TDCP
TOURISM DEVELOPMENT CORPORATION OF PUNJAB

Land Acquisition & Development of Eco-Friendly Tourist Resort, Aliot, Bhurban Murree

Environmental Impact Assessment (EIA)

Dec-2025

ACRONYMS

EA	Environmental Approval
ESIA	Environmental & Social Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
HSE	Health Safety Environment
IEE	Initial Environmental Examination
ICE	Internal Combustion Engine
M&E	Monitoring and Evaluation
NOC	No Objection Certificate
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Administration
Pb–EPA	Punjab Environment Protection Agency
PEPA	Punjab Environmental Protection Agency
PPE	Personal Protective Equipment
HSE	Health Safety & Environment
PMA	Punjab Masstransit Authority
RDA	Rawalpindi Development Authority
BMS	Battery Management System
CO	Carbon Monoxide
UD	Urban Development
SC	Supervision Consultants
RE	Resident Engineer
TDCP	Tourism Development Corporation of Punjab

TABLE OF CONTENTS

Executive Summary i
1. Introduction and Background i
2. Legal and Regulatory Compliance ii
3. Approach and Methodology iii
4. Description of the Project iii
5. Environmental and Social Baseline Conditions iv
6. Public and Stakeholder's Consultations v
7. Anticipated Environmental and Social Impacts and Mitigation Measures v
8. Environmental and Social Management Plan (ESMP) vii
9. Conclusion and Recommendations vii
Chapter 1 1
Introduction 1
1.1 General 1
1.2 Study Objectives 3
1.3 Project Location 4
1.4 Limitations of the Study 4
1.5 Purpose of EIA 5
1.6 Proponent 6
1.7 Consultant 6
Chapter 2 7
Legislative and Regulatory Requirements 7
2.1 Policy Guidelines 7
2.2 Environmental Institutions and Administration 8
2.3 Laws, Regulations and Guidelines 9
2.3.1 Pakistan Environmental Protection Act, 1997 9
2.3.2 Punjab Environmental Protection (Amendment) Act, 2012 10
2.3.3 The Antiquities Act, 1975 10
2.3.4 The Pakistan Penal Code, 1860 11
2.3.5 Safety Regulations 11
2.4 Environmental Guidelines of Pak-EPA 11
2.5 National Forest Policy (2015) 12
2.5.1 Conservation of Forest Ecosystems 12
2.5.2 Compensatory Afforestation 12
2.5.3 Sustainable Land Use Planning 12

2.5.4 Soil and Watershed Protection 13
2.5.5 Climate Change Mitigation 13
2.5.6 Community Participation 13
2.6 National Drinking Water Policy (2009) 13
2.6.1 Protection of Drinking Water Sources 13
2.6.2 Provision of Safe and Potable Drinking Water 14
2.6.3 Sustainable Water Use and Conservation 14
2.6.4 Wastewater Management and Pollution Prevention 14
2.6.5 Institutional Coordination and Compliance 14
2.6.6 Public Health Protection 15
2.7 National Climate Change Policy (2012) 15
2.7.1 Climate Change Vulnerability of the Project Area 15
2.8 National Conservation Strategy (1992) 15
2.8.1 Relevance of NCS to the Project Area 16
2.9 Punjab Environmental Quality Standards (PEQS) (2016) 16
2.9.1. Ambient Air Quality Standards 16
2.9.2 Noise Standards 16
2.9.3 Wastewater and Effluent Discharge Standards 17
2.9.4 Drinking Water Quality Standards 17
2.9.5 Solid and Hazardous Waste Management 17
2.10 Punjab Wildlife Act (1974) 18
2.10.1 Protection of Wildlife and Habitats 18
2.10.2 Protected Areas and Buffer Zones 18
2.10.3 Restrictions on Noise and Human Disturbance 18
2.10.4 Conservation and Sustainable Tourism 19
2.10.5 Institutional Coordination 19
2.11 Punjab Plantation and Maintenance of Trees Act (1974) 19
2.11.1 Regulation of Tree Cutting 19
2.11.2 Compensatory Plantation 21
2.11.3 Protection and Maintenance of Planted Trees 21
2.11.4 Prevention of Damage to Existing Trees 21
2.11.5 Constitutional Coordination and Compliance 21
2.12 Punjab Antiquities Amendment Act (2012) 22
2.12.1 Protection of Declared Antiquities 22
2.12.2 Chance Find Procedures 22
2.12.3 Restrictions on Excavation and Earthworks 23

2.12.4 Institutional Coordination and Compliance 23
2.13 Cutting of Trees (Prohibition) Act 1975....23
2.14 Punjab Forest Act (Amended) 2016 23
2.15 The Punjab Protected Areas Act (2020) 24
2.16 Seismic Building Code of Pakistan (2007) 24
2.17 Environmental Guidelines of UNEP and the World Bank....25
2.18 International Treaties and Obligations....25
2.19 Environmental Assessment Process 25
2.20 Interaction with Other Departments/Agencies 26
2.21 Punjab-EPA 26
2.22 Punjab Revenue Department....26
2.23 Procedure for Environmental Approval....27
Chapter 3 30
APPROACH AND METHODOLOGY 30
3.1 Terms of Reference 30
3.2 Task Assignment and Environmental Team....31
3.4 Field Investigation....32
3.4.1 Review of Legal and Administrative Framework....33
3.4.2 Identification of Impacts 33
3.4.3 Evaluation of Impacts....33
3.4.4 Remedial and Mitigation Measures 34
3.4.5 Development of Environmental and Social Management Plan (ESMP)....34
3.4.6 Report Format....34
3.5 Public, Stakeholder and Institutional Consultations....35
3.6 Stakeholder Meetings and Institutional Consultations 36
3.7 Environmental Monitoring and Laboratory Testing....36
3.7.1 Water Analysis 37
3.7.2 Ambient Noise Level Monitoring....38
3.7.3 Ambient Air Quality Level Monitoring....38
3.8 Data Analysis and Impact Identification....38
Chapter 4 40
PROJECT DESCRIPTION 40
4.1 Type and Category of the Project....40
4.2 Site Alternatives....40
4.3 Location and Site Layout of the Project: 40
4.4 Land Use on the Site 41

4.5 Scope of Services 41
4.5 Road Access 42
4.6 Vegetation Features of the Site 42
4.7 Cost and Magnitude of Operation 42
4.8 Layout plan 42
4.9 Machinery and Utilities to be Used in the Project: 43
4.11 Schedule of Implementation 43
4.12 Sources of water 44
4.13 Water Requirement and Wastewater Generation 44
4.14 Solid Waste Generation 45
4.15 Activities During Operational Phase 45
4.16 Restoration and Rehabilitation Plan 45
4.17 Government Approvals 45
Chapter 5 46
SOCIO-ENVIRONMENTAL BASELINE CONDITIONS 46
5.1 General 46
5.2 Physical Environment 46
5.2.1 Topography 47
5.2.2 Hydrology 47
5.2.3 Soils 48
5.2.4 Seismic Profile 48
5.2.5 Geology 49
5.2.6 Temperature 50
5.2.7 Wind 52
5.2.8 Noise Level 53
5.2.9 Ambient Air Quality 54
5.2.10 Water Resources 54
5.2.11 Minerals 56
5.3 Lab Reports of Baseline Environmental Analysis 56
5.3.1 Water Quality 57
5.3.2 Air Quality 57
5.3.2 Noise Levels 58
5.4 Ecological Environment 59
5.5 Socioeconomic Environment 61
5.5.1 Demographic Profile 62
5.5.2 Livelihood 62

5.5.3 Education/ Literacy Rate 63
5.5.4 Transportation and Communication 63
5.5.5 Quality of Life Values 64
Chapter 6 65
PUBLIC / STAKEHOLDERS CONSULTATIONS AND INFORMATION DISCLOSURE ..65
6.3 Concerned Departments Consulted (Stakeholders) 66
6.4 Community Consultation 68
6.4 Project Stakeholders 69
6.4.1 Proponent 69
6.4.2 Proponent's Environment Consultant Team 69
Chapter 7 74
ANTICIPATED SOCIO-ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES .74
7.1 General 74
7.2 Impacts and Mitigation Measures 74
 Traffic Diversion Routes 76
Chapter 8 86
ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) & BUDGETING 86
8.1 General 86
8.2 Objectives of the EMP 87
8.3 Components of EMP 87
A. Environmental Mitigation Plan 88
8.3.1 Land, Soil, and Slope Stability 88
8.3.2 Air Quality Management 88
8.3.3 Noise Control 89
8.3.4 Water Resources Protection 89
8.3.4 Solid Waste Management 89
8.3.5 Flora and Fauna Protection 89
8.3.6 Occupational Health & Safety 89
8.4 EMP During Operational Phase 89
8.4.1 Air and Noise Quality 89
8.4.2 Water and Wastewater Management 90
8.4.3 Solid Waste Management 90
8.4.4 Biodiversity and Landscaping 90
8.4.5 Community and Social Measures 90
8.5 Environmental Monitoring Plan 90
8.6 Institutional Arrangements 90

8.7 Conclusion....91
8.8 Environmental Monitoring Plan....92
B. General Environmental Management Plans....96
1. Environment Management Plan....96
C. Environmental Auditing Plan....99
D. Restoration and Rehabilitation Plan....99
E. Training and Capacity Building Plan....100
F. Tree Plantation Plan....101
G. Site Waste Management Plan....102
D. Institutional Arrangements....103
c. Monitoring Agency....105
d. Project Contractor(s)....105
e. Environmental Protection Agency (EPA)....106
E. EMP Cost (Environment Budget)....97
Chapter 9....98
CONCLUSION AND RECOMMENDATIONS....98
9.1 Conclusion....98
9.2 Recommendations....99
9.2.1 Engineering Safeguards....99
9.2.2 Environmental Safeguards....99
9.2.2 Socioeconomic Safeguards....100

TABLES

Table 1. EIA Approval Process....28
Table 2. Water Analysis....37
Table 3. Ambient Noise Level Monitoring....38
Table 4. Ambient Air Quality Level Monitoring....38
Table 5. Location and Site Layout....41
Table 6. Machinery and Utilities....43
Table 7. Timeline for Construction of Project....44
Table 8. Water Requirement and Wastewater Generation During Construction....44
Table 9. Average Water Quality....46
Table 10. Air Quality....58
Table 11. Noise Levels....59
Table 12. Tress affected....59
Table 13. Shrubs....60
Table 14. Construction phase impacts and mitigation measures....75
Table 15. Operational phase impacts and mitigation measures....77
Table 16. Organization and their Duties for EMP Implementation....92
Table 17. Environmental Monitoring Plan....93
Table 18. Environmental Management Plan....96
Table 19. Training Program....101
Table 20. Tree Species for Project Area....101
Table 21. Summary of Environmental Budget....97

FIGURES

Figure 1. Google Map 7
Figure 2. Seismic Map of Pakistan 49
Figure 3. Temperature in Project Area 50
Figure 4. Climo graph of Bhurban 51
Figure 5. Average Wind Speed (1991-2024) 53
Figure 6. Average Humidity (1991-2024) 53
Figure 7. Groundwater Samples 56
Figure 8. Ambient Air Results 57

ANNEXURES

I. Layout Plan

II. Lab Reports

III. Public Consultation Performa

IV. Photo Gallery

EXECUTIVE SUMMARY

Executive Summary

Project: Establishment of Eco-Friendly Tourist Resort at Murree-Bhurban.

Proponent: Program Management Unit (PMU) TDCP

Consultant: Dr. Sultan Mahmood, Lead Environment / Climate Change Expert

1. Introduction and Background

Murree-Bhurban is widely recognized for its scenic landscapes, tranquil residential character, and rich natural environment. The area is traditionally associated with peaceful living and ecological value rather than intensive commercial activity or large-scale tourism infrastructure. In line with the principles of sustainable development, the Tourism Development Corporation of Punjab (TDCP) has planned the development of an eco-friendly tourist resort at Aliot, Murree-Bhurban. The project aims to promote sustainable tourism practices, reduce pressure on the congested urban areas of Murree, and provide environmentally responsible recreational opportunities. Situated at an elevation of approximately 6,000 feet above mean sea level within a pine-forested hilly terrain, the proposed resort is designed to incorporate low-impact facilities that harmonize with the surrounding natural landscape and minimize adverse environmental effects. Main features of the proposed project are:

- Construction of eight (8) Glamping Pods: Elevated, eco-friendly structures for luxurious yet minimal-impact stays.
- Construction of three (3) Tree Houses: Integrated with existing trees for an immersive nature experience.
- Construction of A - Frame Restaurant: A stylish, sustainable dining space.
- Construction of walkways
- Provision of fence
- Construction of approach road
- Landscaping

Additional features include scenic walkways, boundary fencing, an erosion-controlled approach road, native landscaping, and non-mechanical kids' rides—all focused on renewable energy, water conservation, and waste management.

Since guidelines of Environmental Protection Agency (EPA) requires the Proponent to acquire an environmental approval for such projects. Dr. Sultan Mahmood, LEP has been assigned the task of detailed Environmental Impact Assessment (EIA) study of the project.

Planning objectives of the environmental assessments are to carry out the identification of environmental impacts, positive or adverse, during construction, operation and maintenance phases of the proposed Establishment of Eco-Friendly Tourist Resort at Aliot, Murree-Bhurban project and suggest appropriate mitigation measures to offset adverse impacts.

2. Legal and Regulatory Compliance

The National Conservation Strategy (NCS) is the primary document addressing environmental issues of the country. The Pakistan Environmental Protection Act (PEPA1997) is the key legislation empowering the Government to frame regulations for the protection and restoration of the environment. Pakistan is a signatory to the Convention on Biological Diversity, and is thereby obliged to develop a national strategy for the conservation of biodiversity.

Submission of EIA report to obtain environmental approval was made mandatory by the Pakistan Environmental Protection Ordinance (PEPO, 1983) and the PEPA-1997. Section 12(1) of PEPA-1997 stipulates that no project involving construction or any change in the physical environment can be undertaken unless an Initial Environmental Examination (IEE) or an EIA is conducted, and relevant approval (NOC) is received from the concerned provincial Environmental Protection Agency (EPA), which in this case is EPA, Punjab.

Policy provisions, eligibility and entitlements for the project affected persons (PAP), with the exception of impacts caused by disruption of public utilities, land acquisition in Pakistan is regulated by the LAA, 1894 with its successive amendments in the main law regulating land acquisition for public purpose. It mandates that land valuation is to be based on the latest three years average registered land sale rates, though in several

recent cases the average rate over the past year, or even the current rates, have been applied.

3. Approach and Methodology

An adequate approach was followed to conduct EIA for this resort project to meet the requirements of Punjab-EPA for social and environmental sustainability standards and policies, as well as referencing the ADB Social Safeguard Policy. The EIA process, however, has undergone the following mandatory steps which are backbone of any environmental assessment process:

- Review of secondary information
- Collection of baseline information on physical, ecological and socio-economic conditions prevailing in the project area
- Impact assessment, mitigation and enhancement measures
- Public Consultation and Disclosure Plan (PCDP)
- Development of Environmental Management and Monitoring Plan (EMMP)

4. Description of the Project

The proposed project, **Establishment of an Eco-Friendly Tourist Resort at Aliot** is located in the Murree-Bhurban area of Murree Tehsil, District Murree, Punjab Province, Pakistan. Murree-Bhurban lies within the lower Himalayan foothills and is characterized by undulating mountainous terrain, dense pine forests, and a cool temperate climate. The project site is situated at an approximate elevation of 5,800–6,200 feet above mean sea level, making it environmentally sensitive and ecologically significant.

The area is accessible through existing regional road networks connecting Murree with Bhurban and Murrree with Islamabad, while remaining sufficiently removed from the highly congested urban core of Murree. The surrounding land use predominantly comprises forest cover, low-density residential settlements, and limited tourism-related developments, reflecting the semi-natural character of the area.

The site lies approximately between latitude 33°54′ N to 33°56′ N and longitude 73°26′ E to 73°28′ E, within the lower Himalayan foothills at an elevation ranging from about 5,800

to 6,200 feet above mean sea level. The project area is surrounded by predominantly natural and semi-natural land uses in all directions. To the north, the site is bounded by dense pine forest and natural hill slopes; to the south, it adjoins existing access routes and limited low-density development; to the east, the terrain consists of forested hills with moderate slopes and undisturbed vegetation; while the west comprises mixed vegetation cover with comparatively gentler slopes. This quadrant-wise setting reflects the environmentally sensitive nature of the area and provides a suitable context for the development of low-impact, eco-friendly tourism facilities.

Different samples of environmental parameters were collected by the EPA approved laboratory WELCOS from the site and provided their respective results. According to them, quality of drinking water is rated as 'fit'. Similarly, waste water and air quality results are also according to the standards as set by the NEQS.

Total cost for compliance of the environmental management plan is estimated as PKR 40 million out of a total cost of the proposed project, i.e. PKR 400.211 million. Project completion time is estimated to be about two years.

5. Environmental and Social Baseline Conditions

The physical environment of Murree District is defined by its hilly terrain in the lower Himalayan foothills, with steep to moderate slopes and dense forest cover. The climate is cool and temperate, featuring mild summers, cold winters, and significant rainfall and occasional snowfall. Air quality is generally good but may deteriorate locally during peak tourist seasons due to increased traffic. Key physical features, including seismic zonation, geology, soils, hydrology, drainage, and slope stability, are also addressed in this report.

Biological environment reveals that project area is covered by pine forests (Pinus roxburghii) with scattered broadleaf species, shrubs, and ground vegetation. It supports diverse wildlife, including mammals like jackals and porcupines, birds such as partridges and pheasants, and some reptiles and amphibians. The ecosystem contributes to biodiversity conservation, soil stabilization, and microclimate regulation. Human activity is limited, keeping ecological integrity largely intact. Potential impacts from the proposed

resort, such as habitat disturbance and waste generation, are assessed with mitigation measures in this EIA report.

With reference to socio economic environment of project area at Murree-Bhurban is a semi-rural, sparsely populated region where local communities primarily depend on tourism, small-scale agriculture, and forest-based livelihoods. The population is engaged in providing services such as guest houses, transport, and small businesses catering to visitors. Social infrastructure, including schools, basic healthcare facilities, and local markets, exists but is limited in capacity. The literacy rate is moderate, and traditional cultural practices remain prevalent. The development of the eco-friendly tourist resort is expected to enhance local employment opportunities, promote sustainable livelihoods, and contribute to socio-economic development while ensuring minimal disruption to community life.

6. Public and Stakeholder's Consultations

As a result of extensive public consultations with stakeholders regarding the proposed eco-friendly tourist resort at Aliot, Murree-Bhurban several concerns were raised. These included issues related to acquisition of private land, temporary disturbance to residents and tourists, soil erosion, dust generation, and potential disruption to local businesses. Stakeholders also highlighted matters concerning fair compensation, safety during construction, restricted access to certain areas, noise pollution, and employment opportunities. Despite these concerns, many stakeholders recognized that the project would enhance the natural aesthetic value of Murree-Bhurban increase property values, improve visitor safety, and provide socio-economic benefits to the local community. Most of the adverse impacts are expected to occur during the construction phase, and appropriate mitigation measures have been proposed in the Environmental Management and Monitoring Plan (EMMP) of this EIA report.

7. Anticipated Environmental and Social Impacts and Mitigation Measures

Environmental impacts have been identified for pre-construction, construction and operation stages and are divided in positive and adverse categories. They are, however, highlighted below:

Positive Impacts

Various key positive environmental features of the project are summarized below which will become in public benefit once the project is in operation:

i. Creation of employment opportunities for local communities during construction and operation phases, promoting sustainable livelihoods.
ii. Encourages eco-tourism, reduces pressure on congested urban Murree, and enhances regional tourism potential.
iii. Upgradation of access roads, basic utilities, and recreational facilities benefiting both visitors and local residents.
iv. Incorporation of eco-friendly design and low-impact facilities promotes conservation and responsible tourism practices.

Adverse impacts

i. Clearing of vegetation and construction activities may temporarily disturb local flora and fauna.
ii. Dust generation, vehicular emissions, and construction noise may affect local air quality and tranquility.
iii. Construction activities may disrupt movement of residents and tourists in the project area.
iv. Local businesses may experience short-term losses due to construction-related restrictions.

To minimize the potential adverse environmental and social impacts of the proposed eco-friendly tourist resort at Aliot, Murree-Bhurban appropriate mitigation measures have been incorporated into project planning, design, and implementation. Vegetation clearance will be minimized, and compensatory plantation will be carried out to maintain ecological balance and prevent habitat loss. Slope stabilization measures, such as terracing, retaining structures, and controlled earthworks, will be implemented to reduce soil erosion and landslide risks. Dust suppression techniques, proper waste management, and maintenance of construction machinery will be adopted to control air and noise pollution.

From a social perspective, the project will ensure transparent and fair land acquisition procedures, with timely compensation provided in accordance with prevailing laws and regulations. Measures will be adopted to minimize disturbance to local residents, including phased construction, clear signage, and maintenance of access routes to homes and businesses. A traffic management plan will be implemented to reduce congestion and ensure pedestrian and commuter safety. Local communities will be given priority in employment and skill development opportunities during both construction and operation phases. In addition, a grievance redress mechanism will be established to address public concerns promptly, ensuring continuous community engagement and social harmony throughout the project lifecycle.

8. Environmental and Social Management Plan (ESMP)

A custom made Environmental Management and Monitoring Plan has been developed, in order to facilitate the implementation of the mitigation, measures identified during the present study. The management plan identifies the roles and responsibilities of the proponent, consultant and the contractors during the construction and operation phases. The plan also defines environmental monitoring requirements during the project period.

An Environmental Monitoring Plan is also provided to be used as a management and monitoring tool for the implementation of the mitigation measures set out in the main EIA report. Institutional arrangement has also been proposed for the effective follow-up activity of the Monitoring Plan.

9. Conclusion and Recommendations

Since it is a tourist resort to attract future tourists visiting Murree-Bhurban it will add beauty and economic value to the adjacent area, especially diluting the dwelling pressure on Murree Town. On the basis of overall socio-environmental impact assessment, it is concluded that the project is unlikely to cause any significant, long term adverse impact on the social, physical and ecological environment of the area, provided the proposed activities are carried out in line with ESMP and the mitigation measures are completely and effectively implemented on ground as stated in this EIA report.

Chapter 1

Introduction

1.1 General

Murree-Bhurban is one of the most prominent hill regions of Punjab, Pakistan, located within the lower Himalayan foothills and renowned for its scenic landscapes, pleasant climate, and rich natural environment. The region has historically served as a major recreational and retreat destination due to its pine-covered hills, cool summers, misty weather, and panoramic views, making it an attractive location for tourism and leisure-oriented development. Unlike heavily urbanized centers, Murree–Bhurban retains a distinctive ecological and residential character, with large tracts of forest land, natural slopes, and low-density settlements that contribute to its environmental and aesthetic value.

Geographically, Murree-Bhurban lies within Murree Tehsil of District Murree at an elevation of approximately 5,800 to 6,200 feet above mean sea level. The area experiences a cool temperate climate, characterized by mild summers, cold winters, heavy monsoon rainfall, and occasional snowfall during winter months. These climatic conditions play a crucial role in shaping the local ecosystem, hydrology, vegetation patterns, and tourism dynamics. The relatively high precipitation and frequent fog events enhance the lushness of the landscape but also make the area environmentally sensitive, particularly with respect to slope stability, soil erosion, and drainage.

The natural environment of Murree–Bhurban is dominated by sub-tropical pine forests, primarily consisting of *Pinus roxburghii (Chir Pine)* along with associated broad-leaved species, shrubs, grasses, and seasonal herbs. These forests perform essential ecological functions, including soil stabilization, groundwater recharge, microclimate regulation, and biodiversity conservation. The region supports a range of fauna typical of the lower Himalayan belt, including mammals, birds, reptiles, and amphibians, which rely on forest cover and relatively undisturbed habitats. Due to these ecological attributes, Murree–Bhurban is recognized as an environmentally sensitive area where unplanned development could result in irreversible environmental degradation.

Socio-economically, the Murree–Bhurban area comprises small villages and scattered settlements, including Murree-Bhurban Lower Topa, Ghora Gali, Kuldana, and Jhika Gali. The population density is low compared to urban centers, and local communities largely depend on tourism-related activities, small-scale agriculture, livestock rearing, and forest-based livelihoods. Seasonal tourism plays a significant role in shaping the local economy, with population numbers increasing substantially during peak summer and winter seasons. While tourism provides income opportunities, it also places pressure on local infrastructure, natural resources, and environmental quality when not managed sustainably.

Over the past few decades, Murree has experienced rapid and largely unregulated tourism growth, leading to congestion, traffic issues, pressure on water resources, waste management challenges, and degradation of natural landscapes in urbanized areas. This situation has highlighted the need for planned, environmentally responsible tourism development that can accommodate visitors while preserving the ecological and social fabric of the region. Murree-Bhurban due to its relatively lower development intensity and natural setting, offers potential for such planned development provided that environmental safeguards are strictly observed.

Resort development in Murree–Bhurban is particularly attractive due to the area's year-round tourism potential, serene environment, and proximity to major urban centers such as Islamabad and Murree. However, the ecological sensitivity of the region demands that any tourism-related development be designed with a strong emphasis on low-impact infrastructure, sustainable land use, conservation of vegetation, and community well-being. Poorly planned construction could exacerbate soil erosion, deforestation, landslide risks, and social disruption, making environmental assessment an essential prerequisite.

In this context, the development of a resort facility in the Murree–Bhurban area requires a comprehensive understanding of the existing environmental baseline, including physical, biological, and socio-economic conditions. It also necessitates a careful evaluation of potential impacts during both construction and operational phases. The Environmental Impact Assessment (EIA) serves as a critical tool to ensure that development aligns with

national environmental regulations, forest laws, and sustainable tourism objectives, while addressing stakeholder concerns and safeguarding local ecosystems.

The introduction of eco-friendly resort development in Murree–Bhurban is envisioned as a means to diversify tourism locations, reduce pressure on congested urban Murree, and promote environmentally responsible recreation. When supported by effective planning, community engagement, and environmental management measures, such development has the potential to contribute positively to regional economic growth while maintaining the natural beauty and ecological integrity that define the Murree–Bhurban landscape.

This EIA report, therefore, places Murree–Bhurban within its broader environmental, social, and regional planning context, providing the foundation for assessing impacts, proposing mitigation measures, and ensuring that resort development proceeds in a manner consistent with the principles of sustainable development and environmental stewardship.

1.2 Study Objectives

Planning objectives of the environmental assessment are to carry out the identification of environmental impacts, positive or adverse, during construction, operation and maintenance activities of the proposed Establishment of Eco-Friendly Tourist Resort at Murree-Bhurban project. The specific objectives are given below:

- To conduct an environment impact assessment (EIA) in the project area of influence
- To identify and predict potential and social impacts (both positive and negative, direct, indirect and cumulative) of the proposed project.
- To recommend appropriate mitigation, compensation and enhancement measures for identified impacts.
- To develop a detailed environment management (EMP) with mitigation, monitoring and institutional arrangement.
- To ensure compliance with all relevant environmental regulations / laws to obtain environmental clearance / approval.

1.3 Project Location

The project site is located in the Aliot village, Murree-Bhurban area of Murree Tehsil, District Murree, Punjab Province, within the lower Himalayan foothills. The area lies at an elevation ranging from approximately 5,800 to 6,200 feet above mean sea level and is characterized by hilly terrain, natural slopes, and dense pine forest vegetation. Geographically, the site is situated between latitude 33°94′ 6476” North and longitude 73°46’3534” East.

The location is accessible through the existing regional road network linking Murree with Islamabad in the west and Bhurban in the east, while being sufficiently distant from the congested urban center of Murree. The surrounding land use predominantly consists of forested areas, scattered rural settlements, and limited tourism-related development, reflecting a relatively undisturbed natural setting. The area’s scenic landscape, cool temperate climate, and environmental sensitivity make it suitable for planned, low-density development that integrates with the natural environment and supports sustainable tourism objectives.

1.4 Limitations of the Study

The proposed eco-friendly tourist resort at Murree-Bhurban is subject to certain limitations, which have been identified during the Environmental Impact Assessment (EIA) study. These limitations do not render the project unfeasible; however, they require careful planning and management to minimize associated risks.

- The project is located in a hilly and ecologically sensitive area, which limits the extent and intensity of construction activities and requires specialized design, slope stabilization, and soil conservation measures.
- Climatic conditions, including heavy monsoon rainfall, fog, and seasonal snowfall, may restrict construction schedules and affect accessibility during certain periods of the year.
- Limited availability of water resources in the region necessitates efficient water management, rainwater harvesting, and conservation measures to avoid pressure on local supplies.

- The existing road infrastructure is narrow and may experience congestion during peak tourist seasons, potentially affecting construction logistics and visitor access.
- Strict compliance with environmental regulations and forest protection requirements may limit flexibility in land use and increase project costs.
- Dependence on seasonal tourism may affect the consistency of economic returns and operational planning.
- Any unforeseen natural hazards, such as landslides or seismic activity, may pose risks to infrastructure and require additional mitigation measures.
- Recognizing and addressing these limitations through appropriate design, environmental safeguards, and adaptive management will be essential to ensure the sustainability and long-term success of the project.

1.5 Purpose of EIA

The purpose of this Environmental Impact Assessment (EIA) is to identify, predict, and evaluate the potential environmental and social impacts associated with the proposed development in the Murree-Bhurban area. The EIA ensures that environmental considerations are incorporated into the project planning and decision-making process at an early stage, in line with the principles of sustainable development.

This assessment establishes the baseline conditions of the physical, biological, and socio-economic environment of the project area and analyzes the likely impacts during the construction and operational phases. It also identifies feasible mitigation measures to avoid, minimize, or manage adverse effects while enhancing the positive impacts of the project. Furthermore, the EIA facilitates public consultation and stakeholder participation, allowing local concerns to be addressed transparently.

The EIA serves as a technical and legal document to support regulatory approval, ensuring compliance with national environmental legislation, forest laws, and applicable guidelines. Ultimately, it provides a framework for environmental management, monitoring, and reporting through the Environmental Management and Monitoring Plan (EMMP), helping to safeguard environmental resources and promote socially responsible development in the project area.

1.6 Proponent

The proponent of the proposed project, TDCP is supposed to construct the Establishment of Eco-Friendly Tourist Resort at Murree-Bhurban. The Proponent will implement and monitor requirements of environmental impact mitigation by formulating Environment Management Committee (EMC). It will take overall responsibility of undertaking and coordinating the mitigation and monitoring, identified during the preconstruction and construction phases

1.7 Consultant

TDCP being the proponent of the proposed project hired Dr. Sultan Mahmood, LEP to carry out the Environmental Impact Assessment (EIA) for the installation of a foreside project in accordance with Punjab- EPA guidelines.

The primary contact is:

Dr. Sultan Mahmood
Freelance
Lead Environment/ CC Expert
House 109, Block C1, College Road,
Township, Lahore

Cell: 0321 4302528
Emai: info@ecocare.pk

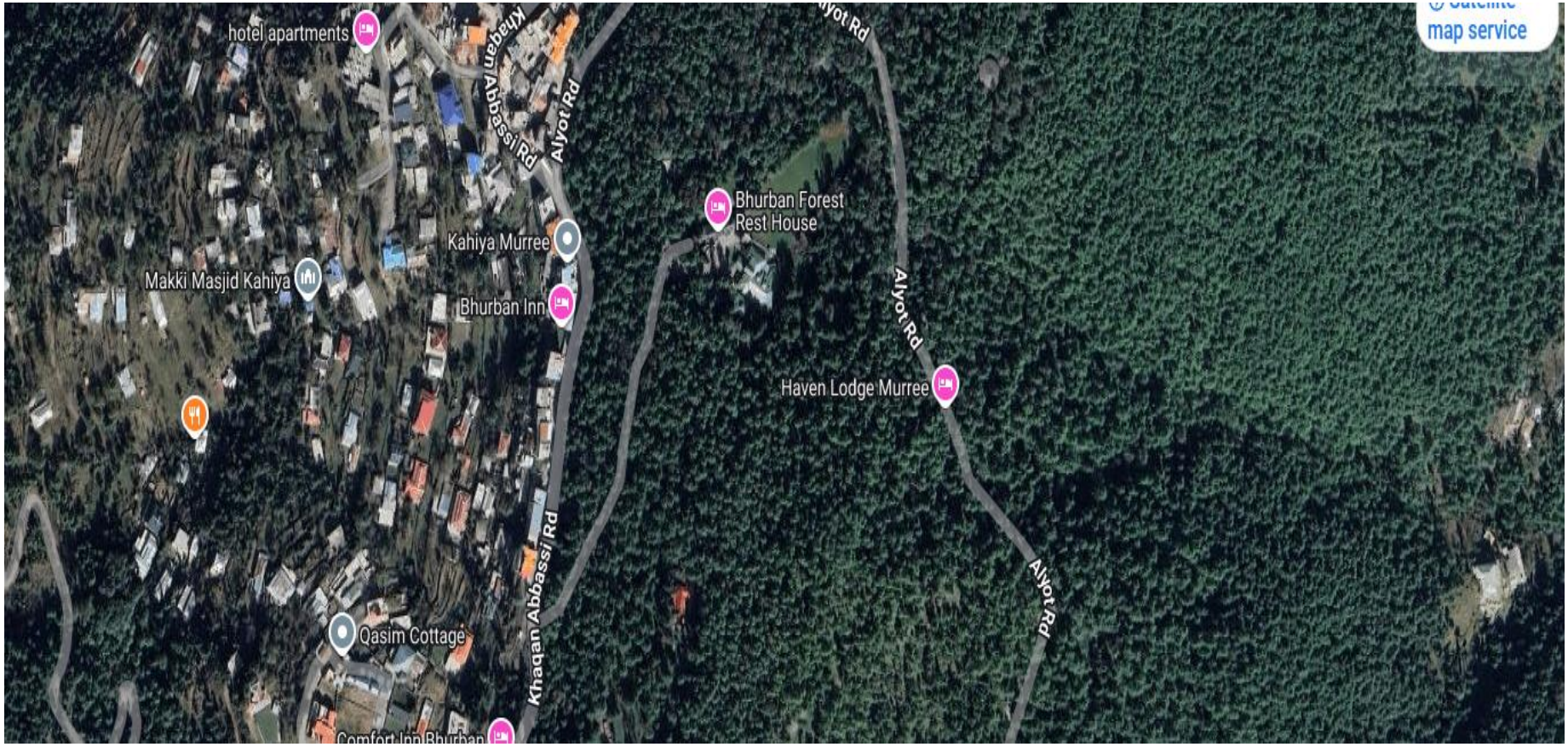

Figure 1. Google Map of the Project Area

Chapter 2

Legislative and Regulatory Requirements

A number of environmental laws exist in Pakistan, containing number of clauses concerning protection of the environment but its history starts in 1983. The Pakistan Environmental Protection Ordinance, 1983 was the first legislation promulgated for the protection of environment. Pakistan Environment Protection Agency (Pak-EPA), however, was established in 1984. No significant environmental policy, guidelines and regulations were enacted untill early 1990's. The National Conservation Strategy was developed and approved by the federal cabinet in 1992. Provincial Environmental Protection Agencies were also established in 1992-1993 including Punjab-EPA. National Environmental Quality Standards (NEQS) were established in 1993. Detailed environmental guidelines started in 1996. The National Assembly and the Senate conferred National Environmental Protection Act in 1997. National Environment Policy was passed by the parliament in 2005 which received World Bank approval in 2011.

This project has been assessed in compliance of existing legal framework on the environment in Pakistan as described henceforth.

2.1 Policy Guidelines

The National Conservation Strategy (NCS) is the primary document addressing environmental issues of the country. NCS is duly recognized as the National Environmental Action Plan by various international donor agencies including the World Bank, ADB, JICA etc. The document identifies fourteen (14) core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural environment. One of these areas is biodiversity conservation. Others include the restoration of rangelands, pollution prevention and abatement, and preservation of cultural heritage.

The Pakistan Environmental Protection Act, 1997 is the key legislation empowering the government to frame regulations for the protection of the environment. Detailed rules,

regulations and guidelines required to enforce the Environmental Protection Act are still in various stages of development.

Pakistan is a signatory to the Convention on Biological Diversity, and is thereby obligated to develop a national strategy for the conservation of biodiversity. The Government of Pakistan has constituted a biodiversity working group under the auspices of the Ministry of Environment, Local Government and Rural Development to develop a Biodiversity Action Plan for the country. After an extensive consultative exercise, a draft Action Plan has been developed. The plan which has been designed to complement the NCS and the proposed provincial conservation strategies identifies the causes of biodiversity loss in Pakistan and suggests a series of proposals for action to conserve biodiversity in the country.

2.2 Environmental Institutions and Administration

The Constitution of Pakistan distributes the legislative powers between the federal and the provincial governments through "Federal and Concurrent Lists" attached to the Constitution as appendices. The Federal list depicts the areas and subjects on which the federal government has exclusive powers. The second, concurrent list contains areas and subjects on which both federal and provincial governments can enact laws.

The Ministry of Environment, Local Government and Rural Development is responsible for environmental issues at federal level. The NCS unit within the Ministry ensures implementation of the National Conservation Strategy. The Pakistan Environmental Protection Agency (PEPA) at the federal level is responsible for administering the provisions of the Environmental Protection Act. It is responsible to ensure compliance with the National Environmental Quality Standards (NEQS), develop monitoring and evaluation systems and initiate legislation when necessary. This ministry was, however, devolved to provincial subjects in 2011 after the 18th amendment in the Constitution of Pakistan.

The Provincial Environmental Protection Agencies, including Punjab-EPA, are responsible for environmental planning and development, approval of Initial Environmental Examination (IEE) and Environmental Impact Assessments (EIA) of new projects at

provincial level. Wildlife conservation and management is also a provincial subject. Provincial Wildlife and forestry departments are responsible for implementation of provisions of provincial Wildlife Protection Ordinances, Acts and Regulations.

2.3 Laws, Regulations and Guidelines

Pakistan Environmental Protection Act, 1997 is the basic law that empowers the Government of Pakistan to develop policies and guidelines for the protection of natural environment. Details of the laws applicable are described below:

2.3.1 Pakistan Environmental Protection Act, 1997

The Act is applicable to a broad range of issues and extends to air, water, soil, marine and noise pollution, as well as the handling of hazardous waste. Some portions from the Act are reproduced below for reference purposes.

- Section-11 (1): "Subject to the provisions of this Act and the rules and regulations made there under no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollution or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards."
- Section-12 (1): "No proponent of a project shall commence construction or operation unless he has filed with the Federal Agency an Initial Environmental Examination (IEE) or, where the project is likely to cause an adverse environmental effect, an Environmental Impact Assessment (EIA), and has obtained from the Federal Agency approval in respect thereof".
- Section-14: "Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except (a) under a license issued by the Federal Agency and in such manner as may be prescribed; or (b) in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party"

2.3.2 Punjab Environmental Protection (Amendment) Act, 2012

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

- The Name of Act has been changed into “Punjab Environmental Protection (Amendment) Act, 2012”.
- For the words “Federal Government”, wherever occur, the word “Government” shall be substituted;
- For the words “Federal Agency”, wherever occur, the words “Provincial Agency” shall be substituted;
- For the word “National”, wherever occurs, the word “Punjab” shall be substituted. All the other clauses, sub-clauses, sections and sub-sections are almost same.

2.3.3 The Antiquities Act, 1975

The Antiquities Act of 1975 ensures the protection of cultural resources in Pakistan. The act is designed to protect antiquities from destruction, theft, negligence, unlawful excavation, trade and export. Antiquities have been defined in the Act as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The law prohibits new construction in the proximity of a protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the project proponents are obligated to:

- Ensure that no activity is undertaken in the proximity of a protected antiquity.
- If during the course of the Project an archaeological discovery is made, it should be reported to the Department of Archaeology, Government of Pakistan.

2.3.4 The Pakistan Penal Code, 1860

The Act deals with the offences where public or private properties and human lives are affected due to intentional or accidental misconduct of an individual or a mass of people. It also addresses violation to any law of the country.

2.3.5 Safety Regulations

Following laws and regulations directly or indirectly govern the occupational health and safety issues during the currently studied production activities:

- PEPA Laws, 2000
- Labor Laws
- Electricity Rules, 1937 2.3.10 Other Regulations

  There are a few more regulations which are triggered during environmental and social assessment when biodiversity and resettlement is studied.
- The Forest Act 1927.

Rules for Prohibition and Regulation of Fishing Burb Oster, Labeo Rohita, Catla, Cirrhina, and Mirgala less than 10 inches in length (1954).

- West Pakistan Land Reform Rules, 1959.
- West Pakistan Land Reforms Regulation, 1959.
- West Pakistan Wildlife Protection Ordinance 1959.
- Wildlife Protection Rules 1960.
- The Land Acquisition Act 1984.
- Wild Birds and Animals Protection Act 1992.

2.4 Environmental Guidelines of Pak-EPA

Sets of environmental guidelines to facilitate environmental assessment studies have been developed under the statutory cover of the Pakistan Environmental Protection Act, 1997. The following guidelines have been developed through a consultative process:

- Guidelines for the preparation and review of environmental reports

- Guidelines for Public Consultations
- Guidelines for sensitive and critical areas
- Sectorial Guidelines

2.5 National Forest Policy (2015)

The National Forest Policy (2015) of Pakistan provides a strategic framework for the protection, sustainable management, and expansion of forest resources. Given that the proposed Eco-Friendly Tourist Resort at Murree–Bhurban is located in a forest-rich and ecologically sensitive hill area, the project is directly governed and influenced by this policy.

The key provisions of the policy relevant to the project are outlined below:

2.5.1 Conservation of Forest Ecosystems

The policy emphasizes the protection of natural forests, particularly in mountainous and watershed areas such as Murree–Bhurban. The project must:

- Avoid unnecessary forest clearance
- Protect surrounding forest land from encroachment
- Maintain ecological balance and biodiversity

2.5.2 Compensatory Afforestation

In case any tree removal is unavoidable, the policy mandates compensatory plantation, preferably using native species. For the proposed project:

- Tree cutting shall be minimized
- Compensatory afforestation shall be carried out at an approved ratio (as directed by Forest Department)
- Plantation shall be undertaken within or near the project area

2.5.3 Sustainable Land Use Planning

The policy discourages land-use changes that lead to forest degradation. Therefore:

- Project design must follow eco-friendly and low-impact development principles
- Construction activities should be limited to designated areas
- Natural slopes, drainage patterns, and vegetation must be preserved

2.5.4 Soil and Watershed Protection

Forests play a critical role in preventing soil erosion and landslides, especially in hilly terrain. In line with the policy:

- Adequate slope stabilization, terracing, and erosion control measures must be implemented
- Natural drainage channels should not be obstructed

2.5.5 Climate Change Mitigation

The policy recognizes forests as key carbon sinks. The project shall:

- Promote green spaces and plantation
- Encourage energy-efficient and low-emission infrastructure
- Contribute positively to climate resilience in the region

2.5.6 Community Participation

The policy promotes involvement of local communities in forest protection and sustainable livelihoods. Accordingly:

- Local labor should be engaged where possible
- Awareness regarding forest conservation shall be promoted
- Community benefits through eco-tourism shall be encouraged

2.6 National Drinking Water Policy (2009)

The National Drinking Water Policy (2009) aims to ensure safe, adequate, and sustainable drinking water for all citizens while protecting water sources from contamination and over-exploitation. The proposed Eco-Friendly Tourist Resort at Murree–Bhurban must comply with this policy due to its reliance on local surface and groundwater resources in an ecologically sensitive hill region.

The key policy provisions relevant to the project are described below:

2.6.1 Protection of Drinking Water Sources

The policy emphasizes safeguarding surface and groundwater sources from pollution. For the proposed project:

- Natural springs, streams, and groundwater sources shall be protected from contamination.
- Construction and operational activities shall be planned to prevent seepage of wastewater, fuels, and chemicals into water sources.
- Buffer zones shall be maintained around water bodies.

2.6.2 Provision of Safe and Potable Drinking Water

In accordance with the policy:

- The project shall ensure that all drinking water supplied to staff and visitors meets Pakistan Drinking Water Quality Standards (PDWQS).
- Regular testing and monitoring of drinking water quality shall be conducted.
- Adequate water treatment (filtration/chlorination) systems shall be installed, if required.

2.6.3 Sustainable Water Use and Conservation

The policy promotes efficient use and conservation of water resources. The project will:

- Adopt water-saving fixtures and appliances.
- Implement rainwater harvesting where feasible.
- Minimize water losses through efficient plumbing and regular maintenance.

2.6.4 Wastewater Management and Pollution Prevention

To protect drinking water sources:

- Wastewater shall be properly treated through septic tanks or appropriate treatment systems before disposal.
- No untreated effluent shall be discharged into nearby streams or land.
- Solid waste shall be managed to prevent leachate contamination of groundwater.

2.6.5 Institutional Coordination and Compliance

The policy stresses coordination among relevant agencies. Accordingly:

- Necessary approvals shall be obtained from concerned departments (EPA, Local Government, WASA/PHED if applicable).
- Compliance with Punjab Environmental Protection Act and relevant regulations shall be ensured.

2.6.6 Public Health Protection

As tourism increases water demand and public exposure:

- Continuous monitoring shall be carried out to prevent waterborne diseases.
- Awareness shall be created among staff regarding safe water handling and hygiene practices.

2.7 National Climate Change Policy (2012)

The National Climate Change Policy (2012) of Pakistan provides a comprehensive framework to address the challenges posed by climate change through adaptation and mitigation measures, with particular emphasis on climate-vulnerable regions such as hill and forested areas. The proposed Eco-Friendly Tourist Resort at Murree–Bhurban located in a climate-sensitive mountainous region, is directly relevant to the objectives and guiding principles of this policy.

2.7.1 Climate Change Vulnerability of the Project Area

Murree–Bhurban is highly susceptible to climate-related risks including:

- Increased rainfall intensity leading to landslides and soil erosion
- Variability in temperature and snowfall patterns
- Pressure on forest cover and water resources
- Increased disaster risks due to unplanned development

2.8 National Conservation Strategy (1992)

The National Conservation Strategy (NCS) 1992 is Pakistan's foundational policy document for promoting sustainable development through environmental conservation, improvement in natural resource management, and integration of environmental considerations into development planning. The proposed Eco-Friendly Tourist Resort at Murree–Bhurban being located in an ecologically sensitive hill and

forested region, is closely aligned with the objectives and guiding principles of the NCS.

2.8.1 Relevance of NCS to the Project Area

Murree–Bhurban falls within a fragile mountainous ecosystem characterized by forest cover, steep slopes, biodiversity, and water catchments. Unplanned development in such areas can lead to deforestation, soil erosion, landslides, and loss of scenic value. The NCS emphasizes protection of these natural assets while allowing environmentally responsible development.

2.9 Punjab Environmental Quality Standards (PEQS) (2016)

The Punjab Environmental Quality Standards (PEQS) 2016, notified under the Punjab Environmental Protection Act, provide legally enforceable limits for air emissions, ambient air quality, noise, wastewater discharge, and drinking water quality. These standards are mandatory for all development projects in Punjab, including the proposed Eco-Friendly Tourist Resort at Murree–Bhurban. Compliance with PEQS is a key requirement of this Environmental Impact Assessment (EIA).

2.9.1. Ambient Air Quality Standards

PEQS prescribe permissible limits for pollutants such as PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO, and O_3.

- During construction, dust emissions from excavation, material handling, and vehicular movement will be controlled through water sprinkling and proper site management.
- During operation, vehicular emissions within the resort will be minimized by promoting pedestrian movement and low-emission transport.
- Ambient air quality monitoring will be carried out periodically to ensure compliance with PEQS limits.

2.9.2 Noise Standards

PEQS define maximum allowable noise levels for residential, commercial, and mixed-use areas.

- Construction activities will be restricted to daytime hours in accordance with PEQS.
- Use of noise-silenced machinery and proper maintenance of equipment will be ensured.
- During operation, noise from generators, HVAC systems, and recreational activities will be controlled through acoustic enclosures and buffers.

2.9.3 Wastewater and Effluent Discharge Standards

PEQS set limits for parameters such as pH, BOD, COD, TSS, oil & grease, and heavy metals.

- Domestic wastewater generated from the resort will be treated through septic tanks or a small-scale treatment system prior to disposal.
- No untreated effluent will be discharged into natural water bodies.
- Treated wastewater may be reused for landscaping, subject to PEQS compliance.

2.9.4 Drinking Water Quality Standards

PEQS include standards for potable water quality covering microbiological, physical, and chemical parameters.

- Drinking water supplied to staff and visitor

2.9.5 Solid and Hazardous Waste Management

- While PEQS focus primarily on emissions and effluents, compliance also requires:
- Proper segregation, storage, and disposal of solid waste through authorized waste management services.
- Safe handling and disposal of any hazardous waste (e.g., oils, lubricants, batteries) in accordance with Punjab EPA guidelines.
- Will meet PEQS requirements.
- Regular testing of water sources will be conducted to ensure safety and compliance.

2.10 Punjab Wildlife Act (1974)

The Punjab Wildlife Act, 1974 provides the legal framework for the protection, preservation, conservation, and management of wildlife, including wild animals, birds, and their habitats within the province of Punjab. The proposed Eco-Friendly Tourist Resort at Murree–Bhurban being located in a forested and ecologically sensitive hill region, falls within the ambit of this Act and must ensure full compliance during both construction and operational phases.

Key provisions of the act relevant to the project are as follow:

2.10.1 Protection of Wildlife and Habitats

The Act prohibits:

- Hunting, capturing, killing, or disturbing wild animals and birds.
- Destruction or damage to wildlife habitats, nests, or breeding grounds.

In compliance with these provisions, the project will:

- Avoid disturbance to natural habitats to the maximum extent possible.
- Restrict construction activities to the demarcated project area.
- Preserve natural vegetation and forest cover surrounding the site.

2.10.2 Protected Areas and Buffer Zones

The Act empowers the Government to declare national parks, wildlife sanctuaries, and game reserves.

- The project site will be verified to ensure it does not fall within any declared protected area or legally notified wildlife sanctuary.
- If any wildlife-sensitive zones exist nearby, buffer measures will be adopted to minimize disturbance.

2.10.3 Restrictions on Noise and Human Disturbance

Excessive noise and human activity can disturb wildlife behavior.

- Construction activities will be limited to daytime hours.
- Noise control measures will be implemented in line with PEQS.
- Resort operations will be managed to maintain a peaceful environment compatible with local wildlife.

2.10.4 Conservation and Sustainable Tourism

The Act supports conservation-oriented development.

- The project promotes eco-tourism, emphasizing low-impact infrastructure.
- Landscaping will use native plant species to support local fauna.
- Awareness signage and guidelines will be provided to visitors to prevent wildlife harassment or littering.

2.10.5 Institutional Coordination

- Coordination will be maintained with the Punjab Wildlife Department for guidance and compliance.
- Any required No Objection Certificates (NOCs) or permissions will be obtained prior to construction.

2.11 Punjab Plantation and Maintenance of Trees Act (1974)

The Punjab Plantation and Maintenance of Trees Act, 1974 provides a legal framework for the protection, plantation, and maintenance of trees in Punjab. The Act aims to prevent indiscriminate cutting of trees and promote afforestation, particularly in areas where development activities may affect existing vegetation. The proposed Eco-Friendly Tourist Resort at Murree–Bhurban located in a forested hill environment, is directly governed by the provisions of this Act.

Key provisions of the act relevant to the project are as follow:

2.11.1 Regulation of Tree Cutting

The Act prohibits the cutting, uprooting, or damaging of trees without prior permission from the competent authority.

- Any tree removal required for the project will be carried out only after obtaining approval from the relevant Forest Department.
- Tree cutting will be limited strictly to the minimum required for project implementation.

- Here's what the Lahore High Court (LHC) has ruled or directed specifically relating to Murree and similar hill-station environmental protection issues — including tree cutting, construction and ecosystem protection:

The Rawalpindi Bench of the Lahore High Court (which hears cases relating to Murree) has previously directed the formation of a committee to draft special legislation to protect the Murree hills ecosystem — covering forests, soil, water and natural resources — because no specific law existed to safeguard it.

A. Ban on Commercial Construction & Illegal Building

In the aftermath of the Murree tragedy (January 2022), where heavy snowfall and infrastructure weaknesses caused widespread problems, the LHC banned all commercial construction in Murree — especially illegal and unauthorized projects — and ordered the demolition of illegal buildings and encroachments. The court also instructed authorities to strengthen sewerage, waste management, and parking systems to reduce environmental stress on the hill station.

B. Tree Cutting & Environmental Safeguards

The court has banned tree cutting as part of smog prevention efforts in Punjab and warned authorities that trees should not be cut without proper authorization.

Courts have stressed public participation and transparency before any tree removal or relocation.

This environmental protection approach is relevant to Murree too, where unlawful deforestation has been of serious concern as part of calls to protect the ecosystem.

C. Protecting Natural Landscape & Preventing Deforestation

According to earlier LHC findings in Murree-related cases, the court explicitly held that deforestation, excessive mountain cutting, and construction of concrete buildings in protected or sensitive areas cannot be allowed — and ordered that state land be retrieved from grabbers and protected. Draft protective legislation for Murree's hills and environment.

Ban commercial construction and illegal buildings across Murree's sensitive zones.

Protect forests and prohibit deforestation and land grabbing in the Murree area.

Apply environmental protection principles (including tree preservation) as emphasized in LHC's smog and air quality cases to Murree ecosystems as well.

2.11.2 Compensatory Plantation

The Act emphasizes replacement of removed trees through plantation.

- Compensatory plantation will be undertaken in accordance with the prescribed ratios, preferably using native and indigenous species.
- Plantation may be carried out within the project site or at locations identified by the Forest Department.

2.11.3 Protection and Maintenance of Planted Trees

The Act requires proper care and survival of newly planted trees.

- A plantation and maintenance plan will be implemented, including watering, fencing, and periodic monitoring.
- Responsibility for maintenance will remain with the project proponent during both construction and operational phases.

2.11.4 Prevention of Damage to Existing Trees

- Existing mature trees outside the construction footprint will be protected through fencing and buffer zones.
- Construction machinery and material storage will be restricted from tree root zones to avoid damage.

2.11.5 Constitutional Coordination and Compliance

- Coordination will be maintained with the Punjab Forest Department for approvals, supervision, and monitoring.

- Compliance reports regarding plantation and survival rates will be submitted as required.

2.12 Punjab Antiquities Amendment Act (2012)

The Punjab Antiquities (Amendment) Act, 2012 amends and strengthens the legal framework for the protection, preservation, and management of antiquities and heritage sites in the Province of Punjab. The Act safeguards historical, archaeological, cultural, and architectural assets and regulates development activities in and around protected antiquities. The proposed Eco-Friendly Tourist Resort at Murree–Bhurban is required to comply with this Act to ensure that no cultural or heritage resources are adversely affected.

Key provisions relevant to the project are as follow:

2.12.1 Protection of Declared Antiquities

The Act prohibits:

- Destruction, damage, alteration, or misuse of any protected antiquity.
- Construction, excavation, or development activities within a prescribed protected or buffer zone around a notified antiquity without prior approval.

For the proposed project:

- The project site will be screened to confirm that it does not fall within the protected limits of any notified antiquity.
- In case any heritage structure or archaeological remain is identified nearby, necessary permissions will be obtained from the relevant authority.

2.12.2 Chance Find Procedures

The Act requires immediate action if any previously unknown antiquity is discovered.

- In the event of a chance archaeological find during excavation, construction activities will be halted immediately.
- The discovery will be reported to the Directorate General of Archaeology, Government of Punjab.

- Work will resume only after clearance and guidance from the competent authority.

2.12.3 Restrictions on Excavation and Earthworks

- Unauthorized excavation or removal of artifacts is strictly prohibited.
- Controlled and monitored excavation will be ensured to avoid damage to any subsurface cultural resources.

2.12.4 Institutional Coordination and Compliance

- Coordination will be maintained with the Punjab Directorate General of Archaeology as required.
- All project activities will adhere to the legal requirements of the Act throughout construction and operation.

2.13 Cutting of Trees (Prohibition) Act 1975

The project will comply with the Cutting of Trees (Prohibition) Act, 1975, which prohibits the cutting, felling, or damaging of trees within five miles of Pakistan's external frontiers without prior written approval from the local formation commander or authorized officer. All trees within the project area will be identified and no tree will be removed without proper authorization. Mitigation measures, including compensatory afforestation and replacement planting, will be implemented to minimize loss of vegetation, maintain ecological balance, and prevent soil erosion. Compliance with this Act ensures that the project adheres to national legal requirements for forest conservation and reduces environmental impacts related to vegetation removal.

2.14 Punjab Forest Act (Amended) 2016

The Punjab Forest (Amendment) Act, 2016 further amended the Punjab Forest Act, 1927 to update forest governance in the province. The amendment, which came into force immediately after receiving the Governor's assent in January 2016, made key changes including the repeal of certain sections and insertion of new provisions. Notably, it expanded provincial government authority, after cabinet approval, to convert reserved forest land or parts of it to other land uses, which drew concerns from environmental groups about potential impacts on protected forest and biodiversity. The amendments also introduced legal provisions to facilitate the establishment of public-private partnerships for

forest development, use of wasteland for forest productivity, and related ancillary matters, reflecting evolving approaches toward forest land utilization and management under provincial law.

2.15 The Punjab Protected Areas Act (2020)

The project will comply with the Punjab Protected Areas Act, 2020, which provides the legal framework for the protection, preservation, conservation, and management of ecologically important areas in the Province of Punjab, including national parks, nature reserves, wildlife sanctuaries, wilderness areas, buffer zones, wildlife reserves, and wetlands. Under this Act, protected areas are notified by the Government to conserve biodiversity, ecosystems, habitats, and species, and to regulate or restrict development activities, prospecting, mining, dredging, extraction, and other harmful actions within or adjacent to these areas; prohibited activities include hunting, vegetation removal, land clearing, and pollution unless expressly permitted under approved management plans or by the management authority. The Act also establishes penalties for violations and requires management plans and authorities to ensure sustainable use and conservation of natural resources in protected areas, aligning with environmental safeguard policies applicable to the project."

2.16 Seismic Building Code of Pakistan (2007)

The Seismic Building Code of Pakistan 2007, formally known as the Pakistan Building Code – Seismic Provisions (SP-2007), was developed and promulgated by the Government of Pakistan's Ministry of Housing and Works in collaboration with the Pakistan Engineering Council and technical experts to establish minimum seismic design requirements for buildings and building-like structures throughout the country following the devastation of the October 8, 2005 Kashmir earthquake. It prescribes earthquake-resistant design principles based on probabilistic seismic hazard assessment and divides Pakistan into seismic zones reflecting varying levels of seismic risk, and applies to reinforced concrete, steel, masonry and similar structures to ensure that design and construction practices protect public safety and welfare by reducing earthquake-induced losses. The provisions are aligned with international standards and specify considerations such as site hazard evaluation, structural design requirements, and construction practices to enhance

resilience against seismic ground motions, and they are intended for adoption into provincial building bylaws and enforced through relevant regulatory authorities.

2.17 Environmental Guidelines of UNEP and the World Bank

Some of the environmental guidelines of UNEP and the World Bank are as follows:

- Environmental Impact Assessment Training Resource Manual, Draft 1996, UNEP
- Pollution Prevention and Abatement Handbook 1998: Towards Cleaner Production (WB/UNIDO/UNEP, 1999)
- Environmental Assessment Sourcebook, Volume-I: Policies, Procedures and Cross-Sectorial Issues (WB, 1991a)
- Environmental Assessment of Energy and Industry Projects (WB, 1991a)

2.18 International Treaties and Obligations

Pakistan is a signatory to various international treaties and conventions on the conservation of the environment and wildlife protection. Some of these treaties and conventions are as follows:

- UN Convention on Biological Diversity, Rio-de-Janeiro (1992)
- Convention of the Conservation of Migratory Species of Wildlife Animals (1979)
- International Plant Protection Convention (1952)

2.19 Environmental Assessment Process

The environmental assessment process is governed by the following documents:

- The Pakistan Environmental Protection Act, 1997
- The Punjab Environmental Protection (Amendment) Act, 2012
- Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000
- Pakistan Environmental Protection Agency Guidelines for the preparation and review of environmental reports. Submission of environmental assessment study report to obtain No-Objection Certificate (NOC) was made mandatory by the

Pakistan Environmental Protection ordinance (1983) and the Pakistan Environmental Protection Act (1997). Section 12(1) of the Pakistan Environmental Protection Act (1997) stipulates that no project involving construction or any change in the physical environment can be undertaken unless an IEE or an EIA is conducted, and approval (NOC) is received from the relevant provincial Environmental Protection Agency.

The Pakistan Environmental Protection Agency Review of IEE and EIA Regulation (2000) categorize projects into various schedules based on the anticipated environmental hazards. Projects with fewer environmental hazards are listed in Schedule-I and are required to carry out an Initial Environmental Examination (IEE). Projects with significant environmental hazards are grouped as Schedule-II. Projects listed in Schedule-II require that a detailed Environmental Impact Assessment (EIA) is carried out. Projects listed under Schedule-I will require a detailed EIA if the project is to be located in a sensitive area.

2.20 Interaction with Other Departments/Agencies

The Lahore Development Authority (LDA) is responsible for ensuring that the Project complies with the laws and regulations controlling the environmental concerns of Dualization of road project construction and operation, and that all pre-construction requisites, such as permits and clearances are met. This section describes the nature of the relationship between the LDA and line departments, since the proponent of present project is LDA.

2.21 Punjab-EPA

The LDA is responsible for providing the complete environmental documentation required by the Punjab-EPA and remain committed to the approved Project design. No deviation is permitted in design and scope of rehabilitation during Project implementation without the prior and explicit permission of the Punjab-EPA.

2.22 Punjab Revenue Department

Under the national law, matters relating to land use and ownership are provincial subjects, and for the purposes of this Project, the Punjab Revenue Department is empowered to carry out the acquisition of private land or built-up property for public purposes, including

on behalf of another provincial or federal agency. For this purpose, lead department must lodge an application with the Punjab government to depute a Land Acquisition Collector (LAC) and other revenue staff who will be responsible for handling matters related to acquisition of land and the disbursement of compensation.

The LDA will provide logistical support and assist in preparing the documents necessary for notification. It will also need to liaise with the Punjab departments of horticulture and forestry in order to evaluate affected vegetation resources, such as trees for compensation purposes and new plantation along the construction of the resort.

The LDA and its contractors must ensure that the Project meets the criteria of the Punjab government for the establishment of construction camps and plants, use of the water resources and the safe disposal of wastewater, and toxic materials. These matters lie in the jurisdiction of Local Governments. Therefore, the Contractor should liaise closely with the concerned body. The LDA will coordinate and monitor environment-related issues.

2.23 Procedure for Environmental Approval

This section describes the procedures required for obtaining NOCs for EIA from concerned authorities. The following general stages have to be followed in the application and approval process for obtaining an “Environmental Approval” for the resort in Muree Bhurbun.

a) Classification of the Project
b) Submission of EIA
c) Issuance of NOC

Detailed process for obtaining NOC according to PEPA-1997 is as follows;

a. Classification of the Project

The proposed project requires an EIA in accordance with Schedule-II of PEPA-1997. Consultants are required to prepare the EIA and to assist in obtaining NOC from EPD Punjab.

b. Submission of IEE

Under Section 12 of the PEPA 1997, a project falling under any category specified in Schedule-II, requires the proponent to file an EIA with the Federal EPA for obtaining the NOC. After preparation of EIA report, ten hard copies and two electronic copies are needed to be submitted to the concerned agencies along with completed Schedule IV form and a non-refundable review fee. In case of the Proposed Project, EPD Punjab based in Lahore will be the main government agency responsible for the issuance of an NOC.

c. Issuance of NOC

Within ten working days of the filling of the EIA; the concerned agencies will confirm that the document submitted is complete for the purpose of review. During this time, should the concerned agency require the proponent to submit any additional information, it will return the EIA to the proponent for revision, clearly listing those aspects that need further discussion. Subsequently, the concerned agency should make every effort to complete an EIA review within 45 days of filing and finally decision on EIA shall be communicated to the proponent in the form prescribed in Schedule V. In case of approval, conditional NOC having validity of three years will be issued. The NOC process for EIA is given below in Table

Table 1. EIA Approval Process

Category	Description
Project Phase	Detailed Design
Approving Authority	Environment Protection Agency, Punjab
Applicable Legislation	Pakistan Environmental Protection Act, 1997
Project Title	Land Acquisition and Development of Eco-Friendly Tourist Resort at Aliot, Bhurban Murree
Timeframe	Six Months

Pertinent Regulatory Steps	
Submission of EIA	• Review fee as per rates in Schedule III • Filled Application form (Schedule IV) • EIA Report (05 hard copies and 02 electronic copies)
Decision on EIA	• Decision communicated to proponent in form prescribed in Schedule V • In case of approval, Issuance of NOC

Chapter 3

APPROACH AND METHODOLOGY

3.1 Terms of Reference

The Client intends to conduct an environmental impact assessment of the subject project. The Environmental Impact Assessment (EIA) document is presented for the purpose of enabling decision makers to assess the anticipated impacts on the social and physical environment arising from the establishment of tourist resort at hill top. The EIA also provides stakeholders and the public with a basis on which to register their reservations to the decision makers, as applicable on the environmental impacts of the recreational project. The EIA identifies the potential significant environmental impacts (both positive and negative) of the Establishment of Eco-Friendly Tourist Resort at Aliot, Murree-Bhurban project and these are reported in the environmental impacts and mitigation chapter.

The review of the finalized technical design of this project for construction will be made a mandatory pre-requisite prior to carrying out the field survey activities pertaining to dislocation and compensation process to consider the interaction between the proposed project and the project site(s).

The design includes review of internal google earth maps of the project site, identification of the site layout and final technical drawings showing the existing roads and drain layout along with other details. Besides identification of these pre-requisites, the social and environmental team undertook the comprehensive fieldwork activities in the project area in the form of topographic survey to record essential data. The data pertinent to impact assessment involved quantification and valuation of the assets in the affected area via Project Affected Personnel (PAP's) participatory consultative interview sessions, and inventory of social, physical and biological amenities, confirmation of topographic information and a photographic record of all activities in the field.

Based upon the available information, a set of broad tasks were conceptualized regarding the project establishment of time frame for various project components; i.e. collection and review of all the secondary data, examination and analysis of applicable environmental

regulations; a quick visit to understand the project area, concept clearance with design team after the visit, identification of stakeholders for seeking help, initial consultations with the Client and meetings with relevant agencies such as Rawalpindi Development Authority (RDA), Departments of Forest, Archaeology, Wildlife, TDCP and Non-Government Organizations (NGO's), political leadership, road users/ commuters, Non-PAP entities (residential/ commercial) and all other departments who have offices in the Corridor of Impact (COI), project description including physical characteristics of the whole study area, land use requirements during construction and operational phases and provision of the proposed main alternatives taking into account environmental effects in coordination with the design team, description of the environment especially the aspects likely to be disturbed by the project, prediction and evaluation of the project impacts on the basis of magnitude and significance with a range of measures proposed to avoid, minimize or mitigate any harmful effects or to enhance the positive effects of the scheme, mobilization of environmental lab and outlining the environmental monitoring and sampling procedures, Environmental and Social Management Plan (ESMP) and finally the compilation of results and recommendations. All of these tasks have been considered in this EIA report. The EIA will be available for general public to view after approval from the EPA.

3.2 Task Assignment and Environmental Team

For timely completion of the EIA study, the field activities were effectively planned to careful planning of effective resource management and well-timed completion of tasks throughout the execution period. In this regard, the services of Dr. Sultan Mahmood, Advisor Environment and Climate Change, m/s Ecocare & Nespak, were hired in individual capacity who supervised the entire process of EIA including field surveys of Establishment of Eco-Friendly Tourist Resort at Murree-Bhurban project area and provided guidance to use correct methodology of data collection process, as well as interviewed the district and town authorities of Rawalpindi and Murree including RDA and others. He reviewed and compiled this EIA report after collecting various chapters prepared by various specialists, as per guidelines of Punjab-EPA. He was also using the services of a sociologist, Ms. Sana Rahat Ali who also compiled this report and presented to him for a final review. In

addition to that field investigators of WELCOS laboratory also accompanied him to monitor environment parameters.

3.4 Field Investigation

The team visited the project site and adjoining areas to collect baseline data and investigated physical, biological, and socioeconomic resources as well as to verify the locations of proposed construction camps. In addition, meetings were held with the stakeholders and community members in the project area to collect primary information about the project, social set up and also to record their views and concerns regarding the proposed development in the area.

The rapid Social Appraisal methodology was applied to discover the facts (empirically verifiable observations or validating the old facts) on the prevailing socio economic and cultural conditions of the Project area.

Various aspects of the physical environment which were investigated during the survey which included the following items:

Physical Environment

This includes a wide range of aspects:

- General characteristics of the site
- Geological/ seismological information
- Soil, topography and natural drainage
- Climate (temperature, winds, precipitation and relative humidity)
- Surface and ground water quality
- Ambient air quality at two selected locations
- Solid waste and drainage (quantity and proposed disposal management)
- Noise levels (source of noise e.g. mechanical operation, traffic on the adjoining road - monitoring at three selected points)

Ecological Environment

- Forest cover, vegetation diversity
- Existing Trees, shrubs and other plants which are part of the social forestry

- Wildlife / Fauna& Flora (including sensitive species)

Socio-economic Environment

- Income level
- Employment/ occupation
- Business/commercial (ownership status, encroachments) and education (literacy level & facilities)
- Religion/sect
- Population density
- Public health (availability of sanitation, medical facilities)

3.4.1 Review of Legal and Administrative Framework

The objective of reviewing legal and administrative framework is to obtain information on all legislation pertaining to the Project development. The Socio-Environment Team reviewed the environmental policies, national, international and provincial laws and guidelines relevant to the Project. A synopsis of all relevant laws in this regard is included in the Chapter 2 of the EIA Report.

3.4.2 Identification of Impacts

The impacts were identified for the systematic consideration of likely or possible significant impacts on the environment. The aim of this task was to assess the possible risks associated with these impacts. The identification of impacts is a key activity in the environmental assessment process, which is based on the professional judgment of Consultants' experienced team supported by national and international guidelines.

3.4.3 Evaluation of Impacts

Each identified impact was also evaluated against its significance in terms of its severity and likelihood of its occurrence. The impact evaluation process was carried out to prioritize each potential impact and screen out insignificant or negligible impacts. The significance of the impacts was assessed in terms of the effects on the natural ecosystem, level of public concern and conformity with legislative or statutory requirements. The assessment of the severity was calculated by taking into consideration the nature, magnitude, extent

and location, timing/ duration and reversibility of the potential impact. The evaluation of the significance of these impacts forms the basis for development of environmental mitigation and monitoring program.

3.4.4 Remedial and Mitigation Measures

The objective of remedial and mitigation measures in any project is to identify practices, technologies or activities that would prevent, minimize or mitigate all significant negative environmental impacts and propose physical and procedural controls to ensure that mitigation is effective. On the basis of impact evaluation process, changes or improved practices were suggested, where ever practical, in the planned activities, to avoid and control unacceptable adverse impacts resulting from normal or extreme events. Monitoring requirements were defined in detail and relevant institutional arrangements for monitoring were recommended.

3.4.5 Development of Environmental and Social Management Plan (ESMP)

An Environmental Management Plan (EMP) was developed out of the ESMP for effective implementation of the recommended mitigation measures. The EMP includes check and balance to control and minimize the identified impacts, and monitoring program to monitor residual impacts, if any, during the operation. The EMP described procedures to be followed throughout the operation of the project and identified roles and responsibilities of all concerned personnel, including reporting during the operational phase. An Environmental Monitoring Plan was outlined alongside Environmental Management Plan, to ensure all the corrective actions to counter the adverse environmental impacts were undertaken.

3.4.6 Report Format

The EIA study presents various findings, results and recommendations and summarizes all such information into a single document which includes:

- Methodology for undertaking the EIA study
- Overview of relevant legislation, guidelines and statutory requirements
- Description of the proposed project

- Details of baseline information relating to the environmental conditions in the project area including desktop study and results of survey work undertaken
- Identification and assessment of environmental impacts during construction and operation
- Evaluation of the significance of environmental impacts during construction and operation
- Recommended mitigation measures and monitoring requirements during construction and operation
- Environmental Management Plan (EMP) and Environmental Monitoring Plan
- Environmental Cost
- Conclusions and Recommendations.

All the above components were divided into different chapters which were independently developed and compiled by various professionals in coordination with other office experts.

3.5 Public, Stakeholder and Institutional Consultations

As part of the disclosure and participatory planning process**,** local community members residing in and around the project area were engaged. The objectives of consultation were to:

- Inform the community about the project's purpose, design, and timeline
- Understand community concerns, expectations, and perceptions
- Ensure inclusion of vulnerable groups and women in feedback sessions

Key methods of engagement:

- One-on-one interviews with shopkeepers, transporters, and local residents
- Verbal and visual communication (layout plan) for better understanding

Main concerns raised:

- Safety and security of the national/ international tourists
- Traffic disruption during construction

- Job opportunities for local residents
- Air and noise pollution from depot and VICS operations

All feedback was documented, analyzed, and incorporated into impact mitigation and planning

3.6 Stakeholder Meetings and Institutional Consultations

Following field surveys, the EIA team conducted formal and informal consultations with key government and institutional stakeholders**,** including:

- Rawalpindi Development Authority (RDA)
- Punjab Environmental Protection Agency (EPA), Rawalpindi
- District office TDCP, Lower Topa
- District office Wildlife Department, Lower Topa
- District Forest Office, Lower Topa
- Residents of the Project Area
- Markets

. Discussions were focused on:

- Concerns of the beneficiaries, i.e., tourists
- Compliance with regulatory frameworks and PEQS
- Emergency preparedness and fire safety
- Coordination for utility services (power, water, waste disposal)
- Meeting outcomes guided the report's legal framework, project approvals, and Environmental and Social Management Plan (ESMP).

3.7 Environmental Monitoring and Laboratory Testing

To assess existing environmental conditions and potential impacts, baseline environmental sampling was conducted, covering:

1. Ambient Air Quality

- Particulate Matter (PM2.5, PM10), CO, NO_2, SO_2
- Monitored using calibrated instruments at 2–3 locations

- Samples tested by an EPA-certified laboratory
- Compared with PEQS guidelines

2. Ambient Noise Levels

- Daytime noise readings at project boundary and nearest receptors
- Measured in decibels (dB) using a digital sound level meter
- Assessed compliance with NEQS for noise

3. Water Quality

- Groundwater samples collected via borehole/pump
- Parameters tested: pH, turbidity, TDS, heavy metals
- Results compared with NEQS Drinking Water Standards
- Sampling locations were selected based on project influence zone and downstream use.

The following set of tests were conducted to collect information in relation to Air quality, Wastewater and Drinking water quality and Noise levels prevailing in the project area.

3.7.1 Water Analysis

Drinking water samples were collected from following locations.

Table 3.7.1 Water Analysis

Sampling point No.	Laboratory code	Location	Results
1	DW1-182	Aliot Village	Fit for drinking
2	DW2-182	Aliot Market	Fit for drinking
3	DW3-182	Aliot Hand pump	Fit for drinking

Environmental parameters analyzed were pH, TDS, Chloride, Fluoride, Sulphate, Sodium, Potassium, Calcium Hardness, Magnesium Hardness, Total Hardness, Arsenic, Iron and Microbiology. The water quality analysis results indicate that all tested physio-chemical and microbiological parameters are within the permissible limits under NEQS and WHO Drinking Water Guidelines.

3.7.2 Ambient Noise Level Monitoring

Ambient Air quality and Noise Level Monitoring was carried out on following location.

Table 2.7.2 Ambient Noise Level Monitoring

Sampling point no.	Laboratory code	Location	Results
1	N-182	Aliot Project Site	41-43 dB

Note. Below the level of 75 dB.

These levels are below the permissible limit of 75 dB(A) within the limits of Punjab Environmental Quality Standards (PEQS) (Annex).

3.7.3 Ambient Air Quality Level Monitoring

Air Quality Level Monitoring was carried out on following location

Table 3.7.3 Ambient Air Quality Level Monitoring

Sampling point no.	Laboratory code	Location	Results
1	AA-182	Aliot Project Site	62-68 µg/m³

Parameters analyzed for ambient air were CO, SO2, NO2, PM10, were also found well within the limits of Punjab Environmental Quality Standards (PEQS) (Annex).

3.8 Data Analysis and Impact Identification

All collected data, i.e., field observations, community feedback, lab results, and institutional inputs were compiled and analyzed using:

- Evidence-based impact identification
- Magnitude-duration-probability assessments

The impacts were categorized as:

- **Construction phase**: Dust, noise, waste generation, traffic

- **Operational phase**: Generator emissions, wastewater, safety risks

Chapter 4

PROJECT DESCRIPTION

4.1 Type and Category of the Project

As per directions of PEPA Act 1997 (Amendment 2012), the Environmental Impact Assessment (EIA) Regulations, 2022 the Establishment of "Establishment of Eco-Friendly Tourist Resort at Aliot, Murree-Bhurban" falls in Schedule I under the category B "Other Projects" stating "Any other project for which filing of an EIA is required by the Provincial Agency under sub-regulation (2) of Regulation 5".

4.2 Site Alternatives

The selected site for the proposed development comprises a vacant tract of land under government ownership, which has been identified as suitable for the planned eco-friendly resort due to its location, land availability, and minimal environmental sensitivity. As the land is already under public ownership, the need for alternative sites was limited, and no viable alternatives were considered at this stage. In fact TDCP has already acquired this area of 21 kanal and 4 marla. The site is not occupied by permanent settlements, and therefore does not require relocation or resettlement of local communities.

The surrounding area consists primarily of natural forest cover with limited nearby development, and access is available through existing road infrastructure without the need for major new alignments. The site's topography and setting are conducive to low-impact, environmentally sensitive development, consistent with sustainable tourism objectives. Considering the absence of significant ecological constraints, absence of resettlement issues, and availability of basic infrastructure, the selected site is considered most appropriate for the proposed project and is not expected to pose any significant adverse impacts on environmental or social components.

4.3 Location and Site Layout of the Project:

The project site is located at Aliot, Murree-Bhurban spreading over an area of 95,400 Sq ft (21 kanal 4 marla) and is located near Murree towards Bhurban at

latitude 33°94′ 6476” North and longitude 73°46’3534” East, following is the detail of various vicinities within half kilometer of the aerial distance from project site:

Table 4.3 Location and Site Layout

South	Forested hills and scattered residential dwellings
North	Natural pine forest and hilly terrain
East	Existing access road linking Murree-Bhurban with Murree and Lower Topa
West	Rural settlements and forested slopes

4.4 Land Use on the Site

The area to the east of Muree town is dominantly under pine forest cover, particularly along the major roads and upper reaches of the ridges. The land use of the project area is a mountainous terrain which has been treated by vegetation cover. The project area is a low-density population area and is surrounded by small villages and local settlements, including Lower Topa, Ghora Gali, Kuldana, and Jhika Gali. The proximity of these settlements has been considered in the EIA to ensure minimal social disturbance and maximum local benefit from the proposed project.

4.5 Scope of Services

Following construction activities will take place at construction phase of the proposed resort:

- Construction of eight (8) Glamping Pods: Elevated, eco-friendly structures for luxurious yet minimal-impact stays.

- Construction of three (3) Tree Houses: Integrated with existing trees for an immersive nature experience.
- Construction of A - Frame Restaurant: A stylish, sustainable dining space.
- Construction of walkways
- Provision of fence
- Construction of approach road
- Landscaping

4.5 Road Access

The project site is accessible through the existing road network of the Murree-Bhurban area, which connects Murree-Bhurban with Murree city, Lower Topa, and other nearby localities. The approach roads are asphalted and functional, though relatively narrow due to the hilly terrain, and are primarily used by local residents and tourists. These roads provide adequate access for light vehicles and can accommodate controlled construction traffic with proper management.

4.6 Vegetation Features of the Site

The project site is located within the natural forested landscape of the Murree-Bhurban region, which is predominantly characterized by sub-tropical pine forest vegetation. The area is mainly covered with Chir Pine (Pinus roxburghii) along with associated tree species such as Oak (Quercus spp.), Kail (Pinus wallichiana) in patches, and scattered shrubs and grasses typical of the lower Himalayan foothills. The vegetation plays a vital role in soil stabilization, slope protection, microclimate regulation, and wildlife habitat support.

4.7 Cost and Magnitude of Operation

Total estimated cost of the Project is approx. PKR 400.211 million including cost of land, infrastructure and machinery.

4.8 Layout plan

Layout plan of Development of Establishment of Eco-Friendly Tourist Resort at Murree-Bhurban is attached at Annex-1.

4.9 Machinery and Utilities to be Used in the Project:

Table 4.9. Machinery and Utilities

	Machinery
1	Excavators
2	Bulldozers
3	Dump Trucks
	Utility
1	Transformer, Electric Power Panels and Power Cables
2	200 KVA Generator
3	80 KVA Diesel Fireman Generator PRIME
4	45 KVA Kipor Generator
7	Fire Fighting, Fire Extinguisher Cylinder
8	Fork Lifter
9	Water Sprinkler

4.10 Manpower

Maximum 150 workers will be required during construction phase of the proposed project whereas 20-30 will be engaged during operational phase. Technical staff will be hired to carry out smooth operations of the proposed unit.

4.11 Schedule of Implementation

The estimated time required for the completion of project is supposed as 6 months. The breakdown of time is given below in Table 4.2:

Table 4.11. Timeline for Construction of Project

S No	Activities	1.5 Months			1.5 Months			2.5 Months			01 Months		
		2W	2W	2W	1W	1W	4W	2W	4W	4W	2W	1W	1W
1	Detailed Designing												
2	Mobilization of Contractors												
3	Lean Construction Period												
4	Peak Construction Period												
5	Restoration of Site												

4.12 Sources of water

Water requirements will be met by groundwater through installation of pumps during construction phase as well as during operational phase.

4.13 Water Requirement and Wastewater Generation

Water requirement and wastewater generated during construction activities are given in Table: 4.3:

Table 4.3 Water Requirement and Wastewater Generation During Construction

S No	Description	Water Consumption (gallons / day)	Wastewater Generation (gallons / day)	Mode of Disposal
1	Domestic	200	160	Will be disposed off through a septic tank
2	Construction and sprinkling	600	-	-

4.14 Solid Waste Generation

The solid waste during operation will consist of discarded raw material packing's, paper cartons and other commercial solid waste. Packaging waste (e.g., plastic, cardboard). Spent containers of raw materials. For proper waste management, waste bins will be provided in the unit. From these bins the waste will be collected by the workers of project site for the proper disposal.

4.15 Activities During Operational Phase

There exists no human settlement on the selected project site to be displaced owing to the commencement of the Project. No structure of any significance stands at the site to be relocated or dismantled. Land is already under proponent's ownership through land acquisition, and no fresh land is to be occupied. Hence, no relocation and rehabilitation are required. Anyhow it is stated that present redundant structure will be demolished to facilitate construction activity.

4.16 Restoration and Rehabilitation Plan

After completion of the construction work all the disturbed sites will be changed into conditions as they are prior to the commencement of the project or even far better than that. For improving the environmental and aesthetic value or visual quality of the site, the proponent will carry out landscaping and tree planting with in project premises.

4.17 Government Approvals

After submission of this EIA Report to Punjab EPA for Environmental Approval, the proponent will receive NOC within stipulated time as announced by Punjab EPA on their website, the contractor will be mobilized for resort construction.

Chapter 5

SOCIO-ENVIRONMENTAL BASELINE CONDITIONS

5.1 General

This chapter defines the baseline environmental status of the proposed project with reference to physical, ecological and social aspects. This information has been derived through primary data collected through environmental monitoring, field observation, public consultation and secondary data review from concerned departments and available online resources.

The socio-environmental survey in the Project Area was also carried out through consultation with the various communities. Local residents living in the Project Area were interviewed to obtain their feedback regarding the construction of the Project and its impacts on their daily life present / future in the short and long term.

5.2 Physical Environment

The physical environment of the Murree-Bhurban area is characterized by its location within the lower Himalayan foothills, featuring rugged and undulating terrain with steep to moderate slopes, narrow ridgelines, and deep valleys. The elevation generally ranges between 5,800 and 6,200 feet above mean sea level, which significantly influences the area's climate and natural setting. The geology primarily consists of sedimentary formations, including sandstone and shale, which are prone to erosion and require careful handling during construction activities. Soils in the area are generally shallow to moderately deep, loamy to clayey in nature, and vulnerable to erosion, particularly on exposed slopes.

Climatically, the area experiences a cool temperate climate, with mild summers, cold winters, frequent fog, high humidity, and substantial monsoon rainfall. Occasional snowfall occurs during winter months. The hydrology of the region is characterized by seasonal streams, natural drainage channels, and surface runoff, as no major perennial rivers exist in the immediate vicinity. The area falls within a seismically active zone, making consideration of slope stability and earthquake-resistant design essential. Overall, the

physical environment of Murree-Bhurban is environmentally sensitive and scenic, necessitating carefully planned and controlled development to avoid land degradation, slope instability, and alteration of natural drainage patterns.

5.2.1 Topography

The topography of the Murree-Bhurban area is characterized by rugged, mountainous terrain typical of the lower Himalayan foothills. The landscape consists of steep to moderately sloping hills, narrow ridgelines, and deeply incised valleys, with elevations generally ranging from approximately 5,800 to 6,200 feet above mean sea level. The terrain is naturally undulating, and slopes vary in gradient, with some areas being highly susceptible to erosion and slope instability if disturbed.

Natural drainage follows the topographic contours, forming seasonal streams and gullies that convey surface runoff during rainfall events, particularly in the monsoon season. The irregular topography significantly influences land use patterns, access routes, and construction feasibility. Due to the sensitive nature of the terrain, any development in the area requires careful site planning, minimal earthworks, and appropriate slope stabilization measures to maintain natural landforms and prevent erosion or landslide risks. For these reasons, proper geotech investigations are very important.

5.2.2 Hydrology

The hydrology of the Murree-Bhurban area is characterized by the absence of major perennial rivers and the presence of a network of seasonal streams, natural drainage channels, and surface runoff pathways. These drainage features are primarily fed by monsoon rainfall and occasional snowfall, resulting in variable flow patterns throughout the year. During the monsoon season, surface runoff increases significantly due to steep slopes and relatively shallow soils, making the area sensitive to erosion and localized flooding.

Groundwater occurrence in the area is limited and generally found at deeper levels within fractured rock formations. Local communities rely mainly on natural springs, rainwater, and limited groundwater abstraction for domestic use. The natural drainage system plays a crucial role in maintaining slope stability and ecological balance; therefore, any alteration

to natural flow paths may lead to erosion, sedimentation, or downstream impacts. As a result, project planning emphasizes the preservation of existing drainage patterns, provision of adequate storm-water management systems, and controlled discharge of runoff to prevent adverse hydrological impacts.

5.2.3 Soils

The soils of the Murree-Bhurban area are generally shallow to moderately deep, developed over sedimentary parent material typical of the lower Himalayan foothills. The soil texture predominantly ranges from loamy to clayey, with a significant organic content in forested areas due to accumulated leaf litter. These soils support pine forest vegetation but are highly susceptible to erosion, particularly on steep slopes and where vegetation cover is disturbed.

Soil stability in the area is influenced by slope gradient, rainfall intensity, and land cover. During the monsoon season, exposed soils are vulnerable to surface erosion, gullying, and landslides if not properly managed. Therefore, any construction activities require careful handling of topsoil, minimization of earthworks, and implementation of soil conservation measures such as retaining structures, terracing, and re-vegetation to maintain soil integrity and prevent degradation. For these reasons, proper geotech investigations are very important.

5.2.4 Seismic Profile

The Murree-Bhurban area lies within a seismically active region of Pakistan due to its proximity to the Himalayan tectonic belt. According to the national seismic zoning classification, the area generally falls within moderate to high seismic risk zones, where earthquakes of varying intensity have been recorded historically. The seismicity of the region is influenced by active fault systems associated with the collision of the Indian and Eurasian tectonic plates.

Given the steep terrain, fragile geology, and seismic sensitivity of the area, earthquakes may trigger slope instability, landslides, and structural damage if appropriate precautions are not taken. Therefore, all proposed structures and infrastructure in the project area will be designed in accordance with relevant seismic-resistant building codes and engineering

standards. Special attention will be given to foundation design, slope stabilization, and structural safety to minimize seismic risks and ensure the long-term stability and safety of the development.

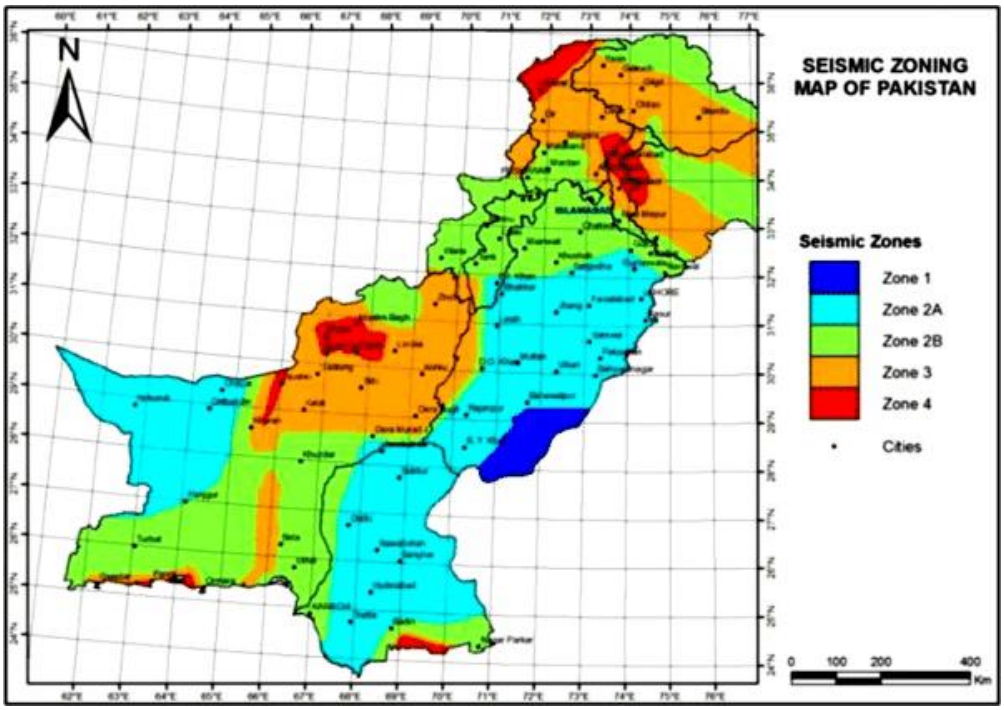

Figure 2. Seismic Map of Pakistan

5.2.5 Geology

The geology of the Murree-Bhurban area is characteristic of the Rock Formation of the lower Himalayan foothills, comprising predominantly sedimentary rocks such as sandstones, siltstones, shales, and claystone layers. These formations are relatively young in geological terms and are structurally weak, making them prone to weathering, erosion, and slope failure, especially on steep gradients.

The rock strata in the area are highly fractured and inter-bedded, which influences groundwater movement and slope stability. Continuous weathering due to rainfall, temperature variations, and vegetation cover further affects the geological stability of the region. Due to these geological conditions, any development activities must be carefully

planned with minimal excavation, controlled blasting (if any), proper foundation design, and slope stabilization measures to prevent landslides and geological hazards.

5.2.6 Temperature

The Murree-Bhurban area experiences a cool temperate climate due to its high elevation in the lower Himalayan foothills. Temperatures during the summer months generally remain mild, ranging from approximately 15°C to 25°C, providing a comfortable climate for residents and visitors. In contrast, winter temperatures often fall between 0°C and 10°C, with colder conditions during nighttime and occasional sub-zero temperatures accompanied by snowfall.

Seasonal temperature variations significantly influence local ecology, hydrology, and human activities. The moderate summer temperatures and cold winters contribute to the region's popularity as a tourist destination, while also requiring that infrastructure and buildings be designed to withstand cold weather conditions and thermal stress. Overall, the temperature regime supports forest growth and seasonal tourism while reinforcing the need for climate-responsive and energy-efficient design practices.

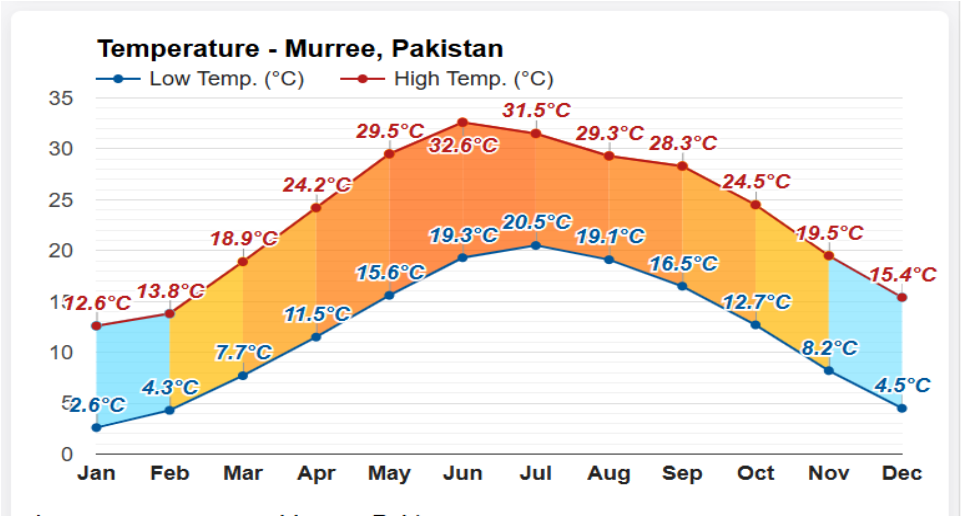

Figure 3. Temperature in Project Area

A. Patterns of Climate (1991-2024)

According to climate statistics for Murree (the nearest long-term climate station to Bhurban), the average annual mean maximum temperature for the reference period 1991–2020 was approximately 22.36°C. During the more recent comparable period 2001–2024, the mean maximum temperature was about 22.64°C, showing a slight warming trend (~+0.29°C).

B. Pattern of Climate (Monthly)

The highest monthly mean maximum temperatures occur in June (~31.1 °C), May (~27.7 °C) and July (~28.8 °C), while the coolest occur in January (~12.1 °C) and February (~13.4 °C).

Bhurban's own climate data shows typical monthly max temps from ~10.9 °C in winter to ~28.6 °C in summer (monthly averages rather than long-term normals)

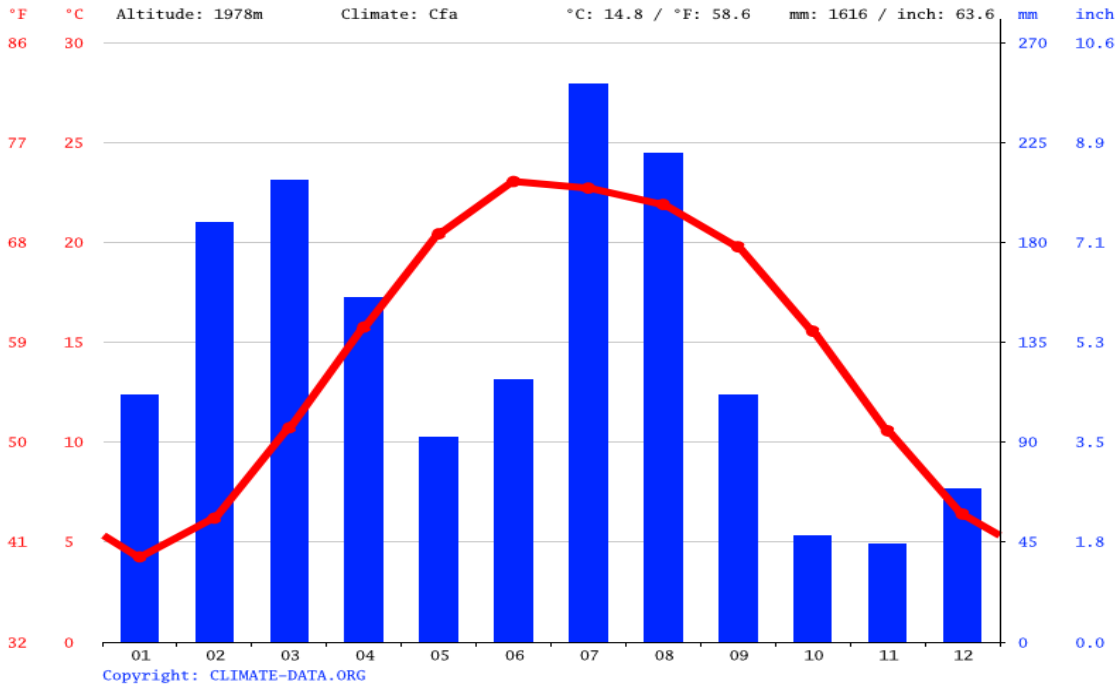

Figure 4. Climo graph of Bhurban

C. Precipitation (1991 to 2024)

From the WMO reference period 1991–2020 (which serves as the baseline for climate normals covering most of 1991–2024): precipitation in the Murree region shows strong seasonality, with lowest monthly means in December (~34.3 mm), November (~23.7 mm) and October (~35.7 mm), and much higher means during the monsoon, particularly July (~182.1 mm) and August (~187.8 mm). Other monthly averages include January (~69.7 mm), February (~90.9 mm), March (~102.9 mm), April (~86.3 mm), May (~54.1 mm), June (~78.3 mm) and September (~88.1 mm) .

In summary, typical mean monthly precipitation over the period covering 1991 through 2024 shows:

- Lowest rainfall: October–December (≈24–36 mm).
- Moderate rainfall: January–June and September (≈55–103 mm).
- Highest rainfall: July–August (≈182–188 mm), reflecting the monsoon peak.

5.2.7 Wind

Area experiences moderate to strong winds, particularly on ridgelines and exposed slopes due to its elevated location in the lower Himalayan foothills. Wind patterns are generally influenced by the topography, seasonal weather systems, and monsoon activity. During the summer, winds are usually mild to moderate, while winter and monsoon seasons may bring stronger gusts, occasionally accompanied by rainfall or snowfall.

The prevailing wind direction plays an important role in microclimate regulation, dispersion of dust and pollutants, and forest ecosystem health. During construction, wind may contribute to dust dispersion and airborne particulate matter, which requires mitigation measures such as water spraying, wind barriers, and careful scheduling of earthworks. Similarly, the design of buildings and resort infrastructure must consider wind loads to ensure structural stability and visitor comfort, especially in exposed areas.

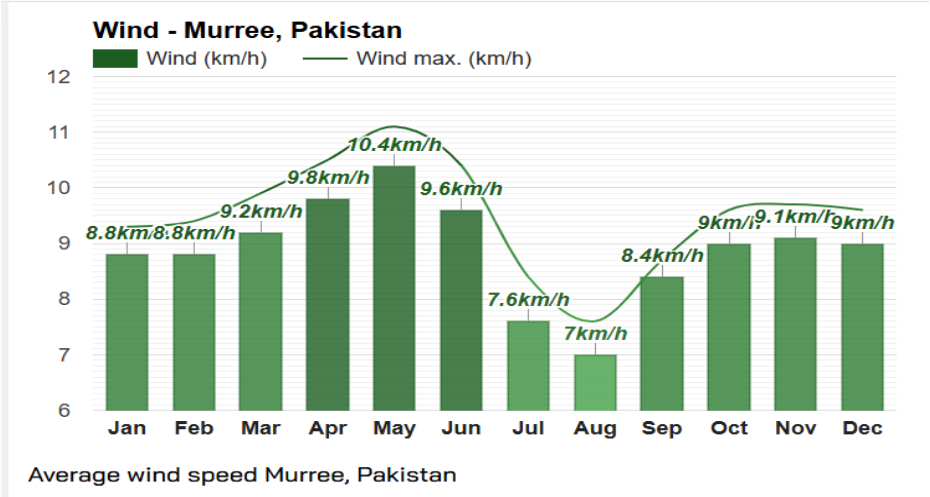

Figure 5. Average Wind Speed (1991-2024)

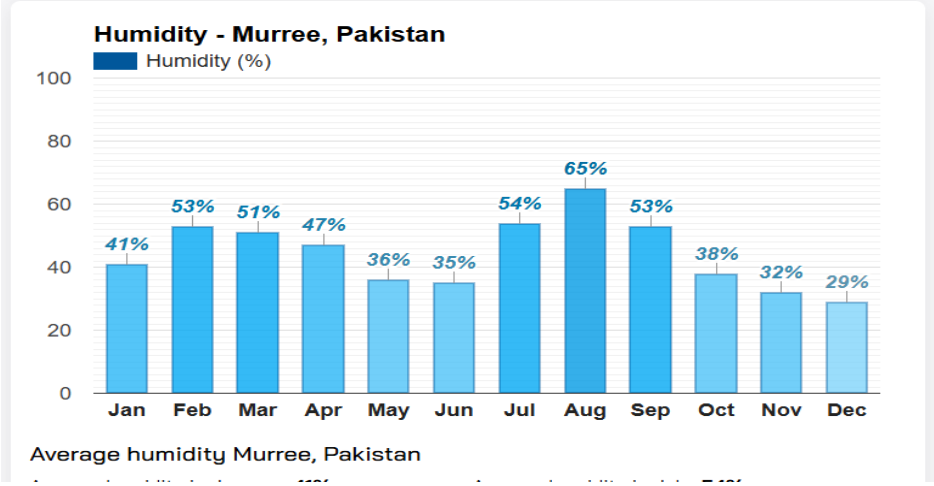

Figure 6. Average Humidity (1991-2024)

5.2.8 Noise Level

The baseline noise levels in the Murree-Bhurban area are generally low due to the sparsely populated settlements, limited vehicular traffic, and predominance of natural forest cover. Ambient noise is mainly generated by local vehicular movement, tourist traffic during peak seasons, and occasional human activities in nearby villages. Background noise levels typically range from 35 to 50 dB(A) during the daytime in most locations, while night-time levels are lower, reflecting the quiet and serene environment of the region.

Seasonal tourism influx can temporarily increase noise levels, particularly near access roads and recreational areas. The presence of dense pine forests and undulating topography helps in natural sound attenuation, reducing the spread of noise to surrounding areas. To maintain the area's tranquil character, the project design emphasizes noise control measures, such as restriction of construction activities to daytime hours, maintenance of machinery, and the use of natural vegetation as a buffer to minimize noise pollution during both construction and operational phases.

5.2.9 Ambient Air Quality

The ambient air quality in the Murree-Bhurban area is generally good due to the region's high elevation, dense forest cover, low population density, and limited industrial activities. The predominant air pollutants, such as particulate matter (PM10 and PM2.5), nitrogen oxides (NOx), sulfur dioxide (SO_2), and carbon monoxide (CO), are present at low concentrations under normal conditions. The natural vegetation acts as a filter for airborne pollutants, contributing to clean and fresh air quality.

However, during peak tourist seasons, temporary increases in vehicular traffic may lead to localized emissions and minor deterioration of air quality, particularly along access roads. Dust generated from unpaved roads, construction activities, and soil erosion can also temporarily affect ambient air quality. To mitigate these impacts, project planning includes proper traffic management, dust suppression measures, and limiting construction activities during high-traffic periods, ensuring that the ambient air quality remains within acceptable limits and maintains the region's natural environment and visitor appeal.

5.2.10 Water Resources

The Murree–Bhurban region is characterized by a mountainous terrain where water availability is primarily dependent on natural and limited engineered sources. The main sources of water in and around the project area are described below:

- **Natural Springs:** The primary source of water in the Murree–Bhurban area is natural hillside springs, which are commonly used by local communities for domestic purposes. These springs are mainly recharged through rainfall and snowmelt.

- **Groundwater:** Groundwater is available at varying depths and is accessed through boreholes and tube wells, although yields are generally limited due to rocky subsurface conditions.
- **Surface Runoff and Streams:** Seasonal nullahs and small streams carry surface runoff during monsoon rains and snowmelt; however, these are not perennial and have limited usability without storage.
- **Municipal Water Supply:** In some areas, water is supplied by the local municipal authorities through piped systems, though supply is often intermittent, especially during peak tourist seasons.
- **Rainwater Harvesting:** Rainfall is a significant potential source, and rainwater harvesting systems can be effectively utilized for non-potable uses such as landscaping and flushing.

Efficient water management, conservation practices, and supplementary rainwater harvesting are essential to ensure sustainable water availability for the project without exerting undue pressure on local water resources.

a. Ground Water

The groundwater resources in the Murree–Bhurban area are limited and largely restricted to fractured rock formations and shallow aquifers. The steep topography, shallow soils, and high forest cover limit the accumulation and availability of groundwater. Local communities primarily rely on natural springs, rainwater collection, and limited shallow wells for domestic and small-scale agricultural use.

Recharge of groundwater occurs mainly during the monsoon season and from melting snow, while discharge is through natural springs, seepage, and seasonal streams. The quality of groundwater is generally good, with minimal contamination due to the absence of industrial activity in the region.

b. Surface water

The surface water resources in the Murree-Bhurban area consist primarily of seasonal streams, small rivulets, and natural drainage channels originating from rainfall and occasional snowfall in the surrounding hills. These water bodies play an important role in maintaining ecological balance, supporting vegetation, and recharging shallow aquifers. Most streams are intermittent, with higher flow volumes during the monsoon season and reduced flow during dry periods.

The surface water quality is generally good due to minimal human disturbance and the absence of industrial and agricultural effluents.

5.2.11 Minerals

The Murree-Bhurban area is not known for significant mineral deposits and does not have any major mining or extractive activities. The geology is dominated by sedimentary formations, including sandstones, shales, and siltstones, which have limited economic mineral potential. Small-scale occurrences of construction-grade stone and gravel may exist locally, primarily used for building and road construction.

Due to the absence of large-scale mineral extraction, the area's mineral resources are not a major economic driver, and the natural landscape remains largely undisturbed. Any development in the region, including tourism infrastructure, is unlikely to have direct impacts on mineral resources. However, construction activities may require limited use of local stone for foundations and landscaping, which should be sourced responsibly to minimize environmental disturbance and avoid depletion of local non-renewable resources.

5.3 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:

5.3.1 Water Quality

Groundwater quality results as received from the environmental laboratory are pasted below with their explanation:

Groundwater samples were collected from each of the four corners of the 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 pH values ranged between 7.15 and 7.25, indicating a neutral to slightly alkaline nature of the water, suitable for general use. TDS levels ranged from 220 to 235 mg/L, well below the PEQS limit of 1000 mg/L, suggesting the water is not excessively mineralized. Total hardness values varied between 90 and 98 mg/L, which classifies the water as moderately hard but still within acceptable standards for drinking and washing. Turbidity levels remained low (0.7 to 0.9 NTU), confirming the absence of suspended particles. Importantly, Iron was below detection limits, and Nitrate levels (0.26 to 0.30 mg/L) were significantly below the PEQS maximum of 10 mg/L. Overall, the test results indicate that the groundwater quality at the site is suitable for human consumption and operational use without the need for extensive treatment. Nonetheless, as the project progresses, it is advisable to establish a groundwater monitoring plan to track potential impacts from depot operations, such as fuel or lubricant spills, which could affect water quality over time.

5.3.2 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 (PM2.5 and PM10), nitrogen oxides (NO_2) sulfur dioxide (SO_2), 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.

Table 5.3.2. Air Quality

Sr. No	Parameters	Units	Measured Concentration	PEQS Limit (24-hour avg.)	Compliance Status
1	$PM_{2.5}$	Ug/m^3	13	35	Compliant
2	PM_{10}	Ug/m^3	18	150	Compliant
3	SO_2	Ug/m^3	78	120	Compliant
4	NO_2	Ug/m^3	12	80	Compliant
5	CO	mg/m^3	1.23	10	Compliant

Figure 7. Ambient Air Results

5.3.2 Noise Levels

The baseline noise levels in the Murree–Murree-Bhurban 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 35 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.

Table 5.3.2. Noise Levels

Sr. No	Monitoring Location	Measured Noise Level dB (A) (Leq)	Applicable Standard (PEQS)	Compliance Status
1	East Boundary	42	75 dB	Compliant
2	West Boundary	43	75 dB	Compliant
3	South Boundary	42	75 dB	Compliant
4	North Boundary	41	75 dB	Compliant

Figure 8. Noise Monitoring Test Report

5.4 Ecological Environment

Murree is famous for its natural beauty and diverse species of plants and animals. In view of its varied geographical features, the Tehsil is rich in the ecology.

i. Flora

The project area at Murree-Bhurban falls within the sub-tropical pine forest zone of the lower Himalayan foothills. The dominant tree species is Chir Pine (Pinus roxburghii), forming dense forest cover across the hilly slopes. Associated flora includes broad-leaved species such as Oak (Quercus spp.), Kail (Pinus wallichiana) in patches, and shrubs like Berberis, Indigofera, and Dodonaea. The ground layer consists of grasses, ferns, and seasonal herbs that contribute to soil binding and moisture retention. This vegetation plays a vital role in biodiversity conservation, slope stabilization, and ecological balance, and has been carefully considered in project planning to minimize disturbance.

Table 5.4. Tress affected

Common Name	**Scientific Name**
Chir Pine	*Pinus roxburghii*
Blue Pine (Kail)	*Pinus wallichiana*
Oak	*Quercus spp.*

Table 5.4. Shrubs

Common Name	Scientific Name
Berberis	*Berberis spp.*
Dodonaea	*Dodonaea viscosa*
Indigofera	*Indigofera spp.*

a. Legal Position of Forest Area

The project area at Murree-Bhurban falls within a region that is subject to the Punjab Forest Act, 1927, and the rules framed thereunder, which regulate the protection, management, and use of forest lands in Punjab. Forest areas in Murree are generally classified as Reserved Forests, Protected Forests, or Guzara Forests, each having specific legal restrictions regarding land use, tree cutting, and development activities. Any intervention within or adjacent to forest land requires prior approval from the Punjab Forest Department, and activities such as vegetation clearance are permitted only after obtaining the necessary No Objection Certificates (NOCs).

In addition, the project is required to comply with the Punjab Environmental Protection Act, 1997, and the Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000, making approval of the EIA mandatory before commencement of construction. Compensatory plantation, conservation measures, and adherence to approved forest management plans are legal obligations under these laws. The proposed eco-friendly resort has been planned in conformity with the applicable forest and environmental legislation to ensure protection of forest resources and sustainable land use.

ii. Fauna

The Murree-Bhurban area supports a variety of wildlife typical of sub-tropical pine forests in the lower Himalayan foothills. The fauna includes mammals, birds, reptiles, and amphibians that contribute to the ecological balance of the region.

- Mammals: Common species include jackals (*Canis aureus*), porcupines (*Hystrix indica*), civets (*Viverricula indica*), and occasional sightings of rhesus monkeys (*Macaca mulatta*) near human settlements.
- Birds: The area hosts resident and migratory birds such as Kalij pheasant (*Lophura leucomelanos*), partridges (*Alectoris chukar*), sparrows (*Passer domesticus*), and crows (*Corvus splendens*).
- Reptiles: Common species include garden lizards (*Calotes versicolor*) and several non-venomous snakes.
- Amphibians: Frogs and other amphibians are found near seasonal streams and waterlogged areas.

No endangered or protected species were reported within the immediate project footprint during baseline surveys. However, construction activities could temporarily disturb wildlife, and mitigation measures such as limiting vegetation clearance, preserving habitat patches, and scheduling construction outside sensitive periods have been proposed in the EMMP.

5.5 Socioeconomic Environment

Socioeconomic assessment reflects the human development, living standards, and economic conditions of the population. For this purpose, detailed field surveys were conducted around the project area and interviews held with nearby residents and stakeholders to evaluate their views and assess the current socio-economic environment of the area.

5.5.1 Demographic Profile

The demographic profile of the Murree-Bhurban area reflects the characteristics of a sparsely populated, rural hill region with small, scattered settlements. Key villages in the vicinity include Murree, Bhurban Lower Topa, Ghora Gali, Kuldana, and Jhika Gali. According to the latest estimates, the combined resident population of these villages is approximately 5,000–10,000 people, with seasonal variations due to the influx of tourists during peak summer and winter periods. At the broader administrative level, Murree Tehsil has a total population of around 252,526, while Murree District as a whole reach approximately 372,947 residents.

The population is relatively young to middle-aged, with families primarily engaged in tourism-related services, small-scale agriculture, and forest-based livelihoods. Literacy rates are moderate, and local communities maintain traditional social and cultural practices. The area has limited social infrastructure, including basic schools, healthcare facilities, and small markets, which are often strained during peak tourist seasons. Understanding this demographic profile is crucial for planning development interventions, as it highlights the need for sustainable socio-economic benefits, employment opportunities, and minimal disruption to local life while implementing tourism or infrastructure projects in the region.

5.5.2 Livelihood

The livelihoods of local communities in the Murree-Bhurban area are closely tied to the natural environment and seasonal tourism. A significant portion of the population is engaged in tourism-related activities, including operating small hotels, guesthouses, restaurants, transport services, handicrafts, and guiding services. These activities form the primary source of income, particularly during peak tourist seasons in summer and winter.

5.5.3 Education/ Literacy Rate

The education and literacy profile of the Murree-Bhurban area reflects the characteristics of a rural hill region with limited educational infrastructure. Basic educational facilities are available in the form of primary and middle schools, while access to secondary and higher education often requires travel to nearby towns or Murree city.

The literacy rate in the area is moderate, with higher literacy observed among the younger generation due to increased awareness and access to schooling. Educational attainment among women is gradually improving, though it still lags behind male literacy levels in some villages. The limited availability of skilled educational resources influences the employment opportunities and socio-economic development of the community.

5.5.4 Transportation and Communication

The transportation network in the Murree-Bhurban area primarily consists of narrow hilly roads connecting villages such as Murree, Bhurban Lower Topa, Ghora Gali, Kuldana, and Jhika Gali to Murree city and surrounding towns. These roads are mostly asphalted but limited in width, making them susceptible to congestion during peak tourist seasons. Seasonal weather, including heavy rainfall and occasional snowfall, can affect road accessibility, particularly on steeper sections and less-maintained stretches. Public transport is available in the form of local vans, taxis, and minibuses, while private vehicles dominate personal travel.

In terms of communication, the area has mobile network coverage and basic internet connectivity, though the quality may vary depending on the topography and distance from main towns. Postal services and local courier facilities are available but limited. The development of eco-friendly tourism infrastructure is expected to improve road access, enhance transportation facilities, and strengthen communication networks, benefiting both local residents and visitors while facilitating safer and more convenient mobility in the region.

5.5.5 Quality of Life Values

The quality of life in the Murree-Bhurban area is shaped by its natural environment, socio-economic conditions, and cultural practices. Residents enjoy a peaceful and scenic living environment, with access to fresh air, forested landscapes, and a cool temperate climate, contributing to physical and mental well-being. The community maintains traditional social structures and cultural practices, fostering strong interpersonal relationships and a sense of communal support.

However, the area faces certain challenges that affect quality of life, like limited healthcare facilities, restricted educational opportunities, inadequate road infrastructure, and seasonal accessibility issues due to rainfall or snowfall. Economic dependence on seasonal tourism also creates income variability, which can impact financial stability for local households.

Planned development, such as eco-friendly resorts and supporting infrastructure, has the potential to improve quality of life by creating employment, enhancing social infrastructure, improving road and communication networks, and promoting sustainable use of natural resources. Ensuring community participation in planning and implementation is crucial to balance development benefits with the preservation of the area’s cultural and environmental integrity.

Chapter 6

PUBLIC / STAKEHOLDERS CONSULTATIONS AND INFORMATION DISCLOSURE

6.1 General

A project stakeholder is defined as any individual, group, or organization possessing an interest in the project, or who may be directly or indirectly, positively or negatively, impacted by its activities. Given their diverse interests and potential concerns, it is imperative to establish confidence with stakeholders regarding the project's rationale, its anticipated impacts, and the proposed management strategies for these impacts.

Stakeholder consultation serves as a critical mechanism for integrating all primary and secondary stakeholders into the project decision-making process. This engagement is fundamental to addressing their concerns, optimizing the project's design, and ultimately conferring project legitimacy. When executed in a participatory and objective manner, stakeholder consultation significantly contributes to the overall stability and long-term viability of the project.

The integration of community input, encompassing both local knowledge and intrinsic values concerning socioeconomic and environmental considerations, demonstrably elevates the quality of project-related decision-making. Consequently, stakeholder consultations were systematically undertaken within the project area. This was not solely to fulfill the statutory requirements of the Environmental Impact Assessment (EIA) in Punjab, but equally to proactively refine and strengthen the social and environmental dimensions of the project's design.

6.2 Objective of the Stakeholder Consultation

The major objectives of public consultation are as follows:

- Promote better understanding of the project, its objectives and its likely impacts and their management.

- Identify and address the concerns of all interested and affected parties of the project.
- Provide a mean to Identify and resolve issues before plans are finalized and development commences, thus avoiding public anger, resentment and potentially costly delays.
- Encourage transparency, and inculcate trust among various stakeholders to promote cooperation and partnership with the communities and local leadership.
- Organize focus group discussions (FGDs) and consultations with women commuters and Civil Society Organizations at the time of design and implementation.

6.3 Concerned Departments Consulted (Stakeholders)

In relation to the Environmental Impact Assessment (EIA) and subsequent departmental review process for the proposed Eco-Friendly Tourist Resort at Murree–Bhurban the following concerned departments and authorities in Pakistan (Punjab) are relevant and were consulted or referenced for regulatory compliance, technical input, and approvals:

6.3.2 Proponent

Tourism Development Corporation of Punjab (TDCP) is the Project proponent and implementing agency responsible for tourism planning and sustainable development.

6.3.3 Punjab Environmental Protection Agency (EPA)

Government of Punjab Regulatory authority for review, approval, and monitoring of the EIA under the Punjab Environmental Protection Act. This agency is also responsible for enforcement of PEQS, environmental monitoring, and compliance audits.

6.3.4 Punjab Forest Department

Concerned with forest land management, tree cutting permissions, compensatory plantation, and compliance with forest laws.

Departments highlighted the sensitivity of the Murree–Bhurban ecosystem, particularly with respect to forest cover, biodiversity, and slope stability. Concerns were raised

regarding potential tree cutting, soil erosion, and increased risk of landslides due to construction activities. In response, the project proponent committed to minimizing vegetation clearance, adopting slope stabilization measures, and implementing compensatory afforestation in coordination with the Forest Department.

6.3.5 Punjab Wildlife & Parks Department

Responsible for protection of wildlife, habitats, and implementation of the Punjab Wildlife Act, 1974. The Wildlife and Forest Departments stressed compliance with the Punjab Wildlife Act and forest laws. The project team clarified that no protected area would be encroached upon, disturbance to wildlife would be minimized, and necessary approvals would be obtained prior to commencement of works.

6.3.6 Directorate General of Archaeology, Government of Punjab

Custodian of antiquities and cultural heritage under the Punjab Antiquities (Amendment) Act, 2012.

6.3.7 Tehsil Municipal Administration (TMA) / Municipal Committee Murree

Responsible for local water supply, sanitation, solid waste management, and building regulations.

Relevant departments emphasized the need for proper management of solid and liquid waste to prevent pollution of the surrounding environment. The project proponent confirmed that waste segregation, safe disposal through authorized contractors, and treatment of wastewater in accordance with PEQS would be ensured.

6.3.8 District Administration Murree

Oversight of land matters, law and order, and coordination among line departments. The potential impact of construction and operational traffic on existing narrow roads and local mobility was raised. It was discussed that traffic management measures, controlled timing of construction traffic, and improvement of access roads where required would be implemented to minimize inconvenience to residents and tourists.

Regulatory Compliance

Departments emphasized strict adherence to environmental regulations, including PEQS, EMMP implementation, and regular environmental monitoring and reporting. The proponent agreed to comply fully and to facilitate inspections by regulatory authorities.

6.4 Community Consultation

Community consultation was carried out as an integral component of the Environmental Impact Assessment (EIA) process to ensure public participation, transparency, and incorporation of local concerns into the project planning and design. The consultation process aimed to inform local communities about the proposed development and to understand their views regarding potential environmental and socio-economic impacts.

Residents of nearby villages and settlements, local business owners, community elders, and other stakeholders from the Murree–Bhurban area were consulted through informal meetings, focused discussions, and site visits. During these interactions, the project objectives, nature of activities, expected benefits, and possible impacts during construction and operation phases were explained in simple and understandable terms.

The main issues raised by the community included protection of forest cover, availability of water resources, traffic congestion during peak tourist seasons, noise and dust during construction, employment opportunities for local residents, and preservation of the natural and scenic character of the area. Concerns were also expressed regarding safety, waste management, and potential disturbance to wildlife.

In response, the project proponent assured the community that environmentally responsible construction practices, effective waste and wastewater management, traffic control measures, and strict compliance with environmental regulations would be implemented. Preference for local employment, promotion of eco-tourism, and enhancement of local livelihoods were also emphasized.

Overall, the community showed a positive attitude toward the project, acknowledging its potential to improve tourism facilities, generate employment, and contribute to local economic development, provided that environmental protection measures are strictly implemented. The feedback received during community consultation has been

incorporated into the project design and the Environmental Management and Monitoring Plan (EMMP) to ensure that community concerns are adequately addressed.

6.4 Project Stakeholders

As discussed earlier at section 3.4, following is a list of all stakeholders of this proposed project:

6.4.1 Proponent

Program Management Unit (PMU) TDCP is the proponent of project. All possible impacts and mitigation measure related to the project were discussed with the proponent and their management. They assured to take all suggested mitigation measures to control any discrepancy arose by the project and to make the project environment friendly.

6.4.2 Proponent's Environment Consultant Team

The proponent has acquired the services of Dr. Sultan Mahmood who went there with his team, to take care of all the environment related issues and tasks.

6.4.3 The Responsible Authority

EPA Punjab is the responsible authority to enforce the implementation of environmental mitigation and conservation measures suggested in this report by proper inspection by its field department. In this regard a representative from EPA, Murree has been consulted.

6.4.4 Environmental Practitioners and Experts

Dr. Sultan Mahmood and his team visited the project site, had discussion with stakeholders and consulted with the local people of nearby areas to evaluate the project environmental & socio-economic impacts. Our environment team identified and analyzed all the environmental issues that may arise from construction/ operation of the project and suggested the mitigation measures accordingly as described in this EIA report. Moreover, all the environmental legislation, laws, regulations are being considered while preparing

this EIA report that has been provided to project proponent and contractor. Our environment team has also discussed the environmental issues and their mitigation in a meeting to all the project members/ stakeholders involved in construction.

Table 6.1 : Stakeholder's Consultations

Sr No.	Participant/ Designation	Views/ Concerns of the Public & Stakeholders	Consultant's Remarks
1	Rawalpindi Development Authority (RDA) Muhammad Kamran, Deputy Director. 0343-5219971	This is very good project for locals as well as for international tourists. The front side of the plot will be further decorated to say welcome to the foreign guests/ tourists.	Agreed
2	Punjab Environment Department, Rawalpindi Ms. Romaissa Ahmad Deputy Director 0333 5644337	• Please provide the layout plan required for this resort. • What will be the fate of the adjacent forest? • Road approaching resort is very narrow which may be widened.	• Consultant will provide the layout plan in time. • Forest area will be completely cordoned off. • Highway Department will requested to widen the approach road to the resort.
3	Punjab Environment Department, Lower Topa, Murree Mohammad Islam Inspector 0334 4782062	• The inspector showed his inability to visit the resort due to the lack of public facilities. Site Inspection Report will be completed in time once official instructions will be received. • Provide map and other information.	• Consultants promised to facilitate the inspector in terms of providing vehicle. • Map and related information will be provided to Deputy Director Environment, Rawalpindi.

4	TDCP, Kotli Sattian, Murree Engr Junaid Ahmad Satti Inspector 0321 5100352	• Please visit Kahut and Kashmir point proposed resorts and touristic tracks.	• He was very cooperative guy and facilitated the visiting team in all respects. • He promised to facilitate Inspector Environment during site inspection report (SIR).
5	Punjab Wildlife Department, Lower Topa, Murree Amjad Abbasi Inspector 0312 9777885	• Telephonic interview • There is illegal hunting through Aliot village to the forest area which may be controlled after resort operations.	
6	Punjab Forest Department Raja Mohammad Pervez 0311 1333255	• This is really a eco-friendly project. • I may provide information and other details of adjacent forest. • Please share pictures of the Aliot area.	• The consultants promised to send pics. • Requested to share forest information.

Public

1	Rashid Mahmood Shopkeeper, Aliot Market, Bhurban 0312 5311068	We wish that resort shoud be established so that we will be in benefit. This project is in our interest.	Agreed
2	Qasim Abbasi Pickup Driver, Aliot Market, Bhurban 0316 5677619	I am happy to know this project because I will enhance my income.	Agreed.

3	Mohammad Ahsan Resident Aliot Village 0316 5784151	Government occupied our property in 2018 for constructing some public amenity and never compensated.	Government will compensate any dislocated person in terms of cash or the alternate space for a shop.
4	Muhammad Azeem, Shop owner, Alliot, Bhurban	The proposed resort may pose security threat to the residents and the shop owners.	Authority may provide full security to the shop keepers .
5	Malik Khurram Shopkeeper 0305-4994990	We may start some good business if project realized.	Agreed
6	Mrs Inayat Resident Aliot	Are you here in routine or any development is really planned?	She did not allow her picture
7	Hameeda Resident Aliot	Fountain is the single source of fresh water. We hope that there will be abundant water supply after resort is constructed.	She did not allow her picture

Chapter 7

ANTICIPATED SOCIO-ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

7.1 General

The construction of any resort surely carries variation in native environment with respect to biological, physical and socio-economic facets. The influences created in these phases leave a positive or adverse effect. This Chapter identifies the potential impacts due to the future implementation of project “Establishment of Eco-Friendly Tourist Resort at Aliot, Murree-Bhurban. The chapter also identifies measures that will help mitigate the Project’s adverse environmental effects and enhances positive impacts. During the course of this assessment, the environmental impacts have been identified for a number of issues based on the analysis of environmental baseline information and activities that are to be undertaken by the Project. That’s why these impacts have been identified in terms of their interval, extent and magnitude.

7.2 Impacts and Mitigation Measures

To get one sight overview of the significance of the impacts, an Environmental Impact Matrix have also been developed for construction and operational phases and incorporated in the EIA report.

The construction of the proposed project will have both positive and adverse impacts during the construction and operational phases, for which proper mitigation measures are necessary. During the field survey, significant efforts were made to identify the potential social, cultural and environmental issues related to the proposed project. Various government departments and agencies were also contacted for obtaining salient information along with area resident/stakeholders. Following is the list of main issues and concerns which have been considered in the EIA study:

Table 3. Construction Phase Impacts and Mitigation Measures

Impact Category	Description	Significance	Mitigation Measures	Residual Impact
Construction Work	Construction of 8 glamping pods; 3 tree houses; A - Frame Restaurant; Walkways; provision of fence; approach road and Landscaping	High	Follow ESMP strictly	High
Degradation of adjacent Natural Forest	Aliot resort is surrounded by natural wealth of pine forest which is expected to come the treat of hunting, poaching and indiscriminate harassment of wildlife.	High	Strictly implementing the hunting and poaching rules of the National Forest Policy.	Moderate
Vegetation Clearance	Removal of limited forest vegetation and shrubs for site preparation and access paths	High	Minimize tree cutting through site-sensitive design	Low

Soil Erosion/ Landslides	Excavation on slopes triggering slips	Very High	Terracing, geotextiles, silt fences; dry-season scheduling; slope stabilization	Moderate
Dust and Noise Pollution	From machinery and traffic	Moderate	Water sprinkling, mufflers, time restrictions (8 AM-6 PM); PPE for workers	Low
Waste Generation	Debris, packaging	Moderate	On-site segregation, recycling; licensed disposal	Low
Water Usage and Runoff	Increased demand; pollution from spills	Moderate	Sustainable sourcing; bunds for spill control; sediment traps	Low

- **Traffic Diversion Routes**

During the construction phase, a Traffic Diversion Plan will be implemented to minimize inconvenience to local residents, tourists, and through traffic in the Murree-Bhurban area. Construction-related vehicle movement will be carefully scheduled to avoid peak tourist hours, particularly during weekends, holidays, and peak seasons. Existing access roads will be used to the maximum extent possible, and temporary diversions or alternative routes will be clearly identified where required.

Proper traffic signage, warning boards, and flagmen will be deployed at critical locations to ensure smooth traffic flow and road user safety. Pedestrian access to nearby settlements and facilities will be maintained at all times. Coordination will be carried out

with local administration and traffic police to manage traffic effectively and respond to any unforeseen congestion or safety issues. These measures aim to ensure uninterrupted mobility, reduce accident risks, and minimize disruption to daily life during the construction period.

Table 4. Operational phase impacts and mitigation measures

Impact Category	Description	Significance	Mitigation Measures	Residual Impact
Water Demand/ Scarcity	Resort usage exacerbating local shortages	High	Rainwater harvesting (80% needs); low-flow fixtures; recycling grey-water	Moderate
Wastewater and Solid Waste	Sewage and tourist litter	Significant	Biological treatment plant; zero-waste policy; composting; awareness programs	Low
Tourist Footfall	Trail erosion, litter, wildlife disturbance	Moderate	Carrying capacity (200 visitors/day); designated paths; eco-guides; no-plastic zones	Low
Biodiversity Loss	Habitat disruption from lights/noise	Moderate	Buffer zones; low-impact lighting; biodiversity monitoring	Low
Cumulative Impacts	Contribution to regional	High	Offsets via park	Moderate

deforestation/ erosion	contributions; collaboration with WWF

All the adverse impacts of the proposed project have been properly addressed and a comprehensive Environmental Management Plan (EMP) has been formulated. The implementation of EMP will help to reduce the adverse impacts of the project. However, few of mitigation measures of the major adverse impacts of the project are given below:

- Adequate budget should be allocated in the project's budget for the compensation to the affectees as per Land Acquisition Act, 1894 and framing a judicious and fair compensation package for provision of compensation on prevailing market rates.
- There must be an amendment in Forest Act prior to any of tree cutting in Reserve Forest Areas. Also to take care of the Lahore High Court orders regarding tree cutting protocols as referred in Chapter 2.
- The structures will be designed considering adequate factor of safety for high wind speeds.
- Adequate safety measures should be ensured during construction of resort.
- Hunting, poaching and harassing of wild animals will be strictly prohibited as tigers and leopards are more or less extinct in the area and contractor will warn their labor accordingly.
- Snow Leopard Conservation Plan must be formulated to save habitat of leopard
- Ensure implementation of Hazard & Risk Management Plan and Occupational Safety Plan in order to prevent or alleviate health and safety issues for workers and general public.

7.3.1 Environmental Adverse Impacts

- **Degradation of Adjacent Natural Pine Forest**

Aliot resort is surrounded by natural wealth of pine forest which is expected to come the treat of hunting, poaching and indiscriminate harassment of wildlife.

Mitigation Measures

Strictly implementing the hunting and poaching rules of the National Forest Policy.

- **Air Pollution**

The main sources of emission during the construction period are the movement of machinery and equipment at site and dust emitted during the leveling, grading, earthwork and foundation works. Exhaust emission from vehicles and equipment deployed during the construction phase is also likely to result in marginal increase in the levels of PM_{10}, $PM_{2.5}$, SO_2, NO_2 & CO. The impact will be for short duration and limited during the construction period only. This will be confined within the project boundary and is expected to be negligible outside the project boundary. The impact will, however, be reversible, marginal and temporary in nature.

Mitigation Measures

Following mitigation measures could be adopted to cope with air pollution impacts.

- Sprinkling of water on unpaved, non-vegetated surface to minimize airborne fugitive dust and during earth moving activities, prior to clearing and before excavating, backfilling, compacting or grading.
- When feasible, shut down idle vehicles and equipment.
- Minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content.
- Implement dust suppression measures to prevent air pollution through water application on roads, construction site, and construction camps.

- **Soil Erosion**

Soil erosion may be caused by exposure of soil surfaces to rain and wind during site clearing, earth moving, and excavation activities. The mobilization and transport of soil particles may, in turn, result in sedimentation of surface drainage networks, which may

result in impacts to the quality of natural water systems and ultimately the biological systems that use these waters.

Mitigation Measures

Soil erosion can be prevented by adopting following measures:

- Scheduling of construction activities may be avoided during heavy rainfall periods (i.e. during the dry season) to the maximum possibility
- Contouring and minimizing length and steepness of slopes
- Mulching to stabilize exposed areas
- Re-vegetating areas promptly
- Providing adequate drainage systems to minimize and control infiltration.

- **Noise and Vibrations**

Noise and vibration may be caused by the operation of pile drivers, earth moving and excavation equipment, concrete mixers, cranes and the transportation of equipment, materials and people. Heavy construction traffic for loading and unloading of construction material will likely to cause increase in ambient noise level. Noise due to the construction of proposed project will be site specific and would not have a major impact on the surroundings.

Mitigation Measures

Noise Pollution can be mitigated by adopting following Practices:

- Avoiding or minimizing project transportation through community areas
- Limit noisy activities to the least noise-sensitive times of the day (week days between 7am and 10pm)
- All machinery and equipment will have sound-control devices no less effective than those provided on the original machinery/ equipment. Motorized equipment will be adequately muffled and maintained.

- To the extent possible, route heavy-truck traffic away from residences and other sensitive receptors.
- Workers in the vicinity of sources of high noise shall wear necessary personal protective equipment (PPE).

- **Wastewater Generation**

Wastewater will be generated from concrete mixer machine operation, watering of raw material i.e. bricks, sand etc. During the construction stage, the sanitary wastewater will be generated at the worker's camp(s).

Mitigation Measures

Following mitigation measures can be adopted:

- Avoid potential spills
- Washing of vehicles and equipment on the site will be restricted
- Chemicals and other liquid and solid dangerous materials must be managed properly.
- Septic tank installed and to be emptied on a regular basis to ensure that wastewater will be collected and adequately removed from the site.
- The Contractor will provide a proper sanitary drainage system for the worker's camp.

- **Solid Waste**

The construction stage will generate waste in the form of spoil soil, left over construction material and other possible sources of wastes. This waste can cause further pollution if not well disposed.

Mitigation Measures

Following practices may be adopted to cope with solid waste management:

- The waste hierarchy will be adopted as far as reasonably practicable.
- Material deemed suitable for reuse on the project site will be retained

- Reuse of material onsite such as dug out soil for backfilling
- If materials cannot be reused on-site, then the feasibility of reusing them off-site will be explored.
- Identifying waste streams which could successfully be used by other businesses or operations. This results in the diversion of waste from landfill and thus presents the potential for cost savings.

- **Land Contamination**

Land contamination may be encountered in sites under construction due to known or -unknown historical releases of hazardous materials or oil, or due to the presence of abandoned infrastructure formerly used to store or handle these materials, including underground storage tanks. Actions necessary to manage the risk from contaminated land will depend on factors such as the level and location of contamination, the type and risks of the contaminated media, and the intended land use.

Mitigation Measures

Mitigation and management measures are given as under:

- Managing contaminated media with the objective of protecting the safety and health of occupants of the site, the surrounding community, and the environment post construction.
- Understanding the historical use of the land with regard to the potential presence of hazardous materials or oil prior to initiation of construction or operational activities.
- Preparing plans and procedures to respond to the discovery of contaminated media to minimize or reduce the risk to health, safety, and the environment
- Preparation of a management plan to manage obsolete, abandoned, hazardous materials or oil consistent with the approach to hazardous waste management.

- **Impact on Health and Safety**

Health and safety issues of workers may arise during construction of the project include exposure of construction workers and neighbors to noise, dust, vibrations, moving trucks and other machinery, dangerous pits and other potential health and safety impacts. These problems may be caused due to non-compliance of health and safety rules, improper or no use of PPEs by the workers. Health deterioration of workers may be caused due to poor drinking water quality and unhygienic conditions.

Mitigation Measures

Following mitigation measures will be adopted to cope with the health and safety issues:

- Availability of proper PPEs (safety helmets, goggles, etc.) to the workers.
- First aid box will be provided on construction site so that the minor injuries would be recovered on site.
- Basic health care unit will available within the premises of project site.
- Contractor will ensure the compliance of all protective equipment including safety helmets, goggles etc.
- Firefighting equipment will be present all the time of construction to avoid any fire hazard.
- Good quality food and water will be provided to the labor force.

7.3.2 Social Impacts and Mitigations Measures

Positive Impacts:

The proposed hill-top recreational resort is expected to generate several positive gender-differentiated socio-economic impacts, particularly for women residing in nearby communities. These impacts are primarily associated with employment generation, skills development, and improvement in local infrastructure and services. Some key benefits are given below:

- Boost in eco-tourism will support the local economy and business
- Lesser burden on Murree dwellings
- Employment and income opportunities are expected to be created as a part of green skills development.
- Promotion of clean image of tourist resorts, for instance Murree city will be progressive and will attract more tourists in smart mobility, tourism, and more national / international funding.
- Skills development and women's empowerment.
- Improvement in social infrastructure and services.

Negative Social Impacts:

The term gender does not refer to women only but it emphasizes that women should also be mainstreamed in any planning process because they comprise half of the country population. Following are the salient features emphasizing the negative social issues:

- Safety, Harassment, and gender-based violence risks
- Unequal access to employment and economic benefits
- Cultural and social pressures
- Increased unpaid care and domestic work

Mitigation Measures

- TDCP and its partners may develop an inclusive recruitment policy to encourage women's employment as resort staff and maintenance personnel, even to create an opportunity for women staffing.
- Offering pre-employment technical and soft skills training in cooperation with TEVTA or other vocational schools.
- Enforce resort recruitment procedures
- Equal pay for equal work
- Targeted skills training for women
- Establishment of minimum female employment targets. Priority should be given to hiring local women and supporting women-led micro-enterprises linked to resort supply chains.

- Involve early and continuous community engagement including separate consultations with women, elders, and religious or community leaders.
- Awareness programs highlighting culturally appropriate tourism practices and the socio-economic benefits of women's participation should be implemented to foster community acceptance.
- Flexible work hours, nearby childcare options where feasible, and promoting shared household responsibilities through community sensitization initiatives.

In conclusion, while gender-related adverse impacts are plausible, they are largely preventable and manageable through proactive planning, inclusive employment policies, safe design features, and gender-responsive community engagement. Incorporating these mitigation measures into the Environmental and Social Management Plan (ESMP) will be critical to ensuring equitable and sustainable project outcomes.

Chapter 8

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) & BUDGETING

8.1 General

Environmental and Social Management Plan (ESMP)

Under Pakistan environmental regulatory framework, Environment Management Plan (EMP) is a mandatory component of the EIA and becomes operationally binding as part of the Environmental and Social Management Plan (ESMP) during project implementation. In other words EMP is a sub-Plan of ESMP and ESMP is prepared based on the EIA thus both, EMP and EMP are basically legally embedded in the EIA.

In this chapter an Environmental Management Plan (ESMP) has been developed to ensure that the proposed eco-friendly tourist resort project is implemented in an environmentally sound and socially responsible manner. The ESMP identifies potential environmental and social impacts during the pre-construction, construction, and operational phases and outlines appropriate mitigation, monitoring, and institutional responsibilities in compliance with Punjab EPA requirements.

Based on the forecast of socio-environmental impacts of the proposed project "Establishment of Eco-Friendly Tourist Resort at Aliot, Murree-Bhurban" and mitigation measures suggested thereof during the preparation of this EIA as reported in Chapter 7 of this document, this chapter presents the implementation and delivery mechanism in the form of an Environmental and social Management Plan (EMP). As guided by the existing environmental regulations in Punjab, they are complied with and potential adverse environmental impacts resulting from the project activities are minimized as practicably as possible. These are achieved through appropriate project planning and methods of project operation. Implementation of ongoing environmental monitoring programs will enable the assessment and modification in the EMP, if required. This EMP also provides the mechanism to address the adverse environmental as well as social impacts of the project during its execution, to enhance project benefits and to introduce standards of good practice to be adopted for all project works.

An EMP holds the key to ensuring that the environmental quality of the residential or commercial zones under project impact does not deteriorate beyond the expected level due to the construction and operation of the project. The EMP contains a set of measures to be employed during different stages like design, construction and operation to eliminate, offset or reduce adverse environmental impacts to acceptable levels during the construction and operation phases on the existing environment. The Environmental Management Plan needs to be implemented right from the initial stage of the project, i.e. pre-construction phase and should continue till the end. The plan can be divided into three stages: design/pre-construction phase, construction stage and (iii) operational stage.

Environmental management is carried out in all stages of the Project namely; pre-construction, construction and operational phases. The EMP for the management of the identified environmental impacts associated with this project consists of three main components:

1. Implementing the Impact Mitigation Plan
2. Monitoring the implementation of the EMP
3. Institutional Framework for Monitoring, Reporting and Supervision of EMP

8.2 Objectives of the EMP

This Environmental Management Plan (EMP) aims at ensuring the application of the mitigation and monitoring measures, needed to reduce and control the various environmental impacts associated with the implementation of the Project. The key objectives of the EMP are summarized below:

- To minimize adverse environmental and social impacts of the project.
- To ensure compliance with PEQS (2016) and relevant national/provincial laws.
- To enhance positive environmental and socioeconomic benefits.
- To define clear roles, responsibilities, and monitoring mechanisms.

8.3 Components of EMP

The EMP consists of the following components:

A. Environmental Mitigation Plan

B. Environmental Monitoring Plan

C. Environment Management Plan

D. Institutional Arrangements

E. EMP Cost

A detail of the above-mentioned plans is given below:

A. Environmental Mitigation Plan

The Environmental Mitigation Plan includes the measures to mitigate the adverse project interventions and enhance its positive impacts during initial physical works and normal operations afterwards. The Environmental Mitigation Plan focuses on offsetting both environmental and social parameters. Environmental parameters include water resources, vegetation, drainage, soil erosion, air/noise quality and health and safety issues whereas social parameters relate to general economic growth, capacity building, job creation, gender issues and public health benefits, etc. during various phases of the project. Table 8.1 emphasize the institutions which are responsible for proper implementation and effective supervision.

6.4 EMP During Construction Phase

8.3.1 Land, Soil, and Slope Stability

- Limit site clearance to approved boundaries only.
- Implement terracing, retaining walls, and slope stabilization measures.
- Schedule earthworks during dry seasons to reduce erosion.
- Use silt traps, geotextiles, and mulching on exposed soil.

8.3.2 Air Quality Management

- Regular water sprinkling on unpaved roads and construction areas.
- Proper covering of construction materials.
- Maintenance of machinery to minimize emissions.
- Prohibition of unnecessary idling of vehicles.

8.3.3 Noise Control

- Restrict construction activities to daytime hours.
- Use noise-silenced equipment where possible.
- Provide PPE (ear plugs/ear muffs) to workers.

8.3.4 Water Resources Protection

- Avoid discharge of untreated wastewater into natural drains.
- Provide temporary sanitation facilities for workers.
- Prevent oil, fuel, and chemical spills through bunding and safe storage.

8.3.4 Solid Waste Management

- Segregation of waste at source.
- Safe disposal of construction debris at approved disposal sites.
- Recyclable materials to be reused or sold to authorized recyclers.

8.3.5 Flora and Fauna Protection

- Avoid unnecessary tree cutting; protect existing vegetation.
- Obtain approvals for tree removal and carry out compensatory plantation.
- Restrict worker movement to designated areas to avoid wildlife disturbance.

8.3.6 Occupational Health & Safety

- Provision of PPE (helmets, gloves, boots, masks).
- First aid facilities at site.
- Safety training for workers.
- Emergency response and accident reporting procedures.

8.4 EMP During Operational Phase

8.4.1 Air and Noise Quality

- Maintain landscaped green areas to improve air quality.
- Control noise from generators and equipment through acoustic enclosures.
- Regular maintenance of HVAC and electrical systems.

8.4.2 Water and Wastewater Management

- Use treated water for landscaping.
- Regular maintenance of septic tanks / treatment systems.
- Promote water conservation and rainwater harvesting.

8.4.3 Solid Waste Management

- Waste segregation (organic, recyclable, non-recyclable).
- Timely collection through authorized municipal or private contractors.
- Awareness programs for staff and visitors.

8.4.4 Biodiversity and Landscaping

- Maintenance of plantation and green belts.
- Use of native plant species.
- Prohibition of hunting or disturbance to wildlife.

8.4.5 Community and Social Measures

- Preference for local employment.
- Continuous engagement with local community.
- Grievance redress mechanism for nearby residents.

8.5 Environmental Monitoring Plan

- Periodic monitoring of air quality, noise levels, water quality, and waste management practices.
- Monitoring frequency as per EPA guidelines.
- Submission of compliance and monitoring reports to Punjab EPA.

8.6 Institutional Arrangements

- **Project Proponent / TDCP:** Overall responsibility for EMP implementation.
- **Contractor:** Day-to-day implementation during construction.
- **Environmental Consultant :** Monitoring, reporting, and compliance checks.
- **Punjab EPA / EPD:** Regulatory oversight and inspections.

8.7 Conclusion

The implementation of this Environmental and Social Management Plan will ensure that the project is developed in accordance with environmental best practices, regulatory requirements, and principles of sustainable tourism. Effective execution and continuous monitoring of the EMP will minimize adverse impacts, protect the natural environment of Murree–Bhurban and enhance long-term social and economic benefits:

Table 7.2: List of PPEs

Human Organ	Hazards	PPEs
Eyes	▪ Dust ▪ Gas and vapors	▪ Goggles ▪ Face screens ▪ Face shields ▪ Visors ▪ Safety spectacles
Head and Neck	▪ Impact from falling or flying objects ▪ Risk of head bumping ▪ Hair getting tangled in machinery	▪ Safety helmets ▪ Bump caps ▪ Hairnets ▪ Firefighters' helmets
Ears	▪ Noise – a combination of sound level and duration of exposure, very high-level sounds are a hazard even with short duration	▪ Earplugs ▪ Earmuffs
Hands and Arms	▪ Abrasion ▪ Cuts and punctures ▪ Electric shock ▪ Vibration	▪ Gloves ▪ Gloves with a cuff ▪ Gauntlets a ▪ Sleeves that covers part or all of the arm
Feet and Legs	▪ Wet, hot and cold conditions ▪ Slipping ▪ Cuts and punctures ▪ Falling objects ▪ Heavy loads	▪ Safety boots and shoes with protective toecaps and penetration-resistant ▪ Mid-sole wellington boots and specific footwear, e.g. foundry boots and chainsaw Boots
Lungs	▪ Oxygen-deficient atmospheres Dusts ▪ Gases and vapors	▪ Fresh-air hose ▪ Compressed airline ▪ Self-contained breathing apparatus

Table 5. Organization and their Duties for EMP Implementation

Stage	Institution	Responsibilities
Pre-Construction	Environment Management Committee of the Client	Ensure EMP requirements are included fully in contract documentation.
Construction	Contractor	Implement EMP
		Undertake monitoring activities
		Reporting to Site Engineer
	Environment Management Committee & Supervisory Consultants	Oversee and monitor environmental management activities and standards.
		Undertake day-to-day supervision of EMP activities.
	Project Manager	Ensure environmental impacts are acceptable.
	Proponent/ Client	Ensure adequate and prompt remedial actions are taken as required.
		Liaise with public and respond to environmental issues.
	Environment Protection Agency, Punjab	Ensuring compliance of statutory environmental management and monitoring standards;
	External Auditor	Auditing EMP and reviewing EIA report.
Operation	Executing Agency	Operation and maintenance.
	External Auditor, if applicable	

8.8 Environmental Monitoring Plan

Under the proposed monitoring strategy, it is recommended that Environment Management Committee will play a key role for compliance of all the monitoring activities during construction phase. All the findings and results in the form of a monitoring report

will be finally passed on to Project Manager for further actions. The monitoring program has been designed carefully considering the identified impacts (chapter 7) and some additions or deletions may be taken up in this program after learning lessons from one year operation of the project through Change Record Register. The program has also proposed testing of parameters to be done by a third party i.e. environmental laboratory.

Most of the proposed EMP mitigation activities will be assured under supervision of engineering design, provisions in the construction contracts, engineering supervision contract and as necessary by agreement with relevant communities.

Table 8.8 Environmental Monitoring Plan

Monitoring Category/ Receptor	Type of Impact	Project Activity	Monitoring Mechanism	Frequency	Monitoring Agency
A: PRECONSTRUCTION					
Land Resources	Infrastructural, housing commercial and business conditions	Maintenance of photographic and other written record (Performas, questionnaires etc.)	Record keeping	Weekly	Design Engineer
	Location of construction camps	Fencing of the construction camp site to isolate it from the local residents	Establishing watch and ward system	Continuous	Design Engineer
Biological Resources	Uprooting of trees	Maintenance of photographic record and tree inventory	Recording inventory for inclusion in EIA report	During Baseline Survey	Consultants
B: CONSTRUCTION PHASE					
Land Resources	Dismantling of existing pavements	Maintaining a record of roads, electrical poles, transformers,	Timely compensation to be allocated damages and claims to be	Daily	Contractor/ RE

	and other infrastructure	towers, pump houses etc.	settled appropriately.		
	Additional generation of solid waste	Implementation of solid waste management system	Monitor to ensure solid waste generated is being disposed of properly	Daily	Contractor/ RE
Water Resources	Quality of drinking water	Testing by third party environmental laboratory	Water Sampling as per PEQS drinking water standards	Once in construction phase	Consultants
	Profile change in wastewater	Waste water management	Monitor measures taken to prevent contamination of ground and/or surface water from waste and sewage generated from construction activities. Monitoring as per NEQS	Daily	Contractor/ RE
	Blockage of drainage system / overflows	Monitor management of waste water to avoid blockage and flooding, especially in rainy season	Monitor to ensure construction activities does not cause flooding at the project site.	Weekly	Contractor/ RE
Air/Noise Quality	Air quality monitoring	Air quality will deteriorate significantly due	$PM_{2.5}$, PM_{10}, NO_x, SO_x, to be monitored.	Once during construction	Contractor/ RE

		to construction activities/ project traffic.	Monitor adequacy of measures undertaken to prevent fugitive dust.		
	Noise level monitoring	Noise emissions from construction vehicles	Monitor preventive measures being implemented to curb noise as per NEQS standards.	Weekly	Contractor/ RE
Biological Resources	Scrub vegetation	Tree plantation/ Landscaping	Count the number of trees and avoid excessive cutting	End of construction phase	Contractor/ RE
Health & Safety of Workers	Air, water and noise borne diseases	Health facilities & medical checkup of reported sick workers	Monitor adherence to all occupational and safety requirements	Weekly or as required	Contractor/ RE
	Risk of accidents	Fencing against risky portions of project area	Monitor adequacy of health checkup service provided.	Monthly	Contractor/ Engineer
	Deteriorated sanitary conditions of campsite	Sanitary liquid and solid waste will be generated daily from construction workers colony/ campsite	Monitor provision of shelter, water supply, excreta and solid waste management at campsites	Monthly	Contractor/ Engineer
C: OPERATIONAL PHASE					

Land Resources	Damage to infrastructure due to negligence	Operation and Maintenance of newly constructed roads and semi-covered drain	Monitoring for the proper implementation maintenance schedule	Monthly	EMC
	Improper drain cleaning process	Operation and maintenance activities	Monitoring of regular cleaning	Weekly	WASA/ EMC
Biological Resources	Damage to re-planted trees and shrubs	Implementation of seasonal tree plantation campaigns and continuous monitoring for the maintenance of social forestry	Record keeping and plantation inventory	Quarterly	EMC/ PHA

B. General Environmental Management Plans

1. Environment Management Plan

Table 6. Environmental Management Plan

Anticipated Social and Environmental Impacts	Proposed Mitigation Measures	Institutional Responsibility
CONSTRUCTION PHASE		
Soil erosion	Avoid earthworks during monsoon season where possible • Mulching, turfing, and slope stabilization of exposed areas • Preservation of natural drainage channels	Construction Crew

Air pollution	• Sprinkling of water on unpaved, non-vegetated surface to minimize airborne fugitive dust and during earth moving activities, prior to clearing and before excavating, back-filling, compacting or grading. • Shut down of idling vehicles and equipment	Construction Crew
Health Safety & Issues	• Availability of proper PPEs (safety helmets, goggles) to the workers • First aid box will be provided on construction site so that the minor injuries would be recovered on site • Basic health care unit within the premises of project site • Contractor must ensure the compliance of all protective equipment including safety helmets, goggles etc.	Construction Crew
OPERATIONAL PHASE		
Pollution	Provision of adequate ventilation.	Operational crew
Air	• Good housekeeping will be maintained at all times in all areas with adoption of good cleaning and working practices. • Use of low VOC materials and efficient emission control system	Operational and maintenance staff

	(e.g. scrubbers)	
Noise	Provision of appropriate noise attenuating materials/structures to abate noise generated from equipment such as electric appliances and extraction systems.	Operational and maintenance staff
Solid Waste Generation	• Timely collection and disposal of waste by waste collection agency • Piling of waste will be avoided on site to ensure the workers' health.	Operational and maintenance staff
Wastewater Generation	• Provision of septic tank for the primary treatment. • Water conservation measures will be adopted • Effluent treatment will be done properly before the disposal of wastewater.	Operational and maintenance staff
Health & Safety Issues	• Provision of personal protective equipment such as masks, aprons, protective gloves and hearing protection for workers. • Provision of first aid facility on site. • Good housekeeping to reduce the risk of accidental injuries. • Training of workers will be provided on regular time intervals.	Operational and maintenance staff
Emergency Response	• Emergency response procedures and contingency plans will be implemented and maintained of in case of failure of fire outbreak.	Operational and maintenance staff

Soil Disturbance	• Scheduling to avoid heavy rainfall periods to the extent practical. • Mulching to stabilize exposed areas.	Contractor
Solid Waste Generation	• Timely collection and disposal of solid waste. • Recyclable waste will be sell out to the recycle market or any relevant customer.	Contractor
Health and Safety Issues	Employees will be provided with personal protective equipment.	Contractor

C. Environmental Auditing Plan

The internal environmental audit of the Project will be carried out by RDA Project Director assisted by a team of experts from Supervisory Consultant during construction. The primary aim of the auditing is to assess compliance and effectiveness of the recommendations of EIA as well as the degree of success of environmental and social objectives, and also to assess the effectiveness of corrective actions. The audit activity will also suggest remedial measures to overcome the environmental and social problems.

Following are the main objectives of the internal audit report:

- To evaluate whether the monitoring done by the supervisory staff is in compliance with the targets as set in EIA.
- To determine the conformity of the environmental management plans with specified requirements and identify non-conformity in environmental and social parameters as per EIA.
- Meet regulatory requirements and commitments.

D. Restoration and Rehabilitation Plan

After completion of the construction work all the disturbed sites will be restored to conditions as they were prior to the commencement of the project or in a better condition.

All the concrete and other material will be cleared and disposed of according to the waste management plan. The fences and construction sign boards will also be removed.

E. Training and Capacity Building Plan

To enhance the capacity of TDCP/ RDA as well as the Contractor, training will be imparted related to the environmental and social issues of the project, implementation of mitigation measures and the monitoring protocols and monitoring mechanism.

The training protocols will include the following aspects:

- Procedures to monitoring the air quality parameters and measures to be adopted for avoiding or minimizing air pollution, particularly from the concrete batching plant, haul trucks, etc.
- Procedures to monitor the water quality parameters and measures to be adopted for avoiding or minimizing water pollution, particularly from the wastewater effluent generated from the workshop, machinery washing yards, and other hazardous chemicals;
- Practices for safe disposal of solid waste;
- Safe noise level from the construction machinery etc.;
- Safety measures against hazards for workforce and the local communities arising from the construction activities;
- Use of safety gadgets by the work force; and
- Training Material

Environmental Specialist will develop and prepare training material regarding environmental awareness, EIA, EMP and restrictions to be followed during the Project implementation. Separate training material will be prepared for each targeted staff. The summary of training material content, staff and training time is given in Table 10

Table 10 Training Program

Target Audience	Trainers	Content	Schedule
Selected Management Staff	Consultant	Key finding of mitigation measures	After every five months
All Personnel	HSE Officer	Mitigation measures	Monthly
Technical Staff	HSE Officer	Waste disposal or sale out status, vehicle movement restrictions and other mitigation measures	After every three months
Other Staff	HSE Officer	Waste disposal, resource Conservation and other mitigation measures	Monthly

The objective of environmental and social monitoring during the various phases of the Project will be as follows:

- Ensuring that the mitigation measures included in the EIA are being implemented completely.
- Ensuring the effectiveness of the mitigation measures in minimizing the project's impacts on social and environmental resources.

F. Tree Plantation Plan

As per prevailing practice in the Province of Punjab, a number of 3-5 plants are to be raised in lieu of each tree removed during any developmental activity. Therefore, keeping in view the standing instructions of the ggovernment as well as considering the harmful environmental impacts it will cause. It is advisable that number of trees to be raised should not be less than 5 times the number of trees removed during Project activities. However, proposed Project Sites have no trees that have to cut down to clear the site.

Table 7. Tree Species Recommended for Project Area

Sr #	Common name	Scientific name
1	Bakain	*Meliaazadarach*
2	Mulberry	*Morus alba*
3	Shareen	*Albizzialebeck*
4	Sheesham	*Dalbergiasissoo*
5	Kikar	*Acacia nilotica*
6	Rubber plant	*Ficuselastica*
7	Simal	*Bombaxceiba*
8	Neem	*Azadirachtaindica A. Juss*
9	Eucalyptus	*Eucalyptus camaldulensis*
10	Katha/ Khair	*Acacia catecha*
11	Phulai	*Acacia modesta*
12	Ever Green	*Acacia retinodes*
13	White siris	*Albiziaprocera*

G. Site Waste Management Plan

The site waste management plan for the proposed project emphasizes on the procedure of how to dispose of construction waste. The project Contractor should not start construction work until they have an approved solid waste management plan (SWMP) in place. The SWMP corresponds to the following topics:

- Type of waste produced at construction site;
- Procedure for waste disposal i.e. reuse, recycle, landfill etc.; and
- Address and issue permits to where waste is transported for disposal or further treatment.

D. Institutional Arrangements

This section describes the organizational structure required for managing the environmental and social aspects of the Project as well as it describes the roles and responsibilities of various authorities. The Table 8.1 emphasizes the institutions which are responsible for proper implementation and effective supervision of EMP for the proposed Establishment of Eco-Friendly Tourist Resort at Aliot, Murree-Bhurban. Having well defined implementation arrangements, with specific assigned responsibilities, and adequate monitoring of the implementation and performance of mitigation measures, are critical to environmental management. The presence of a good and functional institutional framework and monitoring entities ensure that mitigation measures are an important and integral part of these arrangements.

Monitoring becomes part of the development process because mitigation measures are suggested and their performance is monitored. Feedback in the event of poor performance of a mitigation measure will allow appropriate corrective actions to be taken. There are certain institutions belonging to government and private sectors who are taking part in the construction of this project. These institutions will take care of the engineering, design, ecology, socioeconomic and other impacts. The list of these institutions is given below along with their duties:

- Proponent of the project (the Executive Agency, EA) in this case it is TDCP. Main responsibility to implement EMP lies on it.
- Supervision Consultants (SC), as deputed by the Project Proponent; Project Manager (PM) will be appointed by Proponent.
- Project Contractor, as the executors of the Environmental Management Plan during the construction of Establishment of Eco-Friendly Tourist Resort at Aliot, Murree-Bhurban.
- Monitoring Agency, as Environmental unit of the Proponent will acquire an active role to monitor the EMP implementation.
- Punjab-EPA, as observer and top monitoring agency during construction and operational phases.

Roles and Responsibilities

As the institutional strengthening activities are necessary to facilitate implementation of EMP, thus roles and responsibilities of various institutions are discussed below:

a. Project Proponent/ Client

The Proponent of Proposed project is TDCP thus implementation and monitoring requirements of environmental impact mitigation and monitoring measures will be met by them. The Environment Management Committee (EMC) of this project will take overall responsibility for undertaking and coordinating the mitigation and monitoring measures identified during the construction and operational phases. The Proponent in consultation with the consultants and concerned government agencies will ensure that the mitigation and monitoring measures for the operation and maintenance phases are adequately transferred.

The specific duties of TDCP Manager/ Environment will include:

- Coordination as required with regulatory agencies including EPA-Punjab, as well as local community.
- Ensuring that the terms of reference of the Contractor(s) adequately cover environmental issues to comply with the local laws.
- Ensuring that the Contractor develops and adopts environmental implementation plans that are consistent with the EIA requirements.
- Supervising the Project's Contractor and ensuring that all the contractual obligations related to the design and construction, as well as environmental compliance are met.
- Ensuring that day-to-day construction activities are carried out in an environmentally sound and sustainable manner.
- Preparation of environmental progress reports.
- Determine the timing and exact locations of air, noise and water quality monitoring.

- Undertake critically important routine visual monitoring of the construction, waste disposal and overall environmental management practices by the Contractor.
- Devise solutions to the environmental issues as they arise. Particularly those related with dust, noise levels and other impacts that are in some instances unavoidable. Good construction supervision requires that every effort be made to minimize these impacts.

c. Monitoring Agency

It is intended to form an Environmental Unit (EU) within Proponent office to monitor project performance. The roles and function of this unit will be:

- The EU will consist of Environmentalists, Sociologist, RE, M&E Officers and the Environment Committee comprising the affected community.
- Post construction bus depot maintenance activities will be implemented in coordination with the Project Maintenance Manual and those institutions responsible for its safety.
- The EU staff should be required to provide in-house training on Environmental Management to rest of the technical staff employed on the project.

d. Project Contractor(s)

The contractor is responsible for execution of construction activities as well as for environmental protection through their environmental field staff. The contractor is subjected to environmental protection liabilities under environmental laws of Pakistan, project EIA and under their contract with project Proponent. The contractor is also responsible for communicating with the crew and to train them in all aspects of environmental management. The contractor must also fulfill the following contractual obligations as per contract agreement.

- Proper disposal of construction waste;
- Location of labor camps, approach roads, machinery and other materials;
- Rehabilitation of construction site;
- Protect the biological resources at site;

- Respect for social, religious and cultural values at site;
- Control of dust and other pollutants from machinery and stored materials;
- Provision of proper machinery and avoid using out of order equipment or machinery that can cause any adverse health impact or nuisance;
- Public health safety at construction site especially for the labor and nearby community;
- Employment of locals; and
- Storage of fuel must meet the safety requirements.

e. Environmental Protection Agency (EPA)

Punjab-EPA is involved in the project to award NOC for the project implementations as well as to respond on public complaints. The Pakistan Environmental Protection Act (1997) defines the environmental protection standards for national development projects. Punjab -EPA guidelines have been followed to prepare EIA of this project. Punjab EPA can independently consult the Proponent if there are any concerns in relation to this project.

Project Activity / Component	Environmental Component	Potential Impact	Impact Type (Positive/Negative)	Magnitude	Mitigation Measures
Construction of resort	Land / Soil	Soil erosion, land degradation	Negative	High	Use terracing, retaining walls, proper drainage, minimize clearing
	Vegetation	Loss of forest cover	Negative	High	Reforestation, plant native species, limit cutting trees
	Water Resources	Contamination from sewage, runoff	Negative	Medium	Proper sewage treatment, rainwater harvesting
	Wildlife	Disturbance to local fauna	Negative	Medium	Design green corridors, avoid nesting areas
	Air Quality	Dust from construction	Negative	Medium	Water spraying, limit construction during high winds

Project Activity / Component	Environmental Component	Potential Impact	Impact Type (Positive/Negative)	Magnitude	Mitigation Measures
Tourism activities (trekking, paragliding)	Soil	Trail erosion	Negative	Medium	Construct designated trails, maintain paths
	Vegetation	Trampling of flora	Negative	Medium	Create awareness signs, restrict off-path movement
	Wildlife	Disturbance to birds and animals	Negative	Low	Limit human activity in sensitive areas
Road expansion / traffic increase	Air Quality	Vehicle emissions	Negative	High	Promote electric vehicles, tree plantation along roads
	Noise	Disturbance to wildlife & local community	Negative	Medium	Limit construction/traffic in sensitive hours

Project Activity / Component	Environmental Component	Potential Impact	Impact Type (Positive/Negative)	Magnitude	Mitigation Measures
Water supply & infrastructure	Water Resources	Depletion of springs, overuse	Negative	Medium	Rainwater harvesting, sustainable water management
Socio-economic development	Community	Employment & income generation	Positive	High	Training programs, prioritize local hiring
	Cultural Heritage	Impact on historical sites	Negative	Low	Conduct heritage impact assessment, avoid sensitive sites

E. EMP Cost (Environment Budget)

Implementation of the recommendations of the EIA at the construction stage is the sole responsibility of the contractor and the monitoring activities will be carried out by the supervision consultants. Cost for environmental monitoring will be a part of the contract document with the Contractor. It must be noted that environmental cost will not be a separate entity because all of its components will be addressed in the bidding document under various heads of account. For instance, tree plantation will be a part of landscaping; infrastructure repair will be covered under rehabilitation work and so forth.

The lump-sum estimated cost of the implementation of Environmental Monitoring before and a year after the completion of Project period has been worked out to PKR 40 million. This budget is meant for the protection of environment; that includes the cost for environmental enhancement measure i.e. tree plantation, Environmental testing and Environmental reporting and review. The breakdown for Environmental budget is given below in table below:

Table 8. Summary of Environmental Budget

Sr. No.	EMP Parameters	Unit Cost	Before Construction		During Construction		After Construction		Total Cost (Million PKR)
			Times	Cost	Times	Cost	Times	Cost	
1	Environmental Testing[1]	1.5	2	3.0	2	3.0	2	3.0	9.0
2	External Environmental Auditing[2]	1.2	0	0.0	2	2.4	2	2.4	4.8
3	Environmental Training[3]	1.0	2	2.0	3	3.0	2	2.0	7.0
4	Rehabilitation & Restoration Cost[4]	10.0	0	0.0	0	0.0	1	10.0	10.0
5	Area Development & Community Support Projects[5]	2.5	2	5.0	2	5.0	1	2.5	12.5
6	Environmental Reporting & Review	0.12	0	0.0	6	0.72	4	0.48	1.20
								Total	40.00

1. Maintaining environmental parameters include air, water & noise sample testing.
2. Third party evaluation of environmental parameters helping in view EIR Report, in general, and its EMMP chapter, in particular.
3. It will be provided to Contractor and Client's staff, community leaders as well as environmental awareness to public at large.
4. Cost of landscaping, tree plantation, maintenance of buffer zone, borrow site, GRM & gender, etc..
5. Provision of some extra construction of the public facilities to the adjacent community i.e., dispensary, water filtration plant, park, etc.

Chapter 9

CONCLUSION AND RECOMMENDATIONS

9.1 Conclusion

The Environmental Impact Assessment (EIA) study concludes that the proposed development in the Aliot village, Murree-Bhurban area is environmentally and socially feasible, provided that the recommended mitigation and management measures are fully implemented. The project has been planned with a sustainable and eco-friendly approach, aiming to promote tourism while minimizing pressure on urban areas Murree and preserving the natural and cultural integrity of the region.

The baseline assessment indicates that the project area is characterized by sensitive hill ecology, forest cover, clean air, and a low-density population. Potential adverse impacts identified during the construction and operational phases—such as forest degradation, soil erosion, dust generation, noise, waste management issues, and temporary disturbance to local communities—are localized, short-term, and manageable. These impacts can be effectively mitigated through the implementation of the Environmental Management and Monitoring Plan (EMMP), adherence to Punjab EPA regulations, and continuous environmental monitoring.

On the positive side, the project is expected to generate significant touristic, recreational and socio-economic benefits, including attracting national/ international tourists, employment opportunities for local communities, improved infrastructure, enhanced allied tourism facilities, and increased economic activity in the area. The development will also contribute to environmental awareness, landscape enhancement, and sustainable use of natural resources through planned green spaces, controlled construction practices, and conservation measures.

In conclusion, with strict compliance to the proposed mitigation measures, environmental monitoring, and stakeholder engagement, the project will not cause significant adverse environmental or social impacts. The EIA therefore recommends the project for environmental approval, subject to the effective implementation of the EMP and regular oversight by the relevant regulatory authorities.

9.2 Recommendations

9.2.1 Engineering Safeguards

- To ensure safety measures for the construction of any building/ resort, geotechnical investigations are the pre-requisite since the area is hilly and slope stabilization is imminent.
- Soil erosion and slope instability shall be controlled through proper site grading, terracing, mulching, and retaining structures, particularly in steep and erosion-prone areas.

9.2.2 Environmental Safeguards

In compliance with the Punjab Environmental Protection Act, 1997, amended in 2012 and 2017 environmental sustainability the following environmental safeguard measures are recommended for effective implementation throughout the project lifecycle:

- All construction and operational activities should strictly adhere to the approved Environmental Management and Monitoring Plan (EMMP), with clear roles and responsibilities assigned to the contractor and project management unit.
- Vegetation clearance and tree cutting should be minimized, and compensatory plantation must be carried out at an appropriate ratio using native species to maintain ecological balance. For this purpose, decisions taken by the relevant courts must also be taken care of.
- Effective air quality management measures, including regular water sprinkling, covering of construction materials, and maintenance of machinery, must be implemented to control dust and emissions.
- Noise-generating activities should be restricted to daytime hours, and low-noise equipment should be used to protect local communities and wildlife.
- Surface water and groundwater resources must be protected through proper drainage design, sediment control, and prevention of wastewater discharge into natural streams.

- A comprehensive solid waste and wastewater management system should be established, ensuring segregation, recycling, treatment, and disposal in accordance with NEQS standards.
- Regular environmental monitoring for at least three years post construction must be conducted as well as reporting, and third-party audits should be carried out and submitted to the Punjab EPA to ensure continuous compliance.
- Emergency preparedness measures, including fire safety, landslide risk management, and climate resilience, should be incorporated into project design and operation

9.2.2 Socioeconomic Safeguards

To maximize the positive socioeconomic benefits of the project while minimizing potential adverse impacts on local communities, the following safeguards are recommended:

- **Employment Opportunities:** Prioritize hiring of local residents for construction, operational, and service roles to enhance income generation and skill development within the community.
- **Capacity Building:** Conduct training programs for local workers in hospitality, eco-tourism management, and environmental awareness to improve employability and long-term livelihood sustainability.
- **Community Engagement:** Maintain regular consultation with local stakeholders to address concerns related to construction activities, traffic management, and access restrictions, ensuring participatory decision-making.
- **Infrastructure Improvement:** Develop supporting infrastructure (e.g., access roads, waste collection systems, water supply) in consultation with local authorities to benefit both the resort and surrounding communities.
- **Cultural and Social Sensitivity:** Respect local customs, traditions, and social structures, ensuring that the project does not disrupt cultural heritage or community cohesion.

- **Compensation Mechanisms:** Ensure fair and timely compensation for any temporary disruption of land use, business operations, or other community resources impacted during construction.
- **Health and Safety:** Implement measures to protect public health and safety, including traffic management, noise control, and safe access around the project site.
- **Tourism Management:** Encourage eco-friendly and low-impact tourism practices, promoting sustainable interaction between visitors and the local environment, while safeguarding community resources.

These socioeconomic safeguards will ensure that the project delivers long-term economic, social, and cultural benefits, while minimizing disruption and supporting the sustainable development of Aliot Resort, Murree-Bhurban area.

Annex-A

Layout Plan

Annex-B

Land Acquisition Notification

Annex-C

Environmental Laboratory Results

Annex-D

Photo Gallery

Physical Environment

LAB MONITORING


THEAL
DANEDAR

CONSULTATION WITH STAKEHOLDERS

CONSULTATION WITH LOCAL COMMUNITY


Environment Testing Laboratory