeding will make use of local plant varieties

All the above mentioned measures need to be followed by the Contractor before handing over the site(s) back to the owner.

⁹ *Rapid Program Borrow PIT Management Guidelines, USAID*

Annexure-II

Waste Management Plan

WASTE MANAGEMENT PLAN

1. GENERAL INTRODUCTION

Construction work refers to a wide range of materials depending on their origin; they are categorized as excavation material, demolition materials and worksite waste material. Construction waste material of the proposed Project consists mainly of concrete, masonry, asphalt and metal. In addition to this, significant amount of municipal waste will also generate from the construction camps. The solid waste generation is estimated to be 39 kg/day for 70 construction workers during construction phase of the proposed Project and 55 kg/day for 100 persons during operational phase of the proposed Project.

2. ORIGINS AND CAUSES OF CONSTRUCTION WASTE

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

3. CONSTRUCTION WASTE MANAGEMENT PLAN

i) Waste Management Goals

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

ii) Responsibility

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

iii) Waste Prevention Planning

- a) In addition to other requirements specified herein it is a requirement for the work of this Project that the contractor comply with the applicable city waste disposal requirements.
- b) Of the inevitable waste that is generated, the waste materials designated in this specification shall be salvaged for reuse and or recycling where practical and possible. Waste disposal in landfills shall be minimized as much as possible.
- c) Project Construction Documents: The Contractor will contractually require all subcontractors to comply with the Construction Waste Management Plan (WMP)". A copy of the WMP will accompany all subcontractor agreements and require subcontractor participation.
- d) The "Construction Waste Management Plan" shall be implemented and executed as follows and as on the chart:
 - i) Salvageable materials will be diverted from disposal where feasible;
 - ii) There will be a designated area on the construction site reserved for materials that can be recycled;
 - iii) Areas shall be marked to designate what recycle materials are to be stored there; and
 - iv) Hazardous waste shall be managed by a licensed hazardous waste vendor.

iv) Communication and Education Plan

- a) This Waste Management Plan will be posted onsite;
- b) Each subcontractor will be made aware of the intent of this Project with respect to reduction of waste and recycling. Onsite recycling containers and/or areas will be plainly marked;
- c) The subcontractor will be expected to make sure all their crews comply with the Waste Management Plan;
- d) All recycling containers and areas will be clearly marked;
- e) Lists of acceptable and unacceptable materials will be posted at the site; and
- f) All subcontractors will be informed in writing of the importance of non-contamination with other materials or trash.

v) Motivation Plan

The Contractor will conduct a pre-award meeting for subcontractors. Subcontractors under consideration will be required to attend the meeting to review Project goals and requirements with the Project team. Attendance will be a prerequisite for award of subcontracts. This

document will be an attachment to every subcontract. Copies of the attachment will be posted prominently at the job site.

vi) Expected Project Waste, Disposal, and Handling

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

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

vii) Waste Disposal Company:

Rawalpindi Waste Management Company

Address: 81-A Block Iran Road Satellite Town Rawalpindi, Punjab

Telephone No.: +92-315-1039970

Email: info@rwmc.org.pk

viii) Recycle Hauler

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

ix) Possible Recycle Locations and Acceptable Materials

Coordinate with companies in Rawalpindi Division or which are registered with Rawalpindi Waste Management Company

- a) that accept materials for recycle; and
- b) Using the above as a resource, a list will be kept indicating local opportunities for recycle of expected materials. New locations should be added as needed.

Annexure-III
Resource Conservation Plan

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

- Minimize the use of natural resources; and
- Mitigate 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 the activities during different stages of the Project; and
- An inspector shall be assigned responsibility to oversee the ongoing activities to check the compliance of the planned strategies.

4. EXECUTION OF THE PLAN

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

Material

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

- Reuse of the materials shall be appreciated.

Energy

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

Water

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

Pollution

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

5. CHECKING AND CORRECTIVE ACTIONS

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

Annexure-IV

Tree Plantation Plan

TREE PLANTATION PLAN

The basic purpose of afforestation/plantation of suitable species in the Project area is to reduce the risk made due to the cutting of trees for the proposed Project. The risk made will be compensated by the planting of saplings to enhance green cover and improve the overall environment of the area. Afforestation will not only reduce the risk being made but will also increase the carrying capacity of the area regarding many positive aspects.

It is pertinent to mention that 100 tree may be impacted on sites, which is recommended for compensation and cutting should be avoided up to the maximum. Plantation will be done after the construction work immediately. Plantation of indigenous tree species is highly important to maintain biodiversity and ecological balance. It is also important to prevent global warming, soil erosion, and pollution. Afforestation purifies the environment and helps in reducing the carbon dioxide level. Along with the importance of construction, the afforestation activity will further help in enhancing the socio-economic condition of the area and project sustainability.

IMPORTANCE OF TREE PLANTATION

- Trees contribute to their environment by providing oxygen, improving air quality, climate amelioration, conserving water, preserving soil, and supporting wildlife.
- Trees control climate by moderating the effects of the sun, rain, and wind. Leaves absorb and filter the sun's radiant energy, keeping things cool in summer.
- Trees also preserve warmth by providing a screen from harsh wind.
- Trees also lower the air temperature and reduce the heat intensity of the greenhouse effect by maintaining low levels of carbon dioxide.
- Both above and below ground, trees are essential to the ecosystems in which they reside.
- Trees absorb and store rainwater which reduces runoff and sediment deposit after storms. This helps the groundwater supply recharge, prevents the transport of chemicals into streams, and prevents flooding.
- Trees, shrubs, and turf also filter air by removing dust and absorbing other pollutants like carbon monoxide, sulfur dioxide, and nitrogen dioxide.

OBJECTIVES

- To Restore native species
- To improve the quality of air and reduce its pollution
- To add color to the landscape and enhance the beauty of the environment
- To uplift the quality of our living environment through active planting, proper maintenance, and preservation of trees together with other vegetation.
- To Protect and conserve flora and fauna of the project area.
- To attract rain which has a positive impact on the project area.
- To reduce sedimentation by plantation in the project area which will act as a protection wall against wind-born dust particles.

AREA ENHANCEMENT PLAN

Plants will be raised along the nearby available area or access roads. Total number of plants to be planted is **1,000** Number for this project.

**The Forest Department or concerned Authority may update the standards of planting and choice of species as per the actual requirements and site suitability.*

TREES RECOMMENDED

Table-1 shows the recommended trees for afforestation for the Project.

Table-1: Recommended Trees for Plantation

Sr. No.	Local/English Name	Scientific Name
1.	Chir Pine	<i>Pinus roxburghii</i>
2.	Sukh Chain	<i>Pongamia pinnata</i>
3.	Jaman	<i>Eugenia jambolina</i>
4.	Kachnar	<i>Bauhinia variegata</i>

COST

Break-up of Expenditure per Avenue kilometer @ Rs. 1500/- per diem: Break-up of Expenditure per Avenue kilometer or 250 plants @ Rs. 1500/- per diem:

FIRST YEAR

Sr. No.	Item	Quantity	Rate	Amount (PKR)
1.	Layout	1 Av.km	2 MD/Av.km	3,000.00
2.	Digging of Pits 2.5 ft. each 2.5x250 = 625 cft.	625 cft.	5 MD/Av.km	7,500.00
3.	Cost of Plants including	250 No.	Rs100/- plant	25,000.00
4.	Cost of planting of plants	250 No.	Rs. 25/- plant	6,250.00
5.	Carriage of plants from private nursery to site including loading/unloading	250 No.	Rs. 10/- plant	2,500.00
6.	Cost of Manure and Bhall (silt) including carriage	1 Av. Km		20,000.00
7.	H/watering 50 times 250x50 with water bowser, one driver and one coolie	12500 no.	5MD/per %0	100,000.00
8.	Weeding twice 250x2	500 no.	2 MD/per %	15,000.00
9.	Reopening of Pits twice (250x2)/cft/pit	500 cft.	2 MD/per %	15,000.00
10.	Unforeseen			5750.00
Total				200,000.00

SECOND YEAR

Sr. No.	Item	Quantity	Rate	Amount (PKR)
1.	Cost of Plants 20% Restocking	50 No.	Rs.100/- plant	5,000.00
2.	Cost of planting	50 No.	Rs. 25/- plant	1,250.00

Sr. No.	Item	Quantity	Rate	Amount (PKR)
3.	Carriage of plants	50 No.	Rs. 10/- plant	500.00
4.	H/watering 50 times with water bowser, one driver and one coolie	12500 no.	5MD/per %0	100,000.00
5.	Reopening of Pits twice (250x2)	500 cft.	2 MD/per %	1,5000.00
6.	Weeding twice 250x2	500 no.	2 MD/per %	1,5000.00
7.	Unforeseen			1,250.00
Total				1,38,000.00

THIRD YEAR

Sr. No.	Item	Quantity	Rate	Amount (PKR)
1.	Cost of Plants 10% Restocking 25 No.	25 No.	Rs.100/- plant	2,500.00
2.	Cost of planting	25 No.	Rs. 25/- plant	625.00
3.	Carriage of plants	25 No.	Rs. 10/- plant	250.00
4.	H/watering 40 times x250 no.	10,000 no.	5MD/per %0	75,000.00
5.	Reopening of Pits twice (250x2)	500	5MD/per %0	3,750.00
6.	Unforeseen			2,875.00
Total				85,000.00

FOURTH YEAR

Sr. No.	Item	Quantity	Rate	Amount (PKR)
1.	H/watering 30 times	7500 no.	5MD/per %0	56,250.00
2.	Pruning and cleaning of plants	250 no.	5MD/per %0	1,875.00
3.	Unforeseen			1,875.00
Total				60,000.00

*Cost for raising 1 Av. Km and Maintenance or 250 plants in single row: = **PKR. 483,000/-**

For 4 years cost of 1000 Plants = PKR 1,932,000 Total.

**The above calculations and standards are approximate and tentative provided based on available data which may be updated by the implementing agency as per actual, during implementation.*

Annexure-V
Chance Find Procedure

CHANCE FIND PROCEDURE FOR

Project may involve deep excavation. Therefore, the possibility of chance find is not ignorable. In case of any chance find, the contractor will immediately report through TDCP to Directorate General (DG) of Archeology of Tourism, Archeology and Museums Department, Government of Punjab to take further suitable action to preserve those antique or sensitive remains. Representative of the DG 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 DG. The documentation will be completed and if required suitable action will be taken to preserve those antiques and sensitive remains.

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

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

The contact Address of Tourism, Archeology and Museum Department is given below:

Tourism, Archeology and Museum Department

Phone No: 04299210870-71

Email: arch.punjab@gmail.com

Annexure-VI

Sanitation Plan

SANITATION PLAN

1. INTRODUCTION

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

2. PURPOSE OF THE PLAN

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

3. MANAGEMENT OF SANITATION DURING CONSTRUCTION PHASE

i. Responsibility

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

ii. Location of Camp Sites

The 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, must 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 PEQS, 2016. 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 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 site are estimated to be 120 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	6 Toilets
Up to 40 Employees	1 Urinal	3 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. Sewage Pipe Clearance

One of the main issue that may arise during construction and operational phase is the clogging of sewer pipelines as a result of construction material, oil spillage from vehicles, and throwing of solid waste by the patients, staff and visitors due to lack of bins, which will have negative impacts on the access road in form of deterioration of road surface as well as a source of water borne diseases in the area.

iii. Solid Waste Management

Municipal solid waste and medical waste produced from paragliding club should be collected and managed properly by the concerned department. Waste bins should be placed in the paragliding club; regular cleaning of the floors, park, flying area, etc. should be carried out using mechanical sweepers twice a day and at least ten to twenty sweepers should be deputed for the whole paragliding club to assure regular cleaning.

iv. Awareness and Training

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

Annexure-VII
Occupational Health and Safety Plan

GUIDELINE OCCUPATIONAL HEALTH AND SAFETY PLAN

Occupational Health and Safety covers all personnel working under the Project and will be in line with the Punjab Occupational Safety and Health Act, 2019.

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.

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 Project Management 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).

Minimizing hazards and risks at the workplace

To ensure safety at all work sites, the following will be carried out:

- i. Installation of signboards and symbols in risky and hazardous areas, to inform workers to be careful.
- ii. Construction of barricades around construction sites and deep excavated pits, to cordon off and deter entry of unauthorized personnel and workers into these areas.
- iii. Providing a safe storage site/area for large equipment such as power tools and chains, to prevent misuse and loss.
- iv. 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 7 feet in height and for concrete blocks they will not be more than 6 feet high.
- v. Removing all scrap timber, waste material and rubbish from the immediate work area as the work progresses.
- vi. Where scaffolds are required, ensuring that each scaffold or its components shall be capable of supporting its own weight and at least 4 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 6 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;
- vii. Ensure that all ramps or walkways are at least 6 feet wide, having slip resistance threads and not inclined at more than a slope of 1 vertical and 3 horizontal.
 - viii. Stacking away all excavated earth at least 2 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.
 - ix. Constructing support systems, such as bracing to adjoining structures that may be endangered by excavation works nearby.
 - x. Only a trained electrician to construct, install and repair all electrical equipment to prevent risks of electrical shocks and electrocution.
 - xi. Install fire extinguishers and/or other fire-fighting equipment at every work site to prepare for any accidental fire hazards.

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:

- i. High visibility clothing for all personnel during road works must be mandatory.
- ii. 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.
- iii. Safety belt shall be provided to workers working at heights (more than 20 ft) such as roofing, painting, and plastering.
- iv. Safety boots shall be provided to all workers for protection of feet from impact or penetration of falling objects on feet.
- v. Ear protecting devices shall be provided to all workers and will be used during the occurrence of extensive noise.
- vi. Eye and face protection equipment shall be provided to all welders to protect against sparks.
- vii. Respiratory protection devices shall be provided to all workers during occurrence of fumes, dusts, or toxic gas/vapor.
- viii. 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), footwear for elevated work.
Handling work safety	Helmet, leather safety shoes, work gloves.
Welding and cutting work	Eye protectors, shield and helmet, 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, 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.

Type of Work	PPE
Excavation, heavy equipment, motor graders, and bulldozer operation	Hard hat, safety boots, gloves, hearing protection.
Quarries	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.

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. This is very important, because most work sites will be at some distance from the nearest hospital. In addition to the first aid kits, the following measures should be in place:

- i. Provision of dispensaries by the individual EPC contractor.
- ii. A vehicle shall be on standby from the Project Office so that emergency transportation can be arranged to take severely injured/sick workers to the nearest hospital for immediate medical attention.
- iii. A designated Health Officer/worker 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.
- iv. Communication arrangements, such a provision of radios or mobile communication for all work sites, for efficient handling of emergencies, will be made.

Record Maintenance and Remedial action

The Project Management 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 project management. 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 management can jointly identify any unsafe conditions, acts or procedures and recommend for the contractor to undertake certain mitigative actions to change any unsafe or harmful conditions.

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. Each individual contractor will be responsible for ensuring compensation for the respective workers.

Awareness Programs

The Project management will undertake awareness programs through posters, talks, and meetings with the contractors to undertake the following activities:

- i. 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.
- ii. 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.

Nomination of a Health and Safety Focal Person

Within each site (especially if different sites are being implemented by different contractors), a Health and Safety Focal Person will be appointed. The Terms of Reference for the focal person will mainly be as follows:

- i. Function as the focal person/representative for all health and safety matters at the workplace;
- ii. 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;
- iii. 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;
- iv. Ensure that all workers are adequately informed on the requirement to use Personal Protective Equipment and its correct use;
- v. Also responsible for the first aid kit and making sure that the basic immediate medicines are readily available.

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:

- a. Purpose
- b. Scope of Application
- c. Complying Basis
- d. Occupational Health and Safety Objectives
- e. 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
 - Community Health and Safety
- f. Health Plan
 - Labour Protection
 - Sanitary Epidemic Prevention
- g. Safety Plan
 - Summary
 - Qualification Review
 - Safety Training
 - Construction Plans and Documents
 - Control Measures
 - Monitoring Measures
 - Management of the Key Safety Accidents

- h. Public Security Plan
- i. Local Community Health and Safety

CONSTRUCTION HEALTH AND SAFETY CHECKLIST

GENERAL INTRODUCTION

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

ACCESS ON SITE

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

WELFARE

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

SCAFFOLDS

- Are scaffolds erected, altered and dismantled by competent people?
- Are all uprights provided with base plates (and where necessary, timber sole plates)?
- Are all uprights, ledgers, transoms and braces in position?
- Is the scaffold tied to the structure in enough places to prevent collapse?
- Are there double guard rails and toe boards or other suitable protection at every edge, to prevent falling?
- Are brick guards provided to prevent materials falling from scaffolds?
- Are the working platforms fully boarded and are the boards arranged to avoid tipping or tripping?
- Are there effective barriers or warning notices in place to stop people using an incomplete scaffold, e.g. where working platforms are not fully boarded?
- Is the scaffold strong enough to carry the weight of materials stored on it and are these evenly distributed?
- Does a competent person inspect the scaffold regularly, e.g. at least once a week if the working platform is two meter or above in height or at suitable intervals if less than two meter, and always after it has been altered or damaged and following extreme weather events?
- Are the results of inspections recorded and kept?

- Have proprietary scaffolds been inspected and are they being used in accordance with suppliers' instructions?
- Have the wheels of scaffolds been locked and outriggers deployed when in use and are the platforms empty when they are moved?

POWERED ACCESS EQUIPMENT

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

TRAFFIC, VEHICLES AND PLANT

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

CRANES

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

EXCAVATIONS

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

MANUAL HANDLING

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

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

HAZARDOUS SUBSTANCES

- Have you identified all harmful substances and materials, such as asbestos, lead, solvents, paints, cement and dust?
- Have you checked whether a licensed contractor is needed to deal with asbestos on site?
- Have you identified and put into place precautions to prevent or control exposure to hazardous substances by:
 - Doing the work in a different way, to remove the risk entirely;
 - Using a less hazardous material; and
 - Using tools fitted with dust extraction?
- Have workers had information and training so they know what the risks are from the hazardous substances used and produced on site, and what they need to do to avoid the risks?
- Have you got procedures to prevent contact with wet cement (as this can cause both dermatitis and cement burns)?
- Have you arranged health surveillance for people using certain hazardous substances?

NOISE

- Have workers had information and training so they know what the risks are from noise on site, and what they need to do to avoid those risks?
- Have you identified and assessed workers' exposure to noise?

- Can the noise be reduced by using different working methods or selecting quieter plant, e.g. by fitting breakers and other plant or machinery with silencers?
- Are people not involved in the work kept away from the source of the noise?
- Is suitable hearing protection provided and worn in noisy areas?
- Have hearing protection zones been marked?
- Have you arranged health surveillance for people exposed to high levels of noise?

HAND-ARM VIBRATION

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

ELECTRICITY AND OTHER SERVICES

- Have all necessary services been provided on site before work begins and have you also identified existing services present on site (e.g. electric cables or gas mains) and taken effective steps (if necessary) to prevent danger from them?
- Are you using low voltage for tools and equipment, e.g. battery-operated tools or low-voltage systems?
- Where mains voltage has to be used, are trip devices (e.g. residual current devices (RCDs)) provided for all equipment?
- Are RCDs checked daily by users and properly maintained?
- Are cables and leads protected from damage?
- Are all connections to the system properly made and are suitable plugs used?
- Are tools and equipment checked by users, visually examined on site and regularly inspected and tested by a competent person?
- Where there are overhead lines, has the electricity supply been turned off, or have other precautions been taken, such as providing goal posts or taped markers?
- Have hidden electricity cables and other services been located (e.g. with a locator and plans) and marked, and have you taken precautions for safe working?

CONFINED SPACES

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

TOOLS AND MACHINERY

- Are the right tools or machinery being used for the job?
- Are all dangerous parts guarded, e.g. gears, chains drives, Projecting generator shafts?

- Are guards secured and in good repair?
- Are tools and machinery maintained in good repair and are all safety devices operating correctly?
- Are all operators trained and competent?

FIRES AND EMERGENCIES

General

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

Fire

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

PROTECTING THE PUBLIC

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

Annexure-VIII
Emergency Preparedness and Response
Plan

EMERGENCY RESPONSE PLAN

1. INTRODUCTION

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

2. PURPOSE OF PLAN

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

The emergency response plan provides guidance to:

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

3. PLANNING

i. Emergency Response Team

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

The primary responsibilities of the team are described below:

- Identify the potential hazard or risk sources that can lead to emergency situations;
- Ensure availability of adequate resources, procedures and communication system to deal with the identified emergency situations;
- Ensure awareness and training of the staff to facilitate implementation of the emergency response plan;
- Maintaining the records of any previous incidents; and
- Post-event analysis to bridge the gaps of the existing risk prevention procedures.

The emergency response team shall include but not limited to the following:

- Team Leader
- Safety Engineer
- Reporting Officer / Inspector

A) Team Leader

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

B) Safety Engineer

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

C) Reporting Officer/Inspector

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

The designation, roles and responsibilities of each member shall be clearly defined and communicated to the employees. An outline of the framework of responsibilities is presented in **Figure 1**.

ii. Hazard Identification

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

- Structural failure;
- Disruption of Utility (Power, Water, Telecommunications and Gas);
- Accidents;
- Vehicle accident;
- Fog and Smog;
- Power equipment failure or vandalism;
- Fire explosion;

- Earthquake;
- Terrorism including bombing; and
- Disease Outbreak.

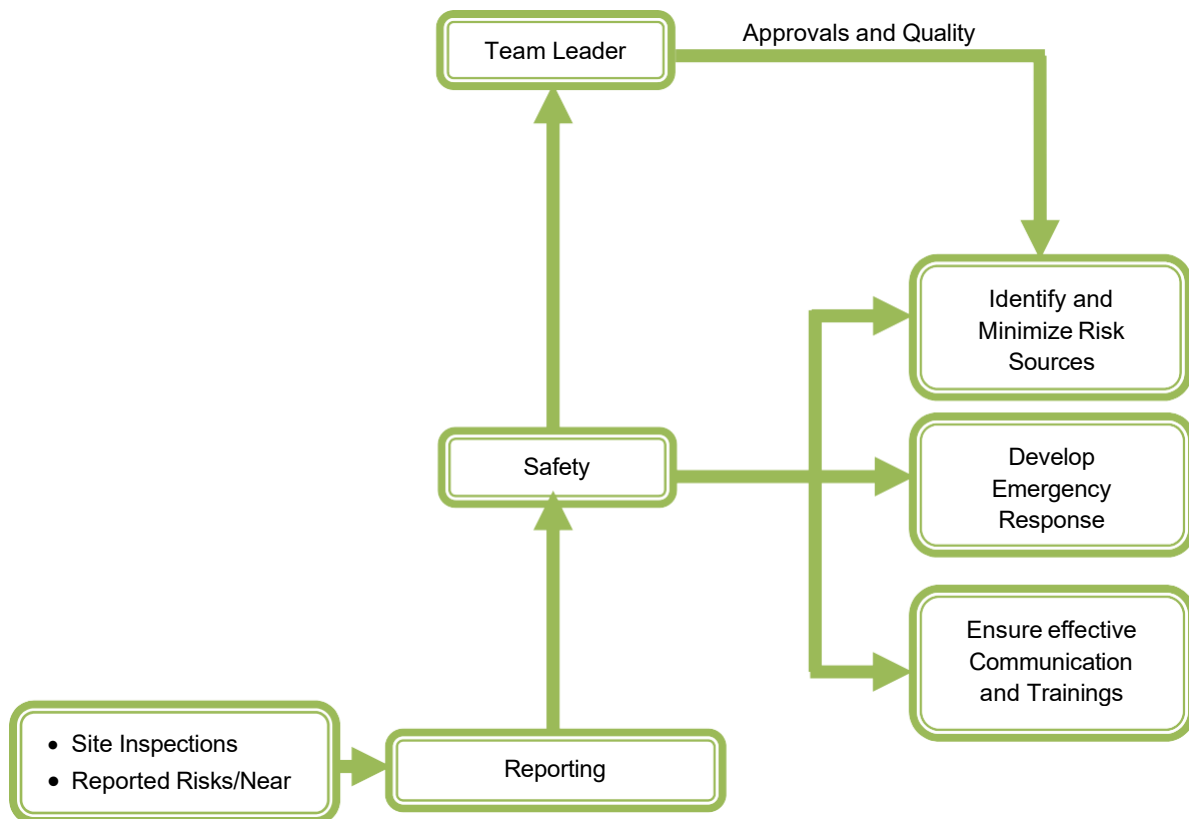


Figure 1: Framework of Responsibilities

iii. Prevention and Mitigation

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

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

4. EMERGENCY PREPAREDNESS

The ERT shall be prepared with all necessary resources and the personnel's shall be trained regularly.

i. Resources

A) Finance and Administration

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

B) Equipment's

All the necessary equipment's needed in an event of emergencies shall be made available, as a minimum. The equipment's needed include:

- Personal protective equipment's (PPEs);
- Alarms;
- Fire extinguishers;
- Crowd control, flashlights, signs, and barricades;
- First aid facility;
- Detection instruments, e.g.; personal alarm kits and smoke detection instruments; and
- Tools to fix minor vandalism.

C) Communication

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

D) Trainings

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

5. EMERGENCY RESPONSE

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

The emergencies can be dealt with:

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

i. Emergency Response Procedure

Any person can report about an emergency, an on-site worker, an outside agency, or the public. Circumstances change during the course of an emergency in different events, thus, the procedure will vary as per the specific situation on ground. However, a basic action plan

to be followed in an emergency is discussed below. This order of response is applicable to almost any emergency and should be followed in sequence.

A) Assess the Situation

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

B) Immediate Control

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

C) Protection from Further Losses

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

ii. Communication

A) Emergency Service Providers

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

B) Emergency Response Team and Management

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

C) Public

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

D) Utilities

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

6. RECOVERY

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

- A detailed analysis and assessment of causes of emergency, extent of damage, and gaps if any, in managing the emergency;
- Recovery and replacement of the assets and infrastructure;
- Reinstatement of disrupted services;
- Road and bridge repairs; and
- Updating of safety arrangements and emergency response procedures to ensure.

Annexure-IX

Traffic Management Plan

PRELIMINARY TRAFFIC MANAGEMENT PLAN (TMP)

1. OBJECTIVES OF TMP AROUND THE PROPOSED PROJECT

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 the 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 temporarily 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;

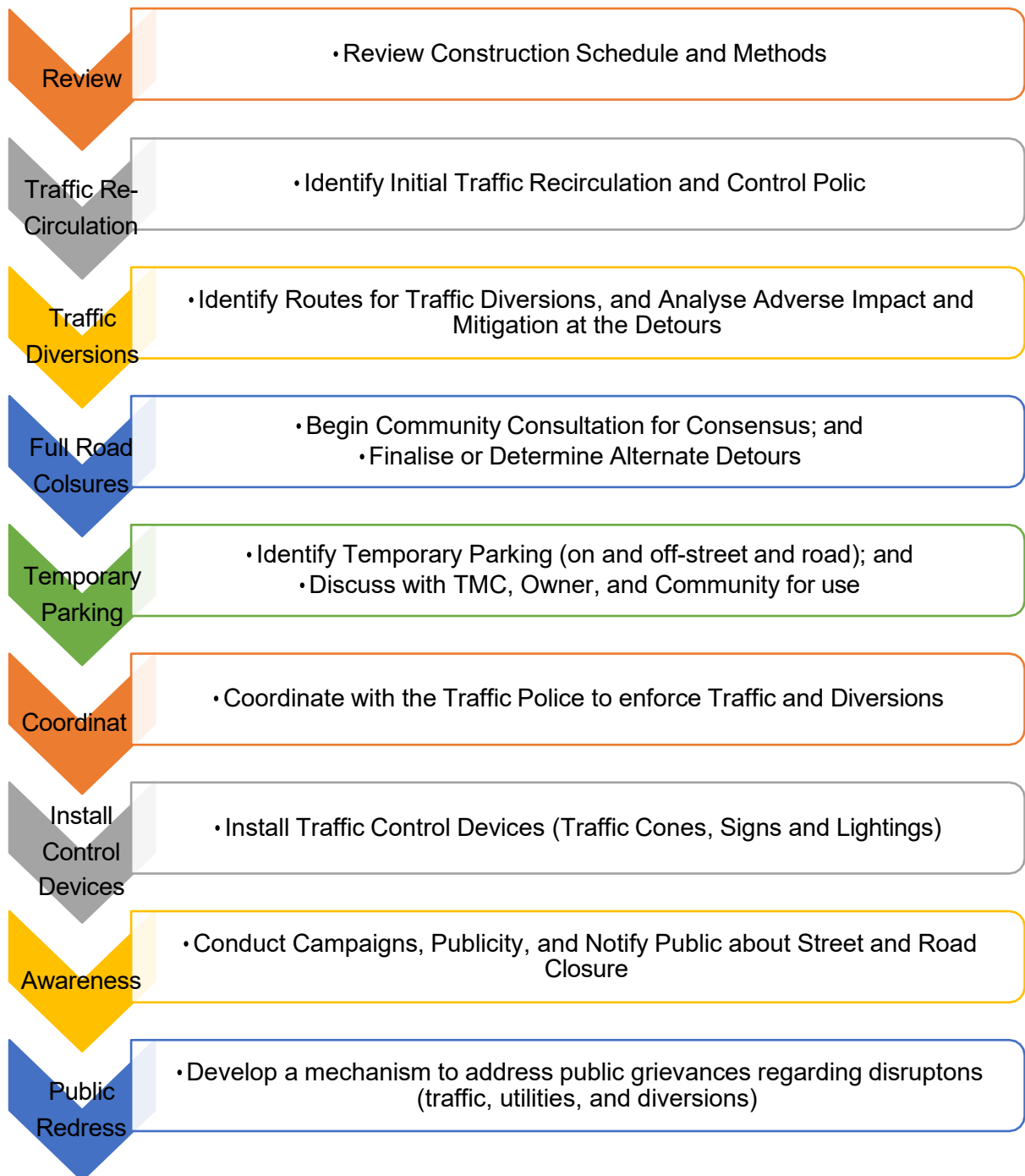


Figure 1: Policy Steps for the TMP

- 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 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 centimeter 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.

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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-X
Break-up of Health and Safety Cost

BREAKUP OF HEALTH AND SAFETY COST				
Items	Quantity	Cost / Item (Rs.)	Total Cost (Rs.)	Rationale
(A) Personal Protective Equipment's (PPEs)				
Dust masks	3360	50	168,000	One dust mask to be used in a week by each labourer for 12 months and for 48 weeks the quantity will be 3360 dust masks.
Safety Shoes	70	3,500	245,000	Two safety shoes are supposed to be used for 12 months by each labourer and for 70 labourers for 12 months construction period it is estimated to be 600
Hand Gloves	280	500	140,000	Four pairs of gloves is to be used by each labourer for 12 months and 280 gloves are estimated to be used by 70 labourers.
First Aid Box	2	3,000	6,000	Two First Aid Box is proposed for 70 labourers.
Ear Plugs	840	100	84,000	One set of ear plug to be used for one month by each labourer and for 12 months it is estimated to be 840 for 70 labourers.
Safety Helmets	140	1,000	140,000	Two safety helmets are to be used by each labourer for 12 months and for 70 labourers 140 safety helmets are estimated.
Safety Jackets (Hi Vis)	140	1,000	140,000	Two safety Jacket (Hi Vis) to be used by each labourer for 12 months and 140 Safety Jackets are estimated to be used by 70 Labourers
Sub-Total (A)			923,000	
(B) Others				
Provision of Dust Bins	10	700	7,000	Ten dust bins are proposed to be placed at construction site for the whole construction period.
Warning Tape	15	500	7,500	---
Safety Cones	10	800	8,000	60 safety cones are estimated to be placed at active construction sites.
Safety Sign Boards	5	1,000	5,000	15 safety sign boards are proposed to be placed at active construction sites.
Sub-Total (B)			27,500	
Grand Total (A + B)			950,500	
Time required for Construction = 12 Months				
No. of labour required during construction = 70				

Annexure-XI
Environmental Laboratory Results