M/S SKY STAR ENERGY PRIVATE LIMITED

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT INSTALLATION OF LGP STORAGE AND FILLING PLANT LOCATED AT MOUZA LAKHO DHER TEHSIL SHALAMAR, DISTRICT LAHORE

March 2025

ECO SYNTEC CONSULTING SERVICES

35 USMAN BLOCK, GARDEN TOWN, LAHORE

ECOSYNTEC@GMAIL.COM

EXECUTIVE SUMMARY

Liquified Petroleum Gas or LPG is a cleaner-burning fuel compared to traditional options like wood, coal, kerosene and even some petroleum products. LPG is used for cooking, space heating and water heating. In addition, LPG also has uses in the commercial and industrial sectors as it is a preferred choice of fuel in restaurants and hotels due to is low price and low emissions. Industrial applications requiring cleaner and controlled heat source also choose LPG as a preferred fuel source.

The demand for LGP is on the rise in Pakistan. This is attributed to many factors including unavailability or unreliable supply of natural gas, pressure drops, load shedding and lack of infrastructure for natural gas[1]. Given the complex energy infrastructure, a detached source of energy that is clean and reliable has gained traction. "The demand for liquefied petroleum gas (LPG) will surge to 15,000 tones a day in coming years from the current 4,500-5,000 tones as this is the only sector which has shown robust growth"[2]. The Increasing demand has created direct economic opportunities. The proposed project is capitalizing on this growing demand for LPG. The proposed project is an initiative by M/S Sky Star Energy Private limited that intends to construct an LPG plant over an area of 24 kanals with a storage capacity of 300 MT and filling capacity of 15- 45 MT/day. The proposed site for the project is Mouza Lakho Dher Tehsil Shalamar, District Lahore.

This environmental impact assessment (EIA) report addresses the potential impacts of the proposed project during construction and operational phases. The EIA report will examine the nature, magnitude, extent, and duration of impacts related to construction and operational activities, including but not limited to air emissions, noise pollution, water resource utilization, waste generation, and potential disruptions to biodiversity. By identifying and assessing these impacts, this report aims to provide a framework for implementing effective mitigation measures, ensuring that the construction of the LPG storage and filling plant proceeds in an

[1] https://psopk.com/en/fuels/gaseous-fuels/liquefied-petroleum-gas

[2] https://www.dawn.com/news/1795183#:~:text=KARACHI%3A%20The%20demand%20for%20liquefied,as%20this%20is%20the%20only

environmentally responsible and sustainable manner, minimizing adverse effects on the surrounding environment and communities. This report also intends to fulfill the regulatory requirements set under Punjab Environmental Protection (Amendment) Act 2017 and its subsequent legislative framework for IEE/EIA including the Review of IEE/EIA Regulations 2022. The process for conducting the environmental assessment and the results of EIA are described in this report.

TITLE AND LOCATION OF THE PROJECT

The title and location of the proposed project is as follow:

TITLE	M/S Sky Star Energy Private Limited
LOCATION	Mouza Lakho Dher Tehsil Shalamar, District Lahore.
NAME OF THE PROPONENT	Liaqat Ali
ADDRESS	House No. W 220, W Block, Phase 8, DHA, Lahore.
EMAIL	pmln.pp126@gmail.com

PROJECT'S SALIENT FEATURES

The salient features of project are as follows:

PROJECT AREA	24 Kanals 75 sft
NATURE OF LAND	Open land / Industrial Plot
SOURCE OF POWER	WAPDA
SOURCE OF WATER	Underground water
WATER CONSUMPTION	Operational Phase: approximately 1000 gallons/day (excluding firefighting reserve) Construction phase: 500 gallons / day
WASTEWATER GENERATED	approximately 600 gallons/day for construction and 300 gallons per day for operational phase
TYPE OF WASTEWATER	Septic tank

NAME OF THE ORGANIZATION PREPARING THE REPORT

This Environmental Impact Assessment report has been prepared by Eco Syntec Consulting Services. The contact details for the consultancy services are:

CONTACT PERSON	Abida Ayub
CONTACT NO.	0344-5484675
ADDRESS	35 Usman Block, New Garden Town, Lahore
E-MAIL	ecosyntec@gmail.com

A BRIEF OUTLINE OF THE PROPOSAL

The proposed project involves construction of an LPG storage and filling plant in the RUDA Industrial Estate, Lahore, spanning over an area of 24 Kanals. This development is driven by the increasing demand for LPG in the province and aims to establish a reliable and efficient supply chain for domestic, commercial, and industrial consumers, contributing to the adoption of cleaner energy sources and fostering economic growth. The project will encompass site development, including land preparation, boundary wall construction, and the establishment of necessary infrastructure such as roads, paving, and drainage systems. Key components will include the design and construction of LPG storage facilities with a total capacity of 300 MT, incorporating essential features like piping, valving, and a vapor recovery system, as well as LPG filling facilities designed for a filling capacity of 15 to 45 MT per day, including filling stations, cylinder handling systems. The plant will be equipped with fire detection and suppression, gas leak detection, and emergency shutdown systems. Essential utilities and ancillary facilities such as an administrative building, control room, and maintenance workshop will also be developed. The project will adhere to stringent environmental and regulatory standards set by the Environmental Protection Agency, Punjab. Successful project implementation will involve a well-defined construction timeline, quality control measures, and a robust operation and management plan, including staffing, LPG sourcing, and a clear distribution and sales strategy. The proposed project has been planned on the norms of sustainable designs and patterns provided under the legislative and sectoral guidelines of Environmental Protection Agency, Punjab. The design of the respective site has been finalized while keeping all the environmental factors under consideration.

SCREENING

LPG plants have a potential for significant environmental impacts including risk of accidents and spills, air emission and potential impacts of soil and water. According to the Schedules the proposed project falls in the category of projects mentioned in Schedule J, i.e. Other Projects "Any other project which filing of an EIA is required by the Provincial Agency under sub-regulation (2) of Regulation 5".

EXISTING ENVIRONMENTAL CONDITIONS

For the purpose of this report, environmental and social baseline conditions at and around the project site has been studied. The data has been gathered through consultation with project proponent, private visits, field survey, site testing and monitoring of environmental parameters, desktop studies and researching existing information. Interviews with people near the project area has been conducted to collect their concerns and suggestions regarding the proposed project. A careful assessment of the project operations, design and proposed amenities reflects that the project will not have any major adverse impacts on the socio-economic and environment of the existing setting. Moreover the project will have positive impacts in terms of employment opportunities as it will create jobs during construction and operation.

MAJOR IMPACTS RELATED TO PROPOSED PROJECT

Following impact assessment methodology; i.e. defining the criteria for evaluation of the impacts, identification of mitigation measures (all possible options), evaluation of the residual impacts and identification of the monitoring requirements. Adequate and effective mitigation measures have been proposed for all construction and operation related likely environmental impacts of the project. These mitigation measures have been proposed in order of attempts to primarily eliminate or minimize the impact or provide compensation or rehabilitate the environment by available means.

The criteria of classification of the impacts as being important, middle or weak are according to:

- Size and geographical extent
- Duration and frequency
- Irreversibility

- Ecological context

Key impacts related to the construction phase include:

- Construction noise
- Solid waste
- Soil contamination
- Air pollution
- Wastewater generation
- Habitat loss/ Damage to flora and fauna
- Community and workers' safety
- Employment conflicts
- Traffic congestion
- Social issues

The project is to be commenced in open plot designated for industrial purpose activity. Potential impacts associated with the construction phase include noise (machine noise anticipated and vehicular noise), air emissions from earthwork and construction machinery and vehicles, and soil contamination due to leakage or accidents of the construction or transportation vehicles, during on-site refueling, solid waste from construction, municipal water uses and safety of the workers and employment conflicts as the major adverse environmental impacts. Key impacts related to the operation phase include:

- Loss of vegetation/biodiversity
- The nuisance of noise
- Wastewater generation
- Solid waste generation
- Air pollution and dust generation
- Fire and explosion hazards
- Safety, public health issues
- Obstructions caused to the public utilities and transportation system
- Traffic congestion
- Soil contamination
- Social issues

RECOMMENDED MITIGATION MEASURES

Site selection is one of the most important criteria that determines the consequences of project activities on the environment and socio-economic well-being of the local community. The Proposed project site has been carefully chosen after careful consideration of potential environmental and socio-economic issues. Detailed mitigation measures are discussed in the Chapter dedicated to Impact assessment and Mitigation Measure. However a brief of the same depicts that the project has taken comprehensive measures for environmental protection during construction and operational phase of the project. These include running the machines and vehicles on good quality (low-sulfur) fuels in good working order ensuring regular maintenance, tuning and servicing, and providing them with noise emission control devices, such as mufflers and silencers. Water suppression, covered transportation of construction material, proper storage of the construction materials and slow driving on unpaved roads will control dust emission. Solid waste of construction and demolition activities will be used for flooring, while the remaining solid waste will be managed as per standard operating procedures. Safety of the workers will be ensured by developing SOPs for all jobs, training the workers to follow SOPs, discouraging any careless attitude of workers and providing the workers with personal protective Equipment (PPE) and encouraging them to use these PPEs.

Since the proposed site is in an industrial estate therefore, the it will not create issues related to traffic flow and damage to public utilities. The project will use underground water for its water needs. Wastewater generated from construction activities will be collected in septic tank and will be disposed of in RUDA sewerage system. A safety supervisor will keep records of daily attendance, injuries and incidents and will provide trainings on activities related to construction.

PROJECT SITE MONITORING AND ASSESSMENT

Monitoring and assessment at the proposed site has been conducted for:

- Air Environment (Ambient Air Quality, Noise Levels)
- Water Environment (Quality: Surface and Groundwater)
- Ecological Environment (Terrestrial Flora & Fauna)
- Socio-Economic Environment (Demographic profile, Occupational structure, Educational status, Literacy status, etc)

The reports demonstrated that results are within the defined limits prescribed by Punjab Environmental Quality Standards (2016).

ENVIRONMENTAL MANAGEMENT & MONITORING PLANS

Environmental impact of a project is worked out using various factors and parameters, so that an Environmental Management Plan can be devised. An environmental management plan or EMP provides mitigation measures, wherever these might be considered necessary in order of appropriateness of elimination, reduction and compensation as the goals. The development of the EMP is to make some person responsible for implementing the mitigation measures as identified so that smooth implementation of the mitigation measures can be assured. Monitoring plans have also been included to ensure the compliance of the EMP by contractors and management of the proposed project.

In addition, Monitoring Plan has been included in the EIA report. The project proponent will be required to implement a strict monitoring plan as per the condition of Environmental Approval, once obtained.

STRUCTURE OF THE REPORT

Chapter 1: **Introduction** briefly presents the brief outline of the project, major impacts, and recommendations for mitigation measures and proposed monitoring.

Chapter 2: **Description of the Project** furnishes project related information such as location, cost, size and major components. It also contains a description and evaluation of the various alternatives that were under consideration and a justification for selecting the proposed system.

Chapter 3: **Consideration of Alternatives** describes the possible alternatives to the project and reasons for their rejection.

Chapter 4: **Environmental Baseline Profile** establishes baseline conditions for physical, biological and socio-economic conditions prevalent in the project area.

Chapter 5: **Anticipated Environmental Impacts and Mitigation Measures** identifies, predicts and evaluates impacts of the project activities before and during the construction and

operation stages and deals with the measures proposed to mitigate potential environmental impacts of the project.

Chapter 6: **Environmental Management and Monitoring Plan** outlines institutional arrangements for the implementation of the proposed mitigation measures, training needs of the staff for implementation of the mitigation measures, monitoring requirements, monitoring cost etc.

Chapter 7: **Impact Assessment and Mitigation** outlines the extent of the possible impacts and the need of mitigation measures for specific impacts. It also shows the ways of achieving the desired results in mitigation of the harmful impacts.

Chapter 8: **Conclusions and Recommendations**

CONCLUSION

The Environmental Impact Assessment contains description of the project, description of the environmental baselines, potential environmental impacts and suggested mitigation measures. An implementation mechanism for mitigation measures in the form of an Environmental Management Plan is included in the study. The objective of this study was to describe the project and its environmental impact and provide mitigation measures. Appropriate mitigation measures as explained in the environmental study should reduce, if not eliminate any impacts so the environmental footprint of the proposed project remains negligible. It is further concluded that all potential environmental concerns associated with the project have been adequately addressed, and no further study is required in this context. It is accordingly recommended that Environmental Approval for the project should be issued by the Punjab Environmental Protection Agency, subject to payment of the requisite scrutiny fee by the proponents of the project.

TBALE OF CONTENTS

LIST OF ANNEXURE

Annexure Number	Description
1	Glossary
2	List of Abbreviation
3	Reference
4	Terms of References for EIA
5	EIA Team
6	Approvals / NOCs
7	Land Ownership Document
8	Laboratory Results
9	Layout Plan
10	Google Earth Map
11	Social Survey Questionnaire
12	Social Survey Picture

LIST OF TABLES

CHAPTER - ONE

INTRODUCTION

The demand for LGP is on the rise in Pakistan. This is attributed to many factors including unavailability or unreliable supply of natural gas, pressure drops, load shedding and lack of infrastructure for natural gas . Given the complex energy infrastructure, a detached source of energy that is clean and reliable has gained traction. “The demand for liquefied petroleum gas (LPG) will surge to 15,000 tones a day in coming years from the current 4,500-5,000 tones as this is the only sector which has shown robust growth” . The Increasing demand has created direct economic opportunities. The proposed project is capitalizing on this growing demand for LPG. The proposed project is an initiative by M/S Sky Star Energy Private limited that intends to construct an LPG plant over an area of 24 kanals with a storage capacity of 300 MT and filling capacity of 15- 45 MT/day. The proposed site for the project is Mouza Lakho Dher Tehsil Shalamar, District Lahore.

This environmental impact assessment (EIA) report addresses the potential impacts of the proposed project during construction and operational phases. The EIA report will examine the nature, magnitude, extent, and duration of impacts related to construction and operational activities, including but not limited to air emissions, noise pollution, water resource utilization, waste generation, and potential disruptions to biodiversity. By identifying and assessing these impacts, this report aims to provide a framework for implementing effective mitigation measures, ensuring that the construction of the LPG storage and filling plant proceeds in an environmentally responsible and sustainable manner, minimizing adverse effects on the surrounding environment and communities. This report also intends to fulfill the regulatory requirements set under Punjab Environmental Protection (Amendment) Act 2017 and its subsequent legislative framework for IEE/EIA including the Review of IEE/EIA Regulations 2022. The process for conducting the environmental assessment and the results of EIA are described in this report.

1.1 PURPOSE OF THE REPORT

As per Punjab Environmental Protection (Amendment) Act, 2017, section 12 (1) describing IEE/EIA mentions that:

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

Furthermore, according to Punjab Environmental Protection Agency (Review of IEE and EIA) Regulations 2022, the proposed project falls under Category J of Schedule II which require projects to undergo an EIA before commencement of construction.

In lieu with the legislative requirement this EIA report describes the project and to identify different environmental aspects like ecological, physical, social, economic aspects of the proposed project. Measures necessary to be adopted to mitigate any environmental impacts on any part of the environment around are also described.

The main objectives of this EIA study are:

- To determine and document the state of the environment of the project area and establish a baseline in order to assess the suitability of the proposed project.
- To identify construction and operation activities with their consequential impacts on social structure and physical environment.
- Provide assistance to the proponent for planning, designing and implementing the project in a way that would eliminate or minimize the negative impact on the biophysical and socio-economic environment and maximizing the benefits to all parties in cost effective manner.
- To present mitigation and monitoring plan for smooth implementation of the suggested mitigation measures.
- To provide opportunity to the public for understanding the project and its impacts on the community and their environment through public consultation.
- To prepare an EIA Report for submission at the Environmental Protection Agency, Punjab for according Environmental Approval.

The proponent requires environmental approval from EPA, Punjab before commencement of construction activities on site. The ultimate purpose of the assessment is to obtain an

Environmental Approval by fulfilling all the legal requirements set under Punjab Environmental Protection Act, (Amended 2012) 1997.

1.2 IDENTIFICATION OF PROJECT AND PROPONENT

Title	M/S Sky Star Energy Private Limited
Location	Mouza Lakho Dher Tehsil Shalamar, District Lahore.
Name Of The Proponent	Liaqat Ali
Address	House No. W 220, W Block, Phase 8, DHA, Lahore.
Email	pmln.pp126@gmail.com

1.3 DETAILS OF CONSULTANTS

The Environmental Impact Assessment study has been carried out by Eco Syntec Consulting Services. The consultancy service can be reached out through:

Name: Eco Syntec Consulting Services

Address: 35 Usman Block, New Garden Town, Lahore.

Contact no: 0344-5484675

Email: ecosyntec@gmail.com

1.4 BRIEF DESCRIPTION OF NATURE, SIZE AND LOCATION OF THE PROJECT

The project involves the establishment of a facility for the storage and filling of Liquefied Petroleum Gas (LPG). This is an industrial facility designed to receive LPG, store it in bulk, and then transfer it into smaller containers (cylinders) for distribution to various end-users (domestic, commercial, and industrial). The primary activities will include the receipt of LPG via tankers, storage in pressurized tanks, and the filling of LPG into cylinders. Salient features of the size of project area:

- **Storage Capacity:** 300 metric tons (MT) of LPG. This indicates the total volume of LPG that the plant can store at any given time.
- **Filling Capacity:** 15 - 45 MT of LPG per day. This represents the amount of LPG that the plant is designed to fill into cylinders daily, indicating its throughput.
- **Land Area:** 24 Kanals. This is the total land area allocated for the project, which will accommodate all the plant's infrastructure, including storage tanks, filling areas, buildings, and safety zones.

The proposed project is situated at Khasra No. 03, 652, 42 Khewat No. 351, 653, 654 80 Khatoni No. 89, 548, 549, 982 to 995, 533 to 544 Mouza Lakho Dher Tehsil Shalamar, District Lahore.

- East: Open Land / Industrial Plot
- West: Open Land / Industrial Plot
- South: Open Land / Industrial Plot
- North: Industrial Unit

- Coordinates for the proposed site are: N 31 36’ 53

  E 74 23’ 24

The LPG plant will be located within the RUDA Industrial Estate, Lahore, Pakistan. RUDA (Ravi Urban Development Authority) is a designated industrial zone, which suggests that the area is planned and zoned for industrial activities. This location is likely chosen to facilitate the distribution of LPG to the Lahore metropolitan area and surrounding regions, taking advantage of the estate's infrastructure and connectivity. The said project has been planned on the norms of sustainable designs and patterns provided under the legislative and sectoral guidelines of Environmental Protection Agency, Punjab. No important religious, archaeological, historical or recreational site, or any other ecologically sensitive, protected area exist within close vicinity of the selected site. The design of the LPG plant is ensued to provide maximum safety. Provisions for plantation and development of green belts is an integral part of the project. The design of the respective site has been finalized while keeping all the environmental factors under consideration. The estimated cost of the project is 150 million PKR.

1.5 METHODOLOGY FOR ENVIRONMENTAL IMPACT ASSESSMENT

This Environmental Impact Assessment is based on methodology provided in the EPA notified guidelines for preparation of EIA report. Initially the baseline of the project area was developed by gathering secondary data, records and information on existing physical and social, and ecological environment. The primary data for the purpose of this EIA report was generated through monitoring and laboratory testing of environmental parameters. The changes expected in the critical environmental aspects e.g. in the parameters like ambient air, noise, socioeconomic indicators that may be significant with a positive or negative attribution were identified. Subsequent mitigation, management and monitoring measures have been drafted accordingly.

The EIA study has adopted the following methodology for report compilation:

1.5.1 LITERATURE REVIEW/BASELINE

Exiting publications and previous IEE/EIA reports with relevance to the proposed project were studied. In addition, the legislative framework governing the process of IEE/EIA and environmental approval were reviewed to ensure that all the parameters are met.

1.5.2 SITE VISITS

This study is based on the finding of the field visits conducted by the team of ESCS. Team members visited the location and neighborhood to perform reconnaissance survey and gather primary baseline information with reference to environmental and social aspects. Site visits have been done with respect to environmental as well as social aspect evaluation. Questionnaires were distributed among the general public to obtain their concerns and suggestions regarding the proposed project.

1.5.3 PROJECT SPECIFIC DATA

The proposed project is spread over an area of 24 Kanals and 75 sft with a total covered area of approximately 3500 sqt. and remaining is open land. The proposed project is planned in RUDA industrial estate which has an efficient network of basic infrastructure like access roads, electricity and sewerage disposal and solid waste collection system. The proposed project has an estimated 300 MT storage capacity whereas, 15 – 45 MT per day of filling capacity. The LPG plant will have

a total of 6 storage tanks each having a capacity of 50 MT. Number of filling point are 10 but the total capacity for filing points can be extended to 11. Type of filling system will be carousel LPG filling machineries. The LPG storage and bottling plant has been design according to NFPA 58 and Oil and Gas Regulatory Authority under Rule B 31.3 of LPG Production and Distribution Rules 2001.

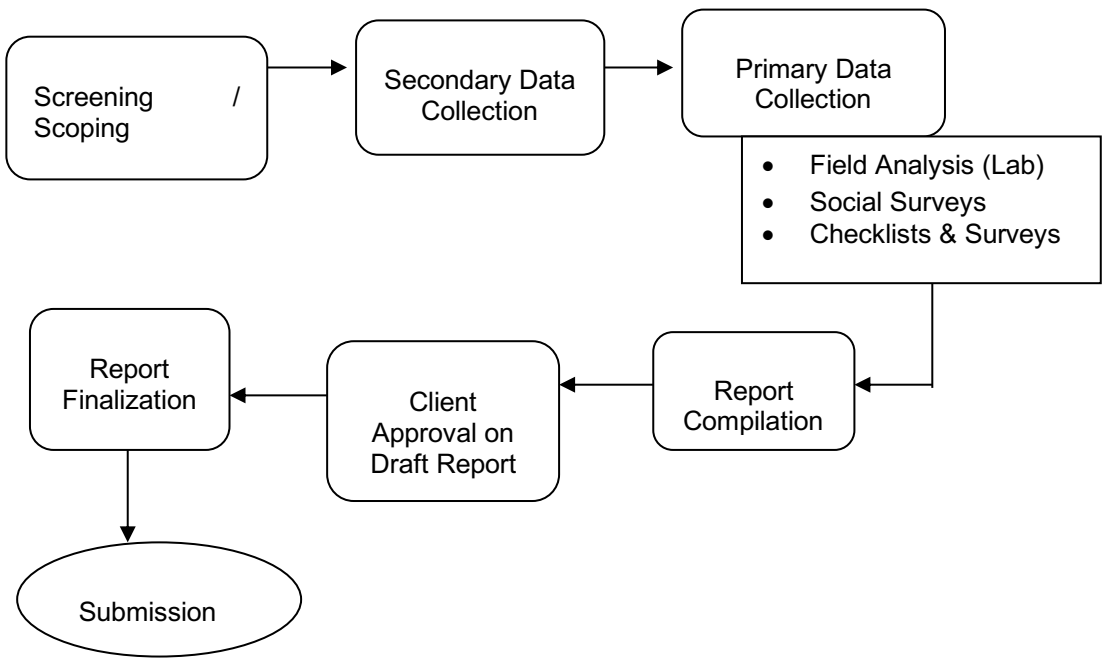
1.5.4 IMPACT IDENTIFICATION AND ASSESSMENT

A categorical assessment of environmental impacts associated with the proposed project with respect to environment and socioeconomic and ecological aspects has been conducted.

1.5.5 MITIGATION MEASURES AND EMMP

Impact assessment has been supplemented by incorporating mitigation measures to lessen severity of impacts and to manage different activities within the outline of environmental management and monitoring plan. The EMMP is provided to facilitate the proponent in establishing an environmental conscious system that supports conservation at all levels of its construction and operation.

Figure 1.1: EIA Report Preparation Flowchart



1.6 TYPE AND CATEGORY OF THE PROJECT/ SCREENING

Screening is an essential part of an EIA process. Screening often results in a categorization of the project and from this a decision is made on whether or not a full EIA is to be carried out. The EPA Punjab has provided a layout for the screening process. Under the Regulations for Review of IEE/EIA, 2022, the EPA Punjab has provided Schedule I and II which categorize projects into IEE and EIA. For the project of construction of M/S Sky Star Energy Private Limited; the same Schedules were consulted. According to these Schedules the proposed project falls under an EAI category based on SCHEDULE II (List of projects requiring an EIA) category J Other Projects.

1.7 SCOPING

1.7.1 INTRODUCTION

Scoping is the EIA stage at which issues, impacts and preliminary alternatives are determined that should be addressed at subsequent stages. It directly follows the screening stage and is a systematic exercise that establishes the boundaries and Terms of Reference (TOR's) for an EIA. A quality scoping study reduces the risk of including inappropriate components or excluding components which should be addressed. While scoping has been defined by many different terms, the definition adopted in recent guidance on project EIA, developed for the European Commission, sets out its meaning in its broadest sense as follows: "Scoping is the process of determining the content and extent of the matters which should be covered in the environmental information to be submitted to a competent authority for projects which are subject to EIA/IEE." (European Commission, 2001).

1.7.2 GUIDING PRINCIPLES FOR CARRYING OUT THE SCOPING STAGE

Spatial and temporal boundaries were defined as a prerequisite to ensure that the impact assessment is done with respect to the proposed site and its environmental and socio-economic elements. Guiding principles for the proposed scoping stage was the Environmental Assessment Checklist provided in the sectoral environmental assessment checklists and guidelines. The checklists require a project to mention all sensitive receptors and protected area within a radius of 500 m and 1000m respectively. In relation to the checklist, a spatial boundary of 1000m was defined for the proposed project site. The Punjab EPA also requires a proposed project to follow

the applicable laws of the province. Impact assessment, therefore has been carried out in line with the guiding principles set by the EPA Punjab. For the purpose of EIA, a scoping session was initiated at the EIA planning stage to include all relevant stakeholders in the study. This helped in defining the boundaries for field assessment of environmental and social parameters.

1.7.3 OBJECTIVES

The key objectives of scoping are to:

- Inform the public about the proposed project
- Identify main stakeholders and their concerns and values
- Define reasonable and practical alternatives to be addressed
- Focus the important issues and significant impacts to be addressed in the EIA report
- Define the boundaries in time, space and subject matter
- Set requirements for the collection of baseline and other information
- Establish the Terms of Reference (TOR's) for the EIA study

1.7.4 LEGISLATION AND GUIDELINES DECIDED TO BE FOLLOWED FOR THE EIA/IEE

The Ministry of Climate Change is the responsible authority for policy making on environmental protection in Pakistan. The following policies are considered during the preparation of the EIA/IEE report:

- National Environment Policy, 2005
- National Resettlement Policy, 2002

In addition to these policies, EPA Punjab has established laws and regulations for environmental assessment studied. These legislations include:

- Punjab Environmental Protection (Amendment) Act, 2017
- Review of IEE/ EIA Regulations of 2022

In addition to the legislative framework, there are certain guidelines notified by the Pakistan Environmental Protection Agency which provide a standard course of actions to be pursued during such studies. These guidelines are:

- Guidelines for the Preparation and Review of Environmental Reports
- Guidelines for Public Consultation
- Guidelines for Sensitive and Critical Areas
- Guidelines for Solid Waste Management 2005
- Environmental, Health, and Safety General Guidelines of the World Bank Group
- Punjab Environmental Quality Standards

Other relevant laws include

Canal and Drainage Act, 1873

This act entails provisions for the prevention of pollution of natural or man-made water bodies.

Pakistan Penal Code, 1860

This defines the penalties for violations concerning pollution of air, water bodies and land.

The Antiquities Act 1975

It is administered by the provincial government and is aimed at safeguarding the preservation of cultural heritage, destruction, damage or defacement of antiquities.

1.7.5 EIA REPORT CONTENT

The content of the IEE report for the proposed project will be as according:

1. Introduction
2. Statutory Requirements
3. Description of the Project
4. Description of the Environment
5. Stakeholders Consultation
6. Screening of Potential Environmental Impacts and Mitigation Measures

7. Environmental Management and Monitoring Plan
8. Conclusions

1.7.6 BASELINE ENVIRONMENTAL INFORMATION THAT WOULD BE INCLUDED IN THE EIA REPORT

I. Physical Resources:
- atmosphere (e.g. air quality and climate)
- topography and soils
- surface water
- groundwater
- geology / seismology

II. Ecological Resources
- fisheries
- aquatic biology
- wildlife
- forests
- rare or endangered species
- protected areas

III. Economic Development
- industries
- infrastructure facilities (e.g. water supply, sewerage, flood control)
- transportation (e.g. roads, harbors, airports, and navigation)
- land use (e.g. dedicated area uses)
- power sources and transmission
- agricultural development
- tourism facilities

IV. Social and Cultural Resources

- population and communities (e.g. numbers, locations, composition, employment)
- health facilities
- education facilities
- socio-economic conditions (e.g. community structure, family structure, social wellbeing)
- physical or cultural heritage
- current use of lands and resources for traditional purposes by indigenous peoples
  - Structures or sites that are of historical, archaeological, paleontological, or architectural significance.

The proposed EIA will use checklist and matrices for impact identification during construction and operational phases. The impacts due to design and location of the project will also be assessed for the proposed project. Laboratory testing will be done to obtain information on the baseline environmental parameters.

Stakeholders during scoping stage:

- General Public
- Academia
- Industries
- Government institution
-

Important issues and concerns raised during consultation were about economic opportunities and employment of members from local community. Noise and dust issues were also discussed during stakeholders consultation process.

Given the nature, type and scope of project, significant impacts and factors to be determined are health and safety issues and potential fire hazard.

1.8 THE REPORT STRUCTURE

This IEE document is structured as follow:

Chapter–1: Introduction: Containing general information about the project and description of the project, proponent and consultants, the need for the project and the report and method of preparing it

Chapter–2: The Project Description: Describes an overall detail of the works to be done and summary of project inputs and outputs.

Chapter 3: Consideration of Alternatives: Provide a vivid picture of the project site and technology alternatives and the reasons of selecting the current project site and technology.

Chapter–4: The Description of the Environment: Gives information on Physical, Biological and Social conditions collected through survey of the Project Area.

Chapter–5: Screening of potential Environmental Impacts and mitigation measures: Identifies various environmental impacts and their preventive actions. This makes the basis of the Environment Management Plan.

Chapter–6: Environmental Management and Monitoring Program: Contains comprehensive prescriptions regarding environmental impacts and their mitigation measures. This also includes institutional arrangements and Environmental Management & Monitoring Plan.

Chapter–7: Mitigation and impact Assessment: It deals with the major potential impacts which could occur during operational phase and how could amendments will be done in design and monitoring for mitigation.

Chapter–8: Conclusion and Recommendation: Concludes the IEE report with some practical recommendations.

CHAPTER - TWO

CONSIDERATION OF ALTERNATIVES

According to 2023 census report the urban population of Punjab is 440.71 per cent where as a majority 59.29 per cent live in the rural areas of the province. The energy demand in urban and rural areas is equally pressing. It is essential to take measures to meet the energy demand in parts of the province where resources are lacking.

As per the EIA guidelines, alternatives have been considered for the proposed LPG storage and filling plant by M/S Sky Star Energy Private Limited.

The alternatives consideration regarding site is followings;

- Alternate I: No project Option
- Alternate II: Alternate Site
- Alternate III: design and technology
- Alternate IV: Land use

2.1 ALTERNATIVE I – NO PROJECT OPTION

The first and foremost option was to evaluate the need for a new projects. Pakistan is a growing economy. The energy demand in the country is also on the rise due to many factors that include growth in economic activities, expanding city boundaries and improvement in living condition, increasing energy demand in rural areas and the increasing population of the country. Given the increasing demand of LPG, it is an economically viable decision to invest in the production of LPG products. Although a no project option will not change the landscape and environment. However, the staggering demand will result in depleting financial reserves for the country. Considering the economic benefits of such a project, it is safe to say that investment in the sector will have more benefits than disadvantages. So the no project option is not a viable choice.

2.2 ALTERNATIVE II – ALTERNATE SITE

Site selection is an important decision in planning a project. Site selection is a major factor in the decision making process of mega projects. The criteria for site selection is a

comprehensive assessment of its environmental, social and economic viability. While selecting a project site the following parameters need to be considered vigilantly:

- Presence of endangered species, forest or protected area
- Habitat type and presence of flora and fauna
- Potential occurrence of disasters like flood, excessive rainfall and seismic activities
- Proximity to surface water body
- Existing land use patterns
- Potential impacts on agriculture and livelihood
- Proximity to sensitive zones including hospitals, schools, religious congregation places
- Proximity to cultural and heritage site
- Proximity to transportation network, energy supply and water resources
- Proximity to human population and chances of social resistance
- Potential impacts of aesthetic value of the area
- Availability of adequate skilled & unskilled labor.
- No settlements in close vicinity
- Project land ownership and chances of land disputes
- Large scale resettlement issues

The proposed project location is an ideal fit as it considers all the criteria meant for site selection. The project site is an industrial estate. It is on terrain with no potential threats due to floods or earthquake. The total area is adequate for the proposed operational activities. Proximity to sensitive zone, forested, protected area is also not a threat. The project site will not lead to resettlement of social resistance in any form. Considering all the criteria for site selection, the existing land is most suitable for the proposed project.

2.3 ALTERNATIVE III- DESIGN AND TECHNOLOGY

Alternate designs for an LPG plant are modular or containerized system. These sometimes are prefabricated and suitable for transportation to different location. However they are not cost effective. They also tend to have potential challenges in integrating with existing infrastructure. Another design approach is decentralized distribution which enable construction of multiple storage plants closer to end users. However, this will require

acquisition of land at different locations resulting in increased project cost of project and duplication of function thus rendering the option unsuitable.

Manual vs. use of sensors, automation and data analytics to manage plant operation. Although manual inspection will reduce the project cost. However, installation of sensor will improve the efficiency and enhance safety through real time monitoring. Sensors will result in predictive maintenance to preventive potential plant failure. M/S Sky Star Energy therefore, has opted for installation of sensors and automation.

2.4 ALTERNATE IV – ALTERNATE LAND USE

Alternate land use options include using the proposed project site for commercial, agricultural or residential purposes. Since the project site is present in an industrial zone therefore, the best use of the plot is for industrial activity.

2.5 CONCLUSION

In view of all above criteria, it was concluded to construct the proposed LPG storage and filling plant at present site.

CHAPTER - THREE

DESCRIPTION OF THE PROJECT

This section describes the project components and related activities. It also describes the type of project, its objectives, location and description of operational activities. The details provided in this section are based on consultations, information and drawings provided by the proponent.

3.1 TYPE AND CATEGORY OF THE PROJECT

According to projects categorization for environmental assessment studies, the proposed project falls under the category of projects mentioned in Schedule II, under the category J of IEE/EIA Regulation 2022. This report is required to fulfill the legal requirements set under section 12 of the Punjab Environmental Protection Act, (Amendment) 2017. According to Section 12 of the Punjab Environmental Protection (Amendment) Act, Initial environmental examination, and environmental impact assessment: "*No proponent of a project shall commence construction or operation unless he has filed with the Government Agency designated by Provincial Environmental Protection Agencies, as the case may be, or, where the project is likely to cause an adverse environmental effects an environmental impact assessment, and has obtained from the Government Agency approval in respect thereof.*" It is this legal requirement from the Government of Punjab that this Environmental Impact Assessment report has been prepared to get Environmental Approval (EA) from the Environmental Protection Agency, Government of Punjab, Lahore.

3.2 OBJECTIVES OF THE PROJECT

The objective of the proposed project is to construct an LPG storage and filling plant to meet the growing demand and ensure reliable LPG supply for consumers in the domestic, commercial and industrial sector.

3.3 LOCATION AND SITE LAYOUT OF THE PROJECT

The location of the proposed project is Mouza Lakho Dher, Tehsil Shalamar, District Lahore. The proposed project is surrounded by industrial units, access road and open land intended for industrial use. The project in its surrounding vicinity has infrastructure like roads, electricity,

telephone, and other basic utilities required for industrial operations. Exact landmarks of the project are given in table 3.1.

Table 3.1: Project Landmarks

PROJECT COORDINATES	NAURE OF SETTINGS
Front	Access Road
Back	Open Plot
Right	Open Plot
Left	Industry

The geographical coordinates of the LPG storage and filling plant are as under:

Latitude 31° 61' 30.7"

Longitude 74° 39' 74.64"


Sky Star Energy
KML file
Swimming pool doctor 212
Ms steel (mehar shahzad)
Habib Concrete Plant
Habib Asphalt Plant
Sialkot - Lahore Mwy
Soby Agro Machinery Lahore showroom
UNIVERSAL MARQUEE
M-11
Ali Swimming Pool & Farm House
Uni Plast (Pvt) Ltd
Tauqeer Kanta
Lahore Sialkot Motorway Bypass Interchange
Mian swimming pool
Binding wire
Service Rd
Table of contents
1/1
2D
Google
100%
Data attribution
16/05/2024
200 m
Camera: 1,673 m
31°36'53"N 74°23'24"E
230 m

3.4 LAND USE ON THE SITE

The site under examination is located at Mouza Lakho Dher, Tehsil Shalamar, District Lahore over an area of 24 kanals and 75 sft. Land selected for the proposed project is barren with some little local plants & shrubs present in scattered quantity. Land ownership documents and layout plan are attached as annex-1 and annex-3 respectively.

Figure 3.1: Current Land Use

3.5 ROAD ACCESS

The proposed project site is easily accessible through the RUDA industrial estate internal road infrastructure. The Industrial zone itself is accessible via Lahore Ring Road and its service road. The nearest toll plaza connected RUDA industrial zone to the main Ring Road is Mehmood Booti Alpha Toll Plaza.

3.6 VEGETATION AND NATURAL FEATURE ON THE SITE

The proposed site is open land. The site is covered with grass and tiny patches of shrubs. It is important to note that the proposed site was selected after due consideration.

3.7 COST AND MAGNITUDE OF OPERATION

The proposed project is construction of an LPG storage and filling plant over an area of 24 kanals in an industrial zone. Construction of project includes the, site survey, construction of boundary walls, roads construction, ground levelling, site clearing work, infrastructure work, structural work, electrical and mechanical work, grey construction and finishing work. Cost of project is 150 million pkr.

3.8 SCHEDULE OF IMPLEMENTATION

It is planned that the following schedule of project implementation will be adhered to, subject to the conditions that everything goes according to planning and no serious bottlenecks are encountered. The implementation stages of the project activity include:

The stage –1 comprises the acquisition of licenses and approvals.

The stage –2 comprises the laying of foundation, start of civil, electrical and mechanical work and development of basic infrastructure.

The stage –3 comprises the completion of plant construction and installation of machineries.

The last stage will be commencement of regular operation after obtaining Environmental Approval. The construction process will approximately will be completed in a period of 6 months to 12 with the help of a workforce of 20 to 25 persons.

3.9 DESCRIPTION OF THE PROJECT

The following steps will be involved in the commencement of the proposed project;

3.9.1 PROJECT CONSTRUCTION

Comparatively normal quantities of building and other facility construction materials will be required for construction of the proposed facility. The materials mainly required are coarse and fine aggregate for concrete works, sandy gravel for backfilling, embankment raising, cement, steel, bitumen, electric equipment, lights, other materials etc. machinery that will be used during construction include:

- Grader
- Excavator
- Sheep feet tractor machine
- Tractor trolley

- Plain roller
- Front blade tractor
- Lifter machine
- Mixture machine

Activities of construction include the followings:

- Site clearing
- Demarcation of the Area for various facilities
- Infrastructure works (roads, water supply, sewerage and drainage, gas, electrical works etc.)
- Construction of storage plant
- Construction of filling plant
- Construction of ancillary building structure
- Installation of street lights
- Plantation of plants and grass

3.9.2 FACILITIES TO BE INTRODUCED

The following important facilities related to the project and its infrastructure will be provided by the proponent:

- Fire assembly point
- Access roads
- Green belts
- Parking area
- Solid waste management facility
- Septic tank

3.10 SALIENT FEATURE OF THE PROPOSED PROJECT

Total area of the plant is 127392 sft or 24 kanals.

- Boundary wall height is 7 feet with additional 2 feet fencing
- LPG tank test pressure is 375 PSI.
- LPG tank design ass per ASME section VIII-DIV-1.
- Storage tank on RCC foundation.
- LPG piping design as per ASME Sec VIII B313.3.
- All LPG lines are SCH 40S A 106 GR B.
- All LPG flangs are class 300 ANSI B16.9.
- 20 percent radiography test for LPG lines.
- Valve wide size is 1/2”.
- ROTO gauge for gauging of tank level is provide with 10” diale plate with fitting size of ¾”.

- Temperature gauges and pressure gauges are fitted along the tank. They will also record temperature and pressure.
- Fixed sprinkler system provided on LPG storage tank, filling shed and bowser point.
- Double earthing system provided for LPG storage tank and pipelines.
- LPG Pumps have compressor conveyor motors.
- Electrical fitting area is explosion proof.
- Fire pump is 750 GPM.
- Fire water tank capacity is 93300 US gallons.
- LPG design pressure 250 PSI.
- LPG design temperature is minimum -20 and maximum is 66 degree celcius.

3.11 STEPS INVOVLED IN LPG STORAGE AND FILLING PROCESS

3.11.1 LPG TRANSPORTATION

LPG will be sourced from refineries within Pakistan and transported to the proposed project site via road tankers. Transportation through road tankers is the most common mode of transportation within Pakistan and Sky Star Energy is going to follow the trend. All transport related activities will comply with regulation set by OGRA which will include covering vehicle specification, driver training. safety procedures and emergency response. The tankers will be equipped with safety features like pressure relief valves, emergency shutdown systems, and fire extinguishers. The proponent will ensure that an effective journey management systems is employed to track tanker movements and ensure safety. The transportation will also follow the specific traffic regulation and time restrictions for tanker movement in order to minimize risk to the general public.

3.11.2 LPG STORAGE

Once the LPG tanker has arrived at the plant site, the next step will be unloading. The steps to follow unloading are:

- Tankers will be parked in the designated unloading zones / bays
- Hoses will be connected between the tankers and plant storage tanks
- LPG will be transferred from the tanker to the storage tanks using pumps.

Strict safety procedure will be followed during unloading, including grounding the tanker, monitoring pressure and flow rates and having trained personnel present on duty during th transfer process.

3.11.3 STORAGE TANKS

LPG will be stored in 6 large tanks of 50MT storage capacity each. The tanks are designed to withstand the pressure of the stored LPG and are equipped with safety features such as,:

Pressure Relief Valve: to release excess pressure in case of overfilling or temperature changes.

Level indicator: to monitor the quantity of LPG in the tanks

Temperature Sensors: to monitor temperature of LPG in each tank

Emergency Shutdown Valves: to quickly isolate the tanks in case of an emergency situation.

The storage area is surrounded by a safety zone of 100 feet open land area and fire protection system that includes water tank for firefighting, fire hydrants, water spray system. The whole procedure of storage is planned to follow a standard monitoring protocol and will be controlled from a central control room. The operator will be responsible to regularly monitor tank levels, pressure, temperature and other essential parameters to ensure plant safety. The LPG plant is equipped with automated systems for valves and pumps which reduced human interactions and increases safety or workers ad the plant at the same time.

3.11.4 LPG FILLING

The LPG filling process begins with the supply of empty cylinders to the filling area, where each cylinder undergoes a thorough inspection for damage, valve integrity, and expiry date. Approved cylinders are then placed on filling stations, and LPG is transferred from the plant's storage tanks into the cylinders via precise filling machines. These machines accurately measure the LPG by weight to ensure correct filling. Each filled cylinder is then weighed to verify the quantity, and any overfilled or underfilled cylinders are rejected. A leak check is performed to guarantee safety, and finally, a safety seal is applied to the cylinder valve. The

filled cylinders are then carefully moved to a designated storage area within the plant, ready for distribution.

3.11.5 AFFILIATED ACTIVITIES – QUALITY CONTROL TO END USER DISTRIBUTION

Following the LPG cylinder filling process, several crucial affiliated activities ensure smooth operation and regulatory compliance. Administrative and commercial control encompasses order processing, meticulous inventory management, strategic sales and distribution management, and comprehensive record-keeping and reporting. After filling, the filled LPG cylinders are transferred to a designated storage area within the plant, organized and secured according to safety protocols. From this storage, the cylinders are then dispatched for distribution, either directly to large industrial customers or, more commonly in Lahore, transported via specialized vehicles to a network of distributors and retailers. These distributors and retailers then make the cylinders available to end-users, which include households, commercial establishments, and small industries. Throughout this post-filling process, strict adherence to safety regulations, transportation guidelines, and customer service standards is maintained.

3.12.2 WATER REQUIREMENT

Underground water will be secured for the drinking and domestic purposes. Estimated water requirement for construction phase of the proposed project is approximately 500 to 600 gallons/day for construction activities and domestic consumption. Whereas the water requirement during operational phase is estimated at 1000 to 1200 gallons per day.

3.12.3 WASTEWATER GENERATION

Estimated wastewater generation is 300 to 400 gallons/day for construction phase. As for operational phase, the wastewater generation is estimated at 550 to 600 gallons/ day. The management of the project will lay down sewer pipe line up to the main sewerage and will also construct septic tanks for primary treatment to improve the wastewater quality before its discharge in the main sewer.

3.12.4 SOLID WASTE GENERATION AND DISPOSAL

The solid waste generation during the construction phase of the project is mostly construction debris. Solid waste during operational phase which consist of domestic waste mostly paper, plastic, polythene shopping bags and other miscellaneous waste will be segregated into organic and recyclable waste at source. Solid waste during construction phase will be reused in construction activities while solid waste during operational phase will be managed (Collection, storage and disposal) by sanitary workers of that area. Waste bins will be installed at various locations of the proposed project. Lifting devices such as wheel barrows and hand carts will be used for transporting goods, garbage, solid waste and debris.

2.12.5 ENERGY DEMAND

The energy will be supplied by WAPDA.

3.12.6 MANPOWER REQUIRED

The man power during construction phase will be 30 to 35 persons, while 15 unskilled persons will perform their duties during operational phase of the proposed project. Thus the project is source of employment for economic development activities of the area.

3.13 PROJECT OPERATION

At operation stage, the project proponent will be involved for operation and maintenance. There will be no any matter of rehabilitation as the proposed site is already acquired by the project proponent. There will not be any let regarding safety factors as applicable from time to time for such industrial unit on all accounts. During entire construction period, necessary precautions will be taken to ensure that no damage is done to the basic infrastructures like sewer system, power transmission lines roads, private or public property and daily human life as well. Dust to be generated will be minimized by constant sprinkling of water. After completion; all construction matrix, debris and garbage will be removed off immediately from the site within the minimum possible time under safe conditions. Any minor spillover of these materials will be cleared adequately. The land, if and where pitted will be adequately leveled. On the whole, the project site and the area in its near vicinity will be made neat and clean. Moreover, the project site does not require relocation and rehabilitation since it does not impact social aspects of the community nearby.

3.14 RESTORATION AND REHABILITATION PLAN

Following restoration and rehabilitation plan will be followed:

- After completion of the construction work all the disturbed site (if any) will be changed into condition as they were prior to commencement of project construction activities.
- The area will be planted with indigenous species.
- All the concrete will be broken and disposed of acting to rehabilitation plan
- For the improvement of environmental and aesthetic values of the site, the proponent will carry out a landscaping and tree plantation campaign within the premises of the unit.

3.15 GOVERNMENT APPROVALS

The proposed project has obtained approval from OGRA, the main regulatory body for licensing and approval of LPG plants. In addition the project has also secured NOCs from Respective Commissioner office and Civil Defense Department. The copies of these NOCs are provided along as annexure. This report is prepared to obtain an Environmental Approval from the EPA Punjab.

CHAPTER - FOUR

DESCRIPTION OF THE ENVIRONMENT

4.0 GENERAL

An environmental baseline study is intended to establish a database against which potential project impacts can be predicted and managed later. This section describes the baseline conditions, which cover the existing physical, ecological, and socio-economic environment of said project area. Information on these aspects has been derived from the desk study of available data, field visits to the project area as well as information obtained through visits to the government departments and other relevant agencies. The EIA of the project covers a comprehensive description of the project area, including the resources which are expected to be affected by the project, as well as, those which are not expected to be directly affected by the construction and operation of the project. The existing environmental conditions around the project have been considered with respect to physical, biological and socio-economic aspects. Site visits were conducted to survey the field area and to collect environmental data on physical, biological and socio-economic parameters. Consultations were held with the general public and stakeholders of the project area in order to seek the public opinion on the implementation of the project.

Prior to identifying the existing environmental settings of a proposed project site, it is essential to define the impact zone for the proposed project zone. Impact zones are essentially defined to substantiate the impact significance in terms of its severity and frequency on the environmental settings of the described area. The impact zone of this particular project is a radius that comes under the direct impacts in case of any accidents. In addition, depending upon the availability of the information, a generalized overview of the environmental settings is also presented where necessary. The existing environment in and around the project site has been studied with respect to physical, ecological and socio-economic conditions.

Information regarding physical environment is collected within project area as well as the study area.

A social 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 proposed project and its impacts on their daily life/future in the short and long term.

4.1 METHODOLOGY OF CONDUCTING BASELINE STUDY

Establishing the environmental baseline includes both the present and likely further state of the environment, taking into account changes resulting from natural events and from other human activities.

The guiding factors for the present baseline study are the EPA requirements for the Initial Environmental Examination notification and local regulations and directives.

The studies were conducted by considering the following:

- The various environmental attributes were divided into primary and secondary studies
- Primary attributes such as air environment, water, soil noise, flora and fauna
- Micro-meteorology were assesses by conducting field studies, on-site monitoring
- Review of the past studies conducted
- Secondary attributes such as land use studies, geology, physiological characteristics
- Socio-economic environment have been assessed by literature review of previous studies conducted by various Government publications etc.
- A reconnaissance survey was conducted to identify the sampling locations on the basis of:
- Locations of villages / towns / sensitive areas for noise, air, socio economics
- Accessibility of power connection and security for monitoring equipment, pollution
- Pockets in the area; and
- Areas that best represent the baseline conditions.

The scoping and the extent of data generation were formulated with interdisciplinary team discussions, criteria questions and professional judgment. The field data generated has been used to:

- Identify extent of impacts on natural resources and nearby communities
- Identify mitigation measures and monitoring equipment

These data can be used to predict possible future impacts on environment and lead to suggesting suitable measures to stem or minimize the adverse impact (if any) as far as possible.

4.2 BASELINE PHYSICAL ENVIRONMENT

The study examines the physical resources, topography, soil, climate, surface and ground water and geology not only of the project site but also the city as whole to assess whether the project under review can or does impact on any of these parameters. The description of physical environment of Lahore city and the project site is present in the following sub sections.

4.2.1 TOPOGRAPHY

The topography of the project area is flat. The General height of the area is approximately 220 meters above the Mean Sea Level (MSL). The district Lahore is divided into two parts. The low lying alluvial soil is along the Ravi River, and the upland in the east. Upland is a plain slope from north-east to south-west. The lowlands are generally inundated during the monsoon season by Ravi River, flowing in the west of district along its boundary with district Sheikhupura.

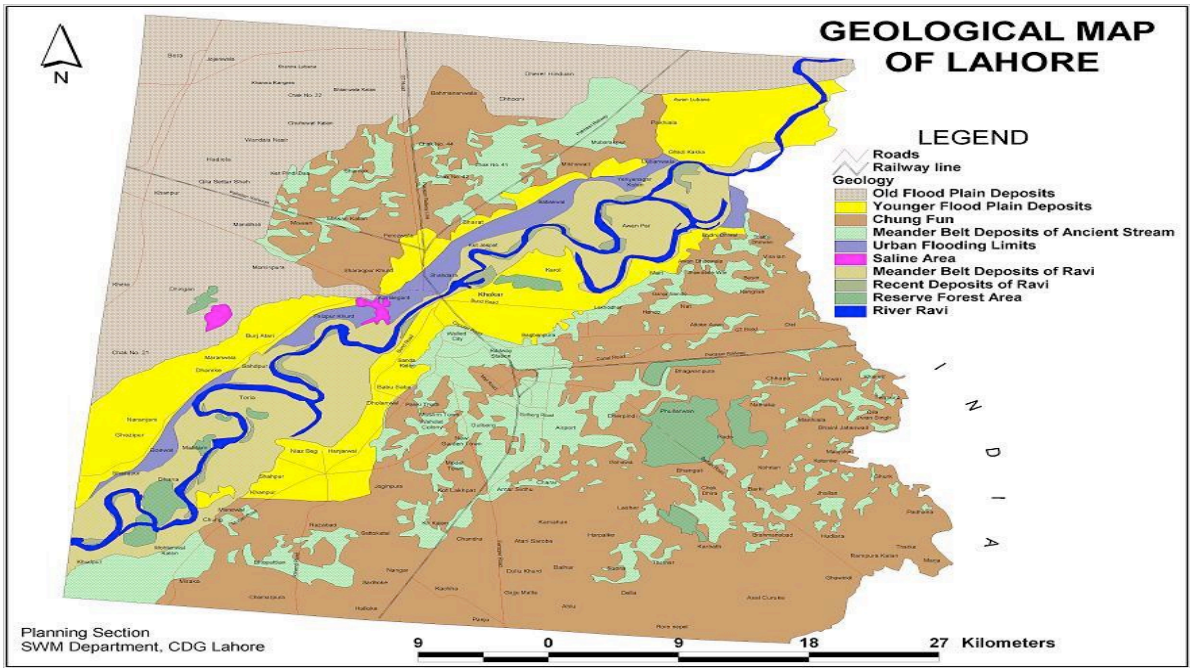
4.2.2 GEOLOGICAL FORMATION

The soil deposits at the project site belong to Chung Fun formation indicating the last glacial cycle. It was followed by the period of melting of glaciers, resulting in deposition of clay, silt and sand deposits in late Pleistocene to recent. With gradual with drawl of the sea during the late territory time, shallow water and possibly deltaic deposits were laid down. It became a vast flood plain on which debris of numerous streams have mingled to load it with huge thickness of alluvial material derived from the Himalaya. Though, there is no evidence of any glaciations in the area, the series

of great climatic changes during the Pleistocene period had impact on the sedimentation in physiography of this region. The presence of old channels of Ravi River indicates conformity of the stream oscillation to terrestrial rotation in the deflection of streams. However, abrupt migration indicate period of excessive flooding during which earlier channels were choked with sediments and the streams were forced to create new channels (Kamzi 1964).

These alluvial deposits comprise earthy brown to brown silt, clay and sand. The beds are largely hard, laminated and sandy with interbeds of clay and layers or lenses of sand. Geological map of the Study Area is given in Figure 4.1. Project site is located in meander belt deposits.

Figure 4.1: Geological Map of the Lahore



The project area does not have any valuable minerals. Although, scientific/in depth, investigations haven't been carried out, yet the surveys conducted have failed to discover any minerals worth the name till to- date. The only minerals worth to value are kallar and kankar in the district Lahore. Kallar is the grey powdery substance collected and taken out from the old village sites and other

deserted abodes in the district. It is used for the manufacture of crude saltpeter and also as manure for the top dressing of young cotton and tobacco plants (no longer in the line of extensive cultivation). With the passage of time the demand for Kallar diminished and its use as a trading commodity is on the decline. Kankar is used for metaling roads and its smaller particulars are burnt for lime. It is a kind of limestone gravel and is found, after being dug out at a depth varying from one to eight feet, in many parts of the district particularly the uplands.

The soil in district is cohesion less and is of alluvial type deposited by Ravi River. Various soil layers below the ground level includes silt, silty clay, silty sand, poorly graded sand with silt, lean clay etc. Soil Map of the Project Area is given in Figure 4.2.

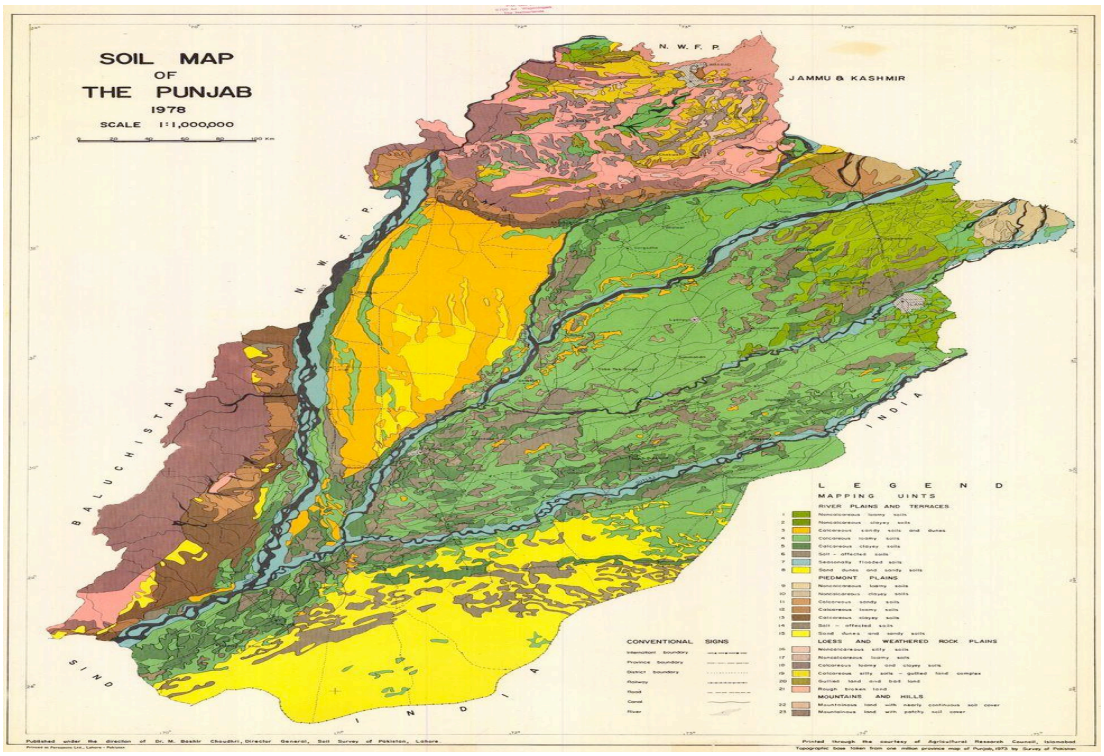


Figure 4.2: Soil Map of the Punjab

4.2.2 CLIMATE

Seasonal climatic conditions must be considered for the design and execution of Project. The climate including air, temperature, precipitation, humidity and evaporation is an influencing factor, affecting the construction of plant and other engineering structures. However, to determine the overall effect of the climatic stresses, daily and seasonal temperature changes, site altitude, direct

solar radiation, and precipitation must be considered. The Project Area has extreme climate: it has hot summer and cold winters. The summer starts from April and lasts till September. May, June, and July are the hottest months. The mean maximum and minimum temperature ranges from 40.4 ºC and 27.3 ºC respectively for these months.

The winter seasons lasts from November to March. December, January and February are the coldest months. The mean maximum and mean minimum temperature ranges from 19.8ºC to 5.9ºC in January. Temperatures in the Project Area vary from 5.9 ºC to 40.4 ºC.

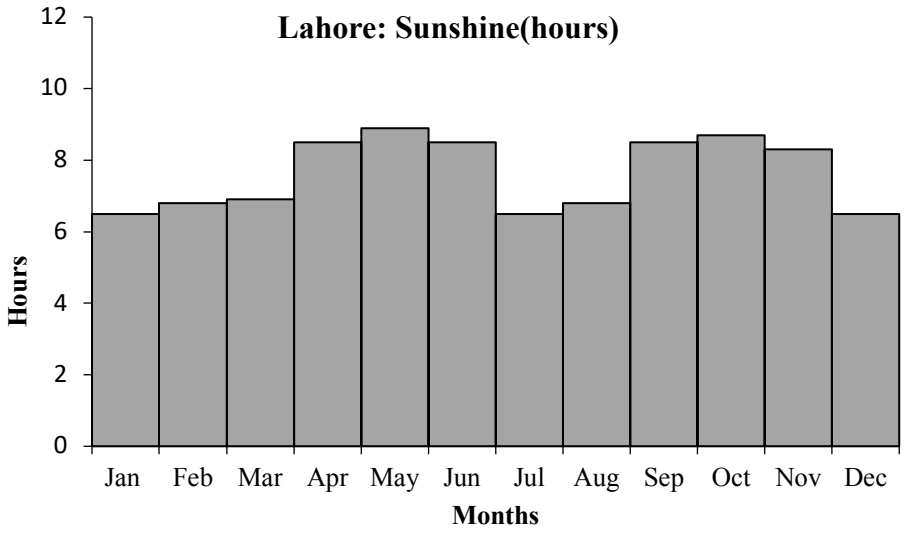


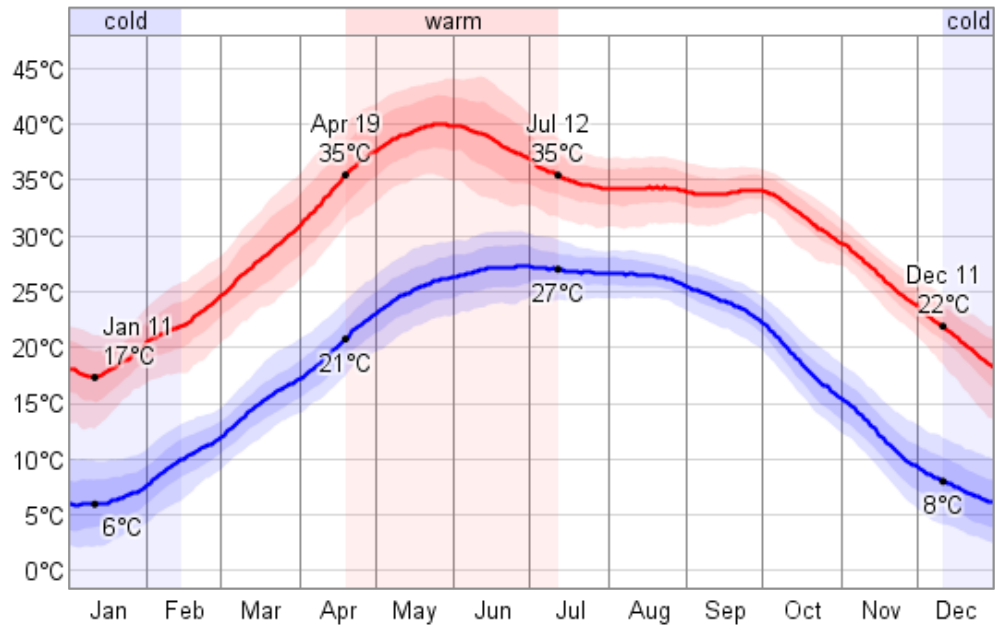
Figure 4.3: Average Monthly Sunshine Hours in Lahore

The people of Lahore have to experience extremes of temperature. The summers are really hot and the winters are very cold. There are three main seasons in Lahore, namely, summer, winter and rainy season. During the summers Lahore experiences heat waves.

4.2.3 TEMPERATURE

Lahore experiences extremes of climate. The summer season starts in April and continues till September. Over the course of a year, the temperature typically varies from 6°C to 40°C and is

rarely below 2°C or above 44°C. The WARM SEASON lasts from April 19 to July 12 with an average daily high temperature above 35°C. The hottest day of the year is May 26, with an average high of 40°C and low of 26°C. The COLD SEASON lasts from December 11 to February 14 with an average daily high temperature below 22°C. The coldest day of the year is January 4, with an average low of 6°C and high of 18°C.



Figures 4.4: Daily High and Low Temperature

Source: Allama Iqbal International Airport (Lahore, Pakistan) weather station

4.2.4 RAINFALL

There are two sources of rainfall in Pakistan, i.e. the Monsoon and the Western Depression. The former takes place from July to September while the latter occurs between December and March. The major part of the province of Punjab receives less than 250 mm of rainfall in a year. Southern

Punjab receives less than 125 mm of rainfall and as such mostly falls in an arid zone. True humid conditions appear after the rainfall increases to 750 mm in plains and 625 mm in the highlands.

Rainfall in Lahore is light to moderate during winter and high during the monsoons, which usually occurs in July and August. The probability that precipitation will be observed at this location varies throughout the year. Precipitation is most likely around August 6, occurring in 49% of days. Precipitation is least likely around November 6, occurring in 5% of days.

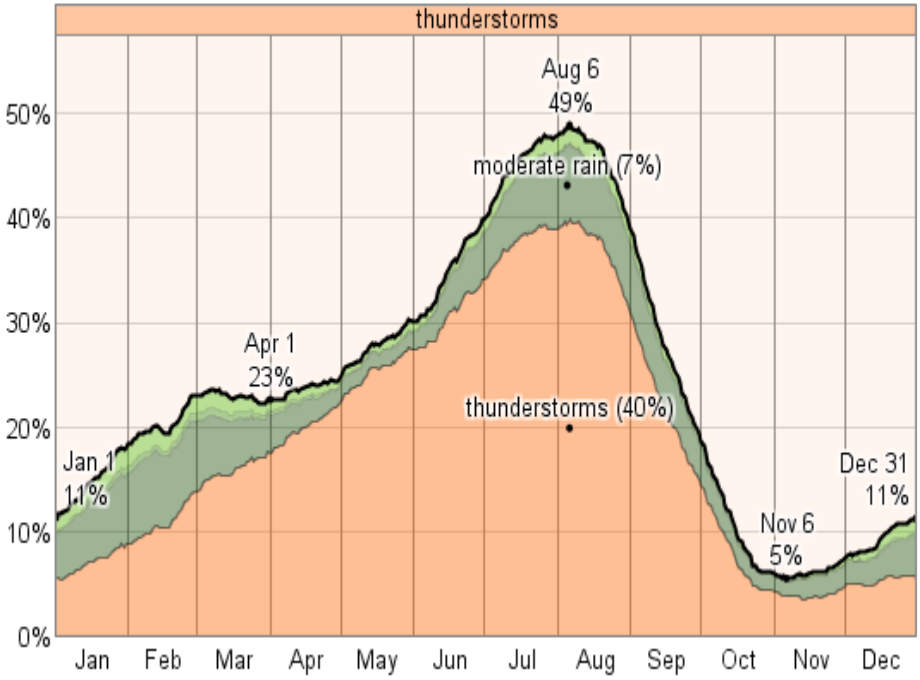


Figure 4.5: Probability of Precipitation at Some Point in the Day

Source: Allama Iqbal International Airport (Lahore, Pakistan) weather station

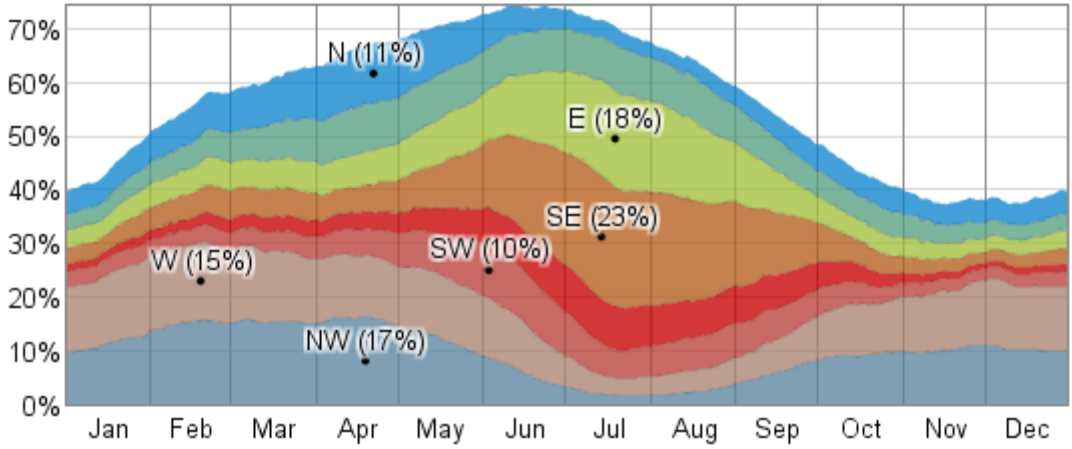
4.2.5 WIND DIRECTION

In Lahore region over the course of the year typical wind speeds vary from 0 m/s to 6 m/s (calm to moderate breeze), rarely exceeding 11 m/s (strong breeze). The HIGHEST average wind speed of 3 m/s (light breeze) occurs around June 21, at which time the average daily maximum wind speed is 6 m/s (moderate breeze). The LOWEST average wind speed of 1 m/s (light air)

occurs around November 21, at which time the average daily maximum wind speed is 3 m/s (light breeze).

Figure 4.6: Wind Directions over the Entire Year

The fraction of time spent with the wind blowing from the various directions over the entire year. Values do not sum to 100% because the wind direction is undefined when the wind speed is zero.



The fraction of time spent with the wind blowing from the various directions on a daily basis. Stacked values do not always sum to 100% because the wind direction is undefined when the wind speed is zero.

Figure 4.7: Fraction of Time Spent with Various Wind Directions

Source: Allama Iqbal International Airport (Lahore, Pakistan) weather station

4.2.6 AMBIENT AIR QUALITY

Atmospheric pollution particularly in urban area has a strong impact upon daily life. Lahore is the second largest city of Pakistan. Its economic growth and rising energy consumption are causing the increase in air pollution. The main sources of the air pollution are motor vehicles and industrial activities. SO^2, NO^2, CO^2, CO, O^3 and Particulate Matter (PM) are investigated as the pollution indicators. The results of monitoring are provided as annex.

4.2.7 NOISE LEVEL

Lahore is capital of the Punjab Province having population around ten million. There are many a large, medium and small industries which are still working within city premises. Industrial activity and vehicular emissions are causing excessive noise in the city.

The affluent areas of Lahore are quieter than rest of the city; the noise level in these areas is still far higher than the standards set by the World Health Organization and the EPA. Noise pollution in the city is on the rise with most residents complaining that the noise is becoming a public nuisance.

4.2.8 WATER RESOURCES

4.2.8.1 SURFACE WATER

There are no surface water resources like canal or ponds, near the project area.

4.2.8.2 REGIONAL FLOW PATTERN & CONDITION OF GROUNDWATER

The regional groundwater flow in the area is from northeast, the Jammu and Kashmir foothills which are at higher elevation, towards the southwest along the general slope of the area. The previous studies and behavior of existing shallow and deep tube wells in the area have shown

that in spite of local variation, aquifer overall behaves as a single homogeneous water body and 73 % of the total consists of sand. This condition is during the monsoon season, when the water table is the high and the annual fluctuation is reported not more than 10 feet.

Before the introduction of controlled irrigation system in Punjab, the water table was deep towards the center of Doabs and was shallow along the rivers. After the introduction of controlled irrigation system in the region, water table started rising as a result of leakage/seepage from irrigation canals and infiltration from irrigation applications on crop fields. As a result, the area became water logged until about 1960 when a quasi equilibrium state was reached, controlled in part, by evapotranspiration and drainage.

4.2.8.3 GROUND WATER

Ground water quality is fresh (defined as acceptable in terms of its salinity). Raw water abstracted from the deep tube wells is believed to be essentially bacteria free. The water quality in the upper 50 meters zone of subsoil is generally brackish. For city's drinking purposes water is abstracted from groundwater aquifer by means of tube wells located throughout the city. The quality of water is generally adequate for direct consumption. About 83% of city population is consuming groundwater for drinking purposes.

Groundwater is available at a depth ranging between 15 to 23 m below the natural surface level. Deep groundwater from a depth of about 210 m in the vicinity of the Project Area is being extracted for meeting the domestic and commercial water demands in nearby areas. Adequate quantity of good quality groundwater is available below a depth of 50m.

Water consumption varies significantly and its variation as of industrial units. Usual water consumption pattern for industrial units and data collected from the prospective industrialist will form basis for total water demand. According to Master Plan-2030 for the city of Lahore, the mean average decline in ground water is about 2.03 feet per year.

The city of Lahore is underlain by the deep permeable aquifer formed within the alluvial plane of the Ravi River, which is the part of Greater Indus Plain.

Ground water is the principal source of municipal water supply in Lahore. This is also the case in the immediate vicinity of the site. The City's drinking water is obtained from groundwater aquifer by means of tube wells located throughout the area. Groundwater is pumped from 400-800 feet and is generally good for direct consumption. About 83% of the city's population is consuming groundwater for drinking purposes.

4.2.8.4 DRINKING WATER QUALITY

WASA (Water and Sanitation Agency Lahore) is providing drinking water to the residents of Lahore. WASA claims the quality of water conform to the Drinking Water Standards.

The increase in population will have direct impact on the water sector for meeting the domestic, industrial and agricultural needs. Pakistan has now essentially exhausted its available water resources and is on the verge of becoming a water deficit country. The quality of water supplies in many cities of Pakistan is deteriorating fast. Over pumping of groundwater due to extended drought has affected the water quality adversely.

4.2.9 DRAINAGE

All of the Lahore districts drain ultimately to River Ravi which is the major natural surface water resource located in the northern part of the district. River Ravi receives huge amount of wastewater from the city of Lahore and other industrial discharges from different sources especially Hudiara Drain, a natural drain which carries pollution loads from both Pakistan and India. Most wastewater discharge reaches to Ravi in the 60km stretch between Bulloki and Lahore. These wastewater discharges, along with reduction in available water in River Ravi for dilution, has greatly deteriorated the quality of river water. River Ravi runs merely as a sullage carrier near Lahore during low flow season. Besides, there are 76 minor drains which finally fall in eight (8) major drains namely Satto Kattla drain, Lakshimi Drain, Suk Neher Drain, Upper Chota Ravi Drain, Siddique Pura Drain and Shahdara Drain. Nowadays, all these drains collect wastewater from different areas of Lahore and finally fall into River Ravi.

4.2.10 SEISMOLOGY

Study area is located in the tectonic zone of down wrap and platform slop in the seismic zone of noticeable earthquake from 3.1 to 4.9 on Richter scale (Atlas for Pakistan). According to building code of Pakistan prepared by NESPAK recently, it is located in Seismic Zone 2A of Pakistan (Lower limit of moderate damage). Zone 2A represents peak ground acceleration (PGA) from 0.08 to 0.16g. **Figure 3.6** shows the seismic zoning map of Punjab with the Project Area falling under Seismic Zone-2A.

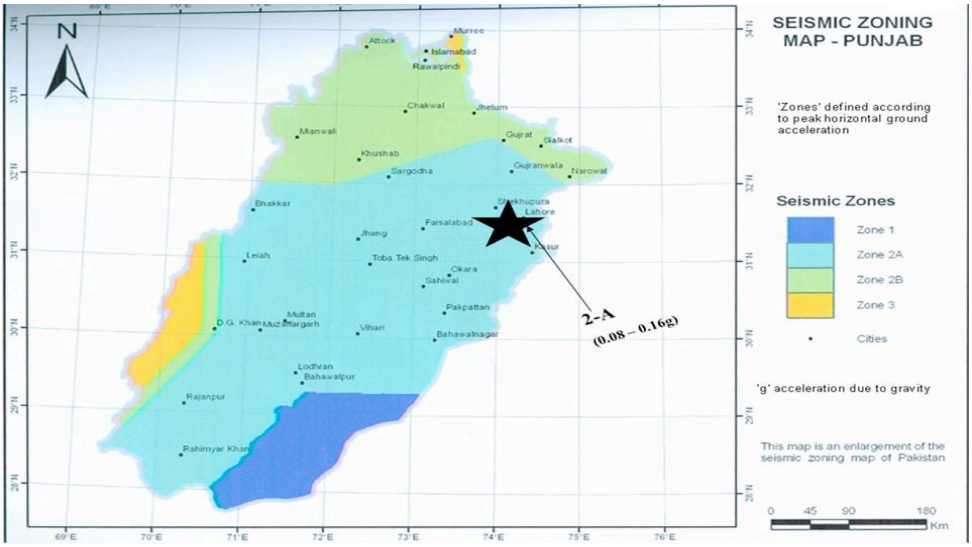


Figure 4.8: Seismic Zoning Map of Punjab

4.3 BASELIEN ECOLOGICAL ENVIRONMENT

The climate of the Lahore is semi-arid and sub-tropical, the vegetation of the area falls; scrub dry, tropical thorn forest type as per Phyto-geographical classification of the area. Lahore is enriched with the presence of natural flora and fauna but with the growing population and development activities, it's somewhat effected. Although Lahore has expanded in area, alongside modern additions to the city are the ancient monuments, old gardens, graveyards, traditional bungalows with attached gardens, large expanses of lawn and old roadside trees.

4.3.1 FLORA

Lahore, the city of gardens is heart of Pakistan. The city has seen the heydays of the Mughals, Sikhs and the British; all left their footprints on the history and cultural mosaic of the city. Resultantly Lahore is a treasure-trove of monuments, historical relics and remains which these nations have left in this historical metropolis of Punjab.

Trees, also called the 'lungs' of the earth, are important for the restoration of the eco-system. People can benefit immensely from their survival and existence. Trees have also been a source of medicine for thousands of years and a refuge for various species of birds. Several species of the trees in Lahore are being used in medicines. Some trees of significant medicinal value are grown easily in the city. Though an ancient city; over the years Lahore has considerably expanded. However, along these modern additions, the ancient monuments, old gardens, trees, graveyards and traditional bungalows having attached gardens, large expanses of lawn and old roadside trees some of them can still be seen, are gradually disappearing. These green areas and old endemic trees of Lahore are home to many resident bird species as well as many summer, winter and transit migrants. So, Lahore is also very important due to its ecological conditions.

Table 4.1: Inventory of some Flora of Lahore

S.No	Common Name	Scientific Name
A.	Amaltas	*Cassia fistula*
B.	Aam/ Mango	*Magniferaindica*
C.	Aroo/Peach	*Prunus persica.*
D.	Bamboo	*Dandroclamuscitratus*
E.	Banyan	*Ficus macrophylla*
F.	Ber	*Zizyphus jujube*
G.	Buddha tree	*Ficusreligiosa Linn.*

H.	Bottle Brush	*Callistemon citrinus*
I.	Burghud	*Ficusbenghalensis*
J.	Benzoil tree	*MoringaoleiferaLam.*
K.	Cassia Tree	*Cassia javanica*
L.	Chhiku	*Achras sapota*
M.	Cypress	*Cupressus funebris.*
N.	Dhokra	*Anogeissus acuminate*
O.	Gul Nishter	*ZiziphuszizyphusMill.*
P.	Gul-e-Neelam	*Jacaranda mimosifolia*
Q.	Imli	*Tarmindusindica*
R.	Jamun	*Syzygiumcumini*
S.	Kachnar	*Bauhinia alba*
T.	Kiker	*Acacia nilotica*
U.	Lasura	*Cordia oblique*
V.	Litchi	*Naphelium litchi*
W.	Shahtut	*Morus macroura*
X.	Talwar Phali	*Oroxylumindicum*
Y.	White Siris	*Albiziaprocera*

(Source: Saima*et al.,* 2016[3])

a) Main Crops

Wheat, Rice (cleaned) and Sugarcane are the main crops grown in the district. Production of these crops during the period 2008-09 to 2010-11 is given below:

Table 4.2: Production of Main Crops

Crop	Production (Th. M.Tons)		
	2008-9	2009-10	2010-11
Wheat	155.66	163.75	185.85
Rice (Cleaned)	83.37	62.71	59.36
Sugar Cane	17.65	17.4	17.92

(Source: Directorate of Agriculture, Crop Reporting Service, Punjab)

Besides, Jawar, Bajra, Tobacco, Moong, Mash, Masoor, Maize, Oil Seed such as Rape / Mustard and Sunflower are also grown in minor quantities in the district.

b) Main Fruits

Citrus, Guava, Mango and Litchi are the main fruits grown in the district. Production of these fruits during the period 2008-09 to 2010-11 is given below:

[3] S Siddiqui., SA Shirazi., A Ali.(2016). A Floristic Analysis of Selected Parks in Lahore Pakistan, Department of Geography, University of the Punjab, Lahore. 25(3 Supp. 2), 389-396.

Table 4.3: Production of Main Fruits

Fruit	Production (M.Tons)		
	2008-9	2009-10	2010-11
Citrus	4402	12037	9378
Guava	10419	10195	10358
Mango	4952	4893	4766
Litchi	1330	1308	1188

(Source: Directorate of Agriculture, Crop Reporting Service, Punjab)

Besides, Pomegranate, Jaman, Peach, Dates, Phalsa and Banana are also grown in minor quantity in the district.

c) Main Vegetables

Potato, Carrot, Cauliflower, Turnip, Ladyfinger, Onion Cabbage and Tomato are the main vegetables grown in the district. Production of these vegetables during the period 2008-09 to 2010-11 is given below:

Table 4.4: Production of Vegetables

Vegetables	Production (M.Tons)		
	2008-9	2009-10	2010-11

Potato	63379	55351	61626
Carrot	18476	17983	19013
Cauliflower	6765	6904	8118
Turnip	3978	4037	4290
Ladyfinger	3552	3616	3680
Onion	1814	1761	2299
Tomato	739	766	793
Cabbage	1236	1242	1242

(Source: Directorate of Agriculture, Crop Reporting Service, Punjab)

Besides, Bitter Gourd, Bottle Gourd, Peas, Garlic and Chillies are also grown in the district in minor quantities.

4.3.2 FORESTS

An area of 2,343 Acres is under forests, which is about 0.54% of the total area of the district. There is also linear plantation of 626 Km alongside the roads/rails/canals in the district. Trees grown in the area are Kau, Phalai, Kikar and Shisham. Production of Timber and Firewood The production of Timber and Fire-Wood in the district during the period 2008-09 to 2010-11 is given

Table 4.5: Production of Timber & Firewood

Year	Production (cubic meter)	
	Timber	Firewood
2008-09	46	92
2009-10	88	59
2010-2011	3	-

(Source: Forestry, Wildlife and Fisheries Department)

4.3.3 LIVESTOCK POPULATION

a) Animal Population

The animal population of the district is given in table below:

Table 4.6: Animal Population in Lahore

Animals	Population (Th Heads)
Goats	135
Cattle	174
Sheep	43
Buffaloes	468

(Source: Livestock & Dairy Development Department)

b) Poultry Population

As per Punjab Development Statistics 2011 there are 433 broiler and 50 layer poultry farms in the district having rearing capacity of 45,070 and 1,500 thousand birds, respectively. There are also 22 breeding farms having rearing capacity of 2000 thousand birds.

4.3.3 FAUNA

With an increase in the rate of urbanization, the ecology of Lahore has been considerably affected and population of birds in Lahore has reduced to just 85 including the endemic and migratory ones. Lahore Zoo is the main preserver of Lahore's fauna. Other popular wildlife centers are Jallo Park and Wildlife Safari Park. These green areas and old endemic trees of Lahore are home to many resident birds as well as providing to seasonal migrants. Three types of migratory birds are regular visitors to Punjab's provincial metropolis. These are winter visitors, summer visitors and transit migrants. Some of Resident species include Indian grey hornbill, yellow-footed green pigeon, parakeets, bulbuls, doves, spotted owlet, Old World babblers, Old World flycatchers, mynas, woodpeckers, crows, black kites, ashy prinia, redstarts, warblers, red-wattled lapwing, kingfishers, and the Oriental white-eye. The Changa Manga forest near Lahore is a hotspot for wildlife in Punjab.

Table 4.7: Inventory of some Fauna of Lahore

S.No	Common Name	Scientific Name
1	Rose Ringed Parakeet	*Psittaculakrameri*
2	Indian-Pond Heron	*Ardeolagrayii*
3	Red-Wattled Lapwing	*Hoplopterusindicus*
4	Common Sandpiper	*Actitishypoleucos*
5	White Wagtail	*Motacilla alba*
6	Yellow Wagtail	*Motacillaflava*

7	Red-vented Bulbul	*Pycnonotuscafer*
8	House Sparrow	*Passer domesticus*
9	Common Myna	*Acridotherestristis*
10	Bank Myna	*Acridotheresginginianus*
11	Pied Myna	*Sturnus contra*
12	House Crow	*Corvussplendens*
13	Nectariniaasiatica	*Purple sunbird*
14	Black Drongo	*Dicrurusmacrocersusvieillot*
15	Black Kite	*Milvus migransmigrans*
16	Blue Rocky Pigeon	*Columba livia*
17	Little Brown Dove	*Streptopeliasenegalensis*
18	White-Breasted Kingfisher	*Halcyon smyrnensis*
19	Little Green Bee eater	*Meropsorientalis*
20	Golden-Backed Woodpecker	*Dinopiumbenghalense*
21	Hoopoe	*Upopaepops*
22	Pheasant-Tailed Jacana	*Hydrophasianuschirurgus*

(Source: Ali *et al.,* 2016[4])

[4] Z. Ali , S.Y. Shelly, F. Bibi and S. S. Ahmad.(2015). Ornitho-Fauna Of City And Ravi Campuses Of University Of Veterinary And Animal Sciences, Lahore-Pakistan. The Journal of Animal & Plant Sciences,

Some birds and few animals like buffaloes, cows, goats, donkeys, hens, rats, cats and dogs are present in the vicinity of site. Some reptiles like lizards are also present. The only amphibian seen the project area is frog. No threatened or endangered species are found in the project site. Similarly no wildlife is present.

4.3.4 WILDLIFE SANCTUARIES AND GAME RESERVES

No wildlife sanctuary or Game Reserve is located in the vicinity of the study area.

4.3.5 CRITICAL HABITATS

No wild life sanctuary or game reserve (Critical Habitats) exists near the project area or the study area and therefore it can be stated that this project does not affect any critical habitat as, no critical habitat is located close to the project area.

4.5 DEMOGRAPHIC PROFILE OF LAHORE

Lahore comprises a large number of Pakistanis along with some foreign nationals. Lahore, the capital of Pakistan is one of most important cities in the country, which is also known as “The Heart of Pakistan”. Demography of Lahore is spread over an area of 1,014 square kilometers. Average household size in 1998 was recorded as 7.12. In 1998, the total number of male population was estimated to be 48 % and female population to be 52 %.

Table 4.8: Population and Intercensal Increase and Growth Rates

Description	1951	1961	1972	1981	1998
Population (in 000’s)	1,135	1,626	2,588	3,545	6,319
Intercensal Increase (%)	43.3	59.2	37.0	78.3	-

Average Annual Growth Rate (%)	3.7	4.1	3.8	3.5	-

The total population of Lahore District was 6,318,745 as enumerated in March 1998 with an intercensal percentage increase of 78.3 since March 1981 when it was 3,544,942 souls. The average annual growth rate of population in the district during intercensal period 1981-1998 was 3.5 percent. The total area of the district is 1772 square kilometers, which gives population density of 3,566 persons per square kilometer as against 2000 persons observed in 1981 indicating a fast growth rate of the district.

4.5.1 RURAL AND URBAN DISTRIBUTIONS

The urban population was 5,209,088 or 82.4 percent of the total population of the Lahore district, which grew at an average rate of 3.3 percent during 1981-98. The growth decreased from 3.7 percent, which was observed during 1972-81. There are one Metropolitan Corporation, two Town Committees and one Cantonment in the District.

There were 261 Mauzas (a smallest revenue unit) in 1998. Of these 61 had population over 5 thousand, another 61 had 2 to 5 thousand, 64 had one to two thousand, and 74 had under one thousand persons while one was un-inhibited.

According to Punjab Development Statistics 2011[5], total population of Lahore district is 8,830 thousand persons out of which 4,680 thousand are males and 4,150 thousand females. Density of population in the district is 4,983 persons per square Kilometer. Percentage break-up of the Rural and urban population is 19.64 and 80.36, respectively.

According to Census-2017 Punjab, Demographic Profile of district is as follows:

[5] Punjab Development Statistics 2011, Bureau of Statistics, Government of the Punjab.

Table 4.9: Census-2017 Punjab for District Lahore

Population 2017			Population 1998			Average Annual growth rate		
Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Average
11,126,285	0	11,126,285	5,209,088	1,131,026	6,340,114	4.07	1.99	3.0

4.5.2 HEALTH FACILITIES

The city of Lahore in Punjab Province of Pakistan is served by a number of private and government hospitals offering world class medical facilities. The rural and urban areas are served by various other medical centers and dispensaries offering modern medical facilities. The hospitals, dispensaries and medical centers in Lahore aim to provide the citizens best medical facilities and prevention from contagious and other harmful diseases.

4.5.3 EDUCATIONAL FACILITIES

Lahore is known as Pakistan's education capital, with more colleges and universities than any other city in the country. Lahore is Pakistan's largest producer of professionals in the fields of science, technology, IT, engineering, medicine, nuclear sciences, pharmacology, telecommunication, biotechnology and microelectronics. The current literacy rate of Lahore is 64%.

4.5.4 TRANSPORTATION AND COMMUNICATION

Lahore is one of the most accessible cities of Pakistan and the only unique city of Pakistan where you can find Public and private Transport, 24 hours a day and 7 days in a week.

A) ROAD LINKS

The district has a total metaled road-length of 1244.41 Kilometers. The District is linked with Sheikhupura, Gujranwala, Okara, Kasur and Narowal districts through metaled road.

B) RAIL LINKS

The Pakistan Railways headquarters is located in Lahore. Pakistan Railways provides an important mode of transportation for commuters and connects distant parts of the country with Lahore for business, sight-seeing, pilgrimage, and education. The Lahore Central Railway Station, built during the British colonial era, is located in the heart of the city. The main Peshawar-Karachi railway line passes through Lahore district. The district is linked with Sheikhupura, Narowal, Gujranwala and Kasur Districts through railway network.

4.5.5 INDUSTRIAL ACTIVITIES

Lahore trade and industries thrives on certain large-scale industries such as steel, textile, carpet and IT industries. Lahore is known as the industrial belt of Pakistan contributing the largest share in the GDP of the country. The city is home to 20% of Pakistan's industrial producers; manufactures include textiles, rubber, iron, and steel. Handicrafts, especially gold and silver work, also flourish. At Sunder Road, many industries are located in the close vicinity of the project.

4.5.6 WATER SUPPLY

An easy access to potable / safe drinking water is one of the basic human rights and needs. The project site has easy access of drinking water.

4.5.7 ELECTRIC SUPPLY

There are 46 grid stations in the district ranging in capacity from 132 KV to 220 KV in the district.

4.5.8 TELEPHONE FACILITIES

There are 69 telephone exchanges operating in the district, ranging in capacities from 1000 lines to 55,752 lines. Cellular phone services are available in the district.

4.6 QUALITY OF LIFE VALUES

Quality of life (QOL) is the general well-being of individuals and societies. QOL has a wide range of contexts, including the fields of international development, healthcare, politics and employment. Quality of life should not be confused with the concept of standard of living, which is based primarily on income.

4.7 CULTURAL ASPECTS

4.7.1 MOTHER TONGUE

The mother tongue refers to the language used for communication between parents and their children in any household. Punjabi is the predominant language being spoken by majority (86.2 percent) of the population of the district followed by Urdu, Pushto and Siraki being spoken by 10.2, 1.9, and 0.4 percent. Sindhi is spoken by 0.1 percent.

4.7.2 LITERACY RATE

Literacy Ratio (10 +) 64.7 %

Male	69.05 %
Female	59.68 %

4.7.3 RELIGION

The population of the district is predominantly Muslims i.e. 93.9 percent. The next higher percentage is of Christians with 5.8 points followed by Ahmadis 0.2 percent.

While other minorities like Hindu etc. are very small in number.

4.7.4 TRADITIONAL CRAFTS

Lahore city is well known for a wide variety of arts and crafts namely embroidery work, silver and gold, jewelry, brass and ivory inlay, hand knitted carpets, block / screen printing, etc.

4.7.5 ETHNIC STRUCTURE

The main castes and groups of the Lahore district are Arain, Jatt, Rajput, Pathan, Mughal, Sheikh, Komboh and Gujjar. Besides, there are also village artisans, which include Lohars (blacksmiths), Tarkhan (carpenter), Kumhars (potters), Mochis (cobblers), Machhis (water-carries), barbers and weavers etc.

4.7.6 SITES OF HISTORICAL SIGNIFICANCE IN LAHORE

Although Lahore has expanded in area, alongside modern additions to the city are the ancient monuments, old gardens, graveyards, traditional bungalows with attached gardens, large expanses of lawn and old roadside trees. Prominent among them includes; Minar e Pakistan, Badshahi Mosque, Lahore Fort, Allama Iqbal's Tomb and Jahangir's Tomb. However, the project site has no sensitive or historical building in the surrounding.

The most common places of interest in Lahore city are discussed as following:

A) ROYAL FORT

Lahore Royal Fort Lahore/Shahi Qila is located at an eminence in the north-west corner of the Walled City. The Citadel is spread over an area of 50 acres. Many visitors from the foreign and local tours of different educational institutions come to see this historical place every year. The front gate of the Fort is called the Alamgiri Gate of the Royal Fort.

B) MINAR-E-PAKISTAN

About 59.5 meters tall monument, called Minar-e-Pakistan is situated near the Royal Fort in the spacious Iqbal Park (previously known as Minto Park), where the historical resolution for the creation of Pakistan was adopted on the 23rd March 1940. Around the minar, there are spacious

parks with beautiful Cyprus trees and flowers all over. The total area of the minar including the park is 22 acres.

C) BADSHAHI MOSQUE

The imperial or the Badshahi Mosque is across the courtyard from Alamgiri Gate of the Royal Fort. It has beautiful gateway and a courtyard that is said to be the largest mosque courtyard in the world for outdoor prayers.

D) SHALAMAR GARDEN

The Shalamar Garden, also written Shalimar Garden, was built by the great Mughal emperor Shah Jahan. Construction began in 1641 A.D and was completed in a year. Shalimar Gardens are located near Baghbanpura along the Grand Trunk Road some 5 kilometers northeast of the main Lahore city. Shalimar Gardens draws inspiration from Central Asia, Kashmir, Punjab, Persia, and the Delhi Sultanate. Every year a festival of Hazrat Madhu Lal Hussain is also being organized near this Garden and Tourists from all over the country visit it.

4.8 SUITABILITY OF SITE

Considering the fact that the proposed site is in an industrial estate surrounded by different industrial units already operational within the estate, the proposed site becomes a suitable option for the proposed project.

CHAPTER V

STAKEHOLDER CONSULTATION

Stakeholder consultation is an integral part of an EIA process that determines general awareness and perception of the community towards the proposed project. Stakeholder consultation is also integral to social impact assessment. We define social impact assessment in terms of efforts to assess or estimate, in advance the social consequences that are likely to follow from specific proposed project. The social change that results from intrusion into community life can also be beneficial but can have undesirable or negative outcomes. Even that change in the long run may have positive effect on the social well-being of a community.

It is a methodology used for examining social change due to external sources, especially specific developmental projects, but also government policies, technological changes and social processes or anything that has a social impact. Like any other EIA, the proposed project also underwent a stakeholder consultation process.

5.1 OBJECTIVE

Its objective is to

- Assess the social impact of proposed project
- Acquire socioeconomic data to evaluate and identify the project intervention.
- Evaluate needs of community related environmental concerns.
- To evaluate adverse and beneficial socioeconomic and health impacts of the activity.
- To give suggestion and find solutions to improve socio economic conditions.
- To analyze socio economic conditions of community, with special reference to environment and preservation of natural resources.

5.2 STAKEHOLDERS CONSULTATION

Stakeholder's consultation leads to better and more acceptable decision-making. Stakeholder's consultation is an a continuous process, which is required at various stages of project development such as during: initial project planning; pre-construction and construction. The process of stakeholder consultation helps to communicate significant information to general public and other interested parties building a harmonious relationship between a project and general public.

Consultation with the stakeholders is two-way communication between the project proponent and the general public. Its goal is to improve decision-making and build understanding by actively involving individuals, groups and organizations, which have a stake in the project. This involvement increases project's long-term viability and enhances its benefits to locally affected people and other stakeholders.

Field surveys are extremely essential to evaluate the socioeconomic and environmental impacts. In addition to the surveys at the preliminary stage, consultation with the community and their active participation plays a vital role in successful implementation of the project. Stakeholders have different perception. In order to identify the different types of stakeholders and ascertain their perceptions about the project were measured a social impact assessment survey was conducted. Informal group discussions were also held as an additional tool for obtaining feedback from the stakeholders that are being discussed in the following pages.

Objectives of the consultation process are:

- Information dissemination, education, and liaison
- Identification of problems and needs
- Collaborative problem solving
- Reaction, comment and feedback on the Project;
- Documenting mitigation measures proposed by the stakeholders

For this EIA, the stakeholder consultation activities were executed based on the following principles

- Transparency
- Openness
- Accessibility
- Inclusion

5.3 METHODS OF PUBLIC CONSULTATION

Public Consultation was carried over a period of two days between 26th and 27th of February 2025. The following methods were used for public consultation with project stakeholders in order to identify concerns regarding the proposed project.

- Focused Group Discussion
- Formal Group Meetings
- Informal discussion

Eco Syntec team conducted public consultations at various locations within and around the project site. The stakeholder's consultation during this phase of the work targeted the project area, administrative and private offices etc. near the project area:

- Selection of the stakeholders for consultation, survey of the project site and initial discussions with the neighboring villagers, workers of cement industry etc.
- Appraising the targeted stakeholders initially for the purpose of consultation and working out a schedule for holding regular consultation meetings
- Distribution of questionnaires to obtain opinions and concerns
- Meetings with the stakeholders through the participation of environmental consultants and social

5.4 STAKEHOLDERS IDENTIFICATION

The key considerations while conducting stakeholder identification was to ensure inclusivity and transparency in the process. A secondary baseline study of the proposed project area supported the process of stakeholder identification. Based on the project and its potential interaction with the population, the stakeholders identified were:

- Decision makers and stakeholder with influence on the project outcomes
- General public

5.4.1 DECISION MAKERS AND STAKEHOLDER WITH INFLUENCE

Government departments /agencies are the most important decision making entities. The government establishes the policy and legal framework for industrial operations, zoning, and social welfare alongside all other aspects related to implementation and execution. Non-government organizations, on the other hand, also play an important role in the successful implementation of a project. Their role as advocate of environment and people ensures that development activities do not pose threats to the community and environmental sustainability. Concerns and suggested shared by stakeholders during the field consultation are as according:

5.4.2 LOCAL COMMUNITY

Potentially, the most affected party in a project development life cycle is the local community. Based on proximity, nature and scope of a project, the local community can be badly effected or contented with the outcomes of a project. Local community can be:

Directly affected parties: Stakeholders directly affected by the proposed project in terms of land acquisition and loss of property / assets or any other type of economic displacement

Indirectly affected parties: Stakeholders indirectly affected by the proposed Project, for example through:

- Effects on community health and safety due to emissions
- Impacts on agriculture due to construction activities and movement of heavy
- machinery in the area
- Economic impacts on employments and local businesses
- Socio-cultural impacts due to the influx of people in the area

Public consultation from people residing in vicinity of project site revealed that people want such industrial setup which promotes green businesses, healthy ecology, social justice and fair wages.

Study Area: The standard impact safe zone according to EPA guidelines is 500m. The checklist provided in the guidelines requires obtaining information within a 500m radius of the project boundaries. This buffer zone guideline was applied for the proposed LPG plant by Sky Star Energy project as well. However, since the proposed project site does not have a considerable population with a radius o of 500m, therefore, we broadened our study area to 1000m.

Target Population: The target population was comprised of the people living nearby the proposed project site.

Study Size: A total of forty two households/general community members of different socio-economic conditions were surveyed.

Study Instrument: Data collection tool was a 25 items based semi-structured questionnaire.

Project Awareness: Before filling the questionnaire respondents were given a brief description of the project. They were told about the purpose of study. They were also told if they have any problem to understand the questions in questionnaire can ask.

6.5 CONSULTATION PROCESS

Stakeholder consultation for this EIA has been conducted in accordance with EPA, Punjab Guidelines for Public Consultation during IEE/EIA. For the execution of stakeholder consultation activities, a team of environmental and social experts visited the project area.

6.5.2 CONSULTATION WITH LOCAL COMMUNITY

Concerns and views of local communities were noted through questionnaires survey and focused group discussions in the areas around the project area. A focused group session was also held with local heads in project area. At the end of discussion sessions, concerns and views of the

people were recorded in questionnaires prepared for this purpose. Interactive and participatory methods were adopted during focused group discussions to ensure the transformation of thoughts and perceptions from general public regarding the proposed Project. All stakeholders were encouraged to share their concerns related to propose Project which were recorded carefully.

Participants were also asked to suggest alternatives of what they think to be more suitable in case of their particular concerns. Males and females were separately consulted.

5.6 ISSUES DISCUSSED IN STAKEHOLDER CONSULTATION

Following issues were discussed during the stakeholder consultation

- Overall activities of the project
- Possible impacts environment and socio-economic wellbeing and mitigation measures
- Benefits or implications of the project specifically for the local people.

Table 5.1 Respondent Profile And Responses During Stakeholder Consultation

#	Name	Address	Contact	Occupation	Comments
1	M. Saleem	Sagianwa Sahupura	0344-4043276	Farmer	The project will bring job opportunities for the locals and people of this city.
2	M. Sajjad	Shahdrah	0303-9200087	Driver	Good thing is the project is not closer to the population and also such projects are need of the economy.
3	Umair Asghar	Kamonki	0301-6209500	Recovery Clerk (Private Job)	The project will bring job opportunities for the locals.
4	Allah Wasaya	Lakho Dher	0310-4453942	Farmer	No complaints and also economic upliftment is important and I favour the proejct.

5	M. Nasir	Baghbanpura	0333-8685804	Manager (Shalamar Steel)	There is high LPG demand and this project can give easy access to LGP resource.
6	Afzal Ahmed	Aimanabad	CNIC: 34101-8754420-5	Labour	The project will bring work opportunities.
7	Ali Hassan	Lakho Dher	CNIC: 34102-7320511-3	Labour	The project will bring work opportunities.
8	M. Riaz	Bahawalnagar (rental residence in Mehmood Booti)	CNIC: 31105-1016890-1	Labour	The project will bring work opportunities.
9	Aizaz	Lahore	CNIC: 35201-3001649-9	Labour	The project will bring work opportunities.
10	M. Pervaiz	Chak Baidi, Pakpattan (Current resident Mehmood Booti)	CNIC: 36402-9480319-7	Labour	The project will bring work opportunities.

11	Arsalan Jaffar	Khanewal (Current resident Lahore)	CNIC: 33303-4225939-1	Foreman	The project is a good initiative for the economy.
12	M. Ali	Mehmood Booti	CNIC: 37105-2345389-3	Engineer	The project will support the people and economy.
13	Mian Qaisar Baig	Shalimar	Labour	CNIC: 35201-9764816-9	The proposed project will be a good addition to the economy.
14	M. Umair	Ghazi Road	Labor	CNIC: 37201-6825774-5	The project will bring work opportunities.
15	M. Latif	Shalamar	CNIC: 35201-4695282-9	Labor	No anticipated impacts due to proposed project.
16	Khalid Saifullah	Shalamar	35201-0413640-1	Business (Shop Owner)	No anticipated impacts due to proposed project.

17	Imran Khalid	Mehmood Booti	31104-8050803-5	Labor	The project will bring work opportunities.
18	Ahmed Mehmood	Lahore	31302-8491640-7	Labor	No anticipated impacts due to proposed project.
19	Saeed Akhtar	Lahore	36501-1809152-9	Waiter	The project will not impact the land, environment and propel negatively. But will bring good opportunities for work.
20	Farooq Ahmed	Lahore	32303-1488997-7	Restaurant staff	The project should help the local community in getting work.
21	Basharat Ali	Lakho Dher (Temporary resident)	34502-0390103-5	Labor	The project will create work opportunities.
22	Kashif	Lahore	35201-9077874-1	Welder	No complaints and concerns from the proposed project.

23	Shafqat Ali	Lakho Dher	35201-1373334-5	Guard	No complaints and concerns from the proposed project.
24	M. Waqas	Lahore	35201-3180940-7	Labor	No Complaints.
25	M. Qurban	Lahore	36402-9423190-9	Labor	The project will not have negative impacts on the environment or people.
26	Shoaib Akhtar	Lahore (Work Resident)	36501-4589357-9	Labor	No impacts anticipated due to the project construction.
27	Hassan Ali	Lakho Dher	35102-4045410-7	Mechanical Engineer	The project will be a good addition to the economy.
28	M. Imran	Mehmood Booti	3330-34581590-9	Labor	The project does not impose any negative impacts on the local environment.

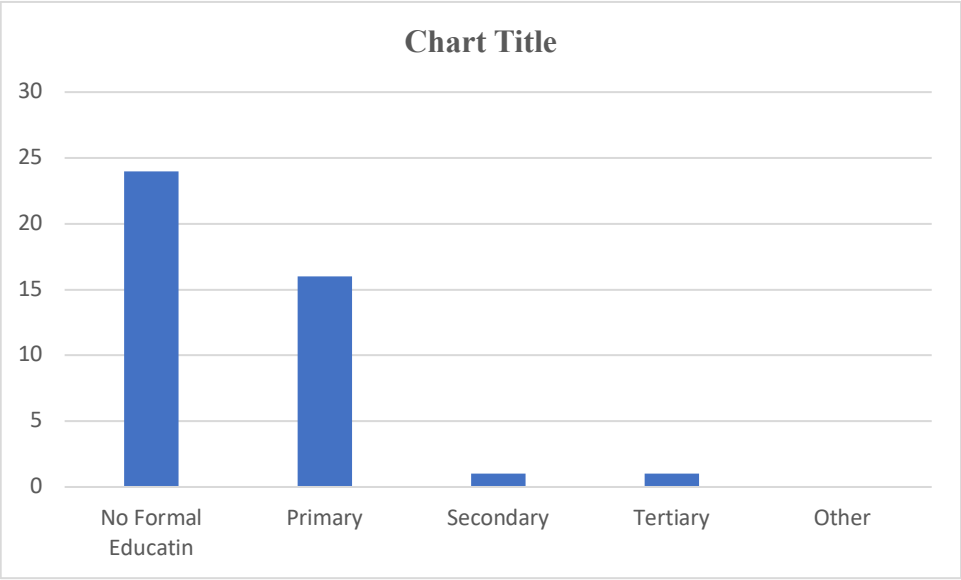
29	Zia ur Rehman	Shalamar	13501-8481643-9	Mechanic	The project does not impose any negative impacts on the local environment.
30	Hahib Ullah	Shalamar	35201-8864852-3	Labor	The project will create job opportunities.
31	M. Arif	Lakho Dher	13501-5438405-1	Labor	Locals will benefit from project.
32	Shafaqat Ali	Lahore	35201-8655172-5	Labor	The project will not impact the environment.
33	M. Arshad	Mehmood Booti	36302-3010442-7	Labor	The project will have a positive impact and create job opportunities.
34	Shahid	Lahore	36104-9137734-5	Driver	Traffic related issues should not take place.
35	Tahir Hameed	Lahore	34501-2007190-1	Small Vendor	The project should create job opportunities in the area.

36	M. Naqeeb ul Hassan	Lahore	34602-3807939-7	Supplier	The project will create good opportunities for people. The proponent should ensure that the project does not create any environment related issues.
37	M. Younus	Lahore	34102-6019319-1	Labor	No complaints or reservations against the project.
38	Zafar Iqbal	Lahore (temporary resident)	34101-0165454-7`	Factory worker	They should provide good job opportunities to people.
39	Irfan Ashiq	Lahore	34102-7427021-1	Labor	The project will create income opportunities and prosperity.
40	M. Arsalan	Mehmood Booti, Lahore	31104-1734880-3	Office Assistant	The project will create more job opportunities

5.7 OUTCOMES OF STAKEHOLDERS CONSULTATIONS

A total of 40 questionnaire were distributed among the respondents. The general profile of the respondents indicate the overall economic conditions of the area. The overall awareness level in the general public regarding the project was almost negligible. However, when the team explained the nature and scope of project to the respondents, their attitudes were welcoming. One major observation concurred during the general public consultation was that most of the population surrounding the project site are low income and economically disadvantaged. The emphasis therefor was mostly on economic benefits of the project. However, a few also mentioned increase in traffic flow and noise related issues during construction activities at project site. Most respondents were of combined family household structure. Family sizes vary from 3 to 8 depending on the household structure.

Graph 5.1: Education profile of respondents



Education and occupation are a good criteria to interpret the responses during a stakeholder consultation process. Respondents who are under resourced with limited financial means have a tendency to opt for better economic opportunities. This also reflects in the responses received for LPG project during public consultation.

5.8 RESULTS OF STAKEHOLDER CONSULTATION

The following are the outcomes of stakeholders consultation:

1. The community consultations demonstrated that goodwill towards the project proponent indeed exists. Approval for project activities by communities was evident. The consultations were considered a good gesture and were appreciated. The poverty level is such that communities are looking forward to any project proponent to improve their financial well-being to a great extent.
2. The proposed project is anticipated to create more employment opportunities for the local community. The respondent emphasized that members from surrounding communities must be given preference in jobs during construction and operational phase. Considering the financial challenges that the people have to confront on daily basis, the suggestions mostly revolved around the economic benefits that the proposed project could bring to the area.
3. The proposed project can potentially increase the traffic flow in the area leading to the issues of traffic congestion and general public safety and therefore proper traffic management plan must be implemented to address this concern.

5.9 CONCLUSION

The overall socio-economic impact of the project is interpreted in relation to the existing environmental conditions. It followed that such a development that is proposed can contribute in improvement of socio-economic and health status of inhabitants of the community if environmental management measures are adopted in true sense. The project, overall, will not have major adverse impacts on the existing environment and people. Suitable mitigation measures have been recommended to minimize the adverse impacts identified in this study. With due implementation of the mitigation measures, there would be very no adverse impacts on the socio-economic environment.

Findings of the Overall Discussion

- Project will increase revenue generation for the government
- It will create employment opportunities
- Local people should be given preference for employment in the proposed project

- Construction of the proposed project should be completed in the designated timeframe to limit adverse impacts of construction

None of the respondent was against industrialization and are of the view that new industries should be installed at large scale as they provide employment opportunity.

CHAPTER - SIX

SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The proposed project involves construction of an LPG storage and filling plant. Any such projects comes with its own consequences. These consequences could be positive or negative depending on various factors that include, frequency, intensity and most importantly the commitment displayed by the proponent towards creating a safe, healthy and sustainable environment through rigorous interventions during the project construction and operational phases. The project activities will, therefore, neither adversely affects the population nor the environment around the project site.

6.1 GENERAL

The potential environmental impacts related to the establishment of the project have been studied related to design, construction and operational stages of it. Environmental protection measures are recommended to eliminate adverse impacts on environment or to reduce them to an acceptable level within the prevailing legislative and regulatory framework. These Impacts are evaluated on the basis of magnitude, immediacy and sustainability. A careful consideration of project aspect, their potential environmental impacts and mitigation measures are proposed in this chapter. Evaluation criteria are as follow:

- Magnitude: Type of impact (direct, indirect, and cumulative)
- Immediacy: Temporal extent q
    - Spatial extent (local, widespread)
- Sustainability and Reversibility:
    - Mitigability (fully, partially)
    - Monitoring (fully, partially)

6.2 OBJECTIVES

Objectives of screening all possible impacts and then providing their mitigation measures are:

- To find alternative ways of doing the project activities.
- To enhance the environmental and social benefits of proposed project.
- To avoid, minimize and remediate adverse impacts.
- To ensure that residual adverse impacts are kept within acceptable limits

6.3 IMPACT ASSESSMENT METHODOLOGY

6.3.1 SCREENING OF POTENTIAL IMPACTS

Based on site visits, observations, brain storming on the provided information and social interviews, significant impacts were anticipated and evaluated. Then qualitative and quantitative (where possible) assessment of these anticipated impacts were carried out.

6.3.2 IDENTIFICATION OF MITIGATION MEASURES

After anticipation and screening of significant impacts, certain mitigation measures are provided in order to enhance benefits of project as well as reducing its negative impacts.

6.3.3 EVALUATION OF THE RESIDUAL IMPACTS

Incorporation of suggested mitigation measures may reduce the magnitude of the environmental impacts of the project. But sometimes, it may fail in bringing them within the acceptable limits. This step refers to the identification of the anticipated remaining impacts after mitigation measures have been applied. Propper measures to address residual impacts have also been discussed in this chapter.

6.3.4 IDENTIFICATION OF MONITORING REQUIREMENTS

The last step in the assessment process is the identification of minimum monitoring requirements. The scope and frequency of monitoring depends on the residual impacts. The purpose of the monitoring is to confirm that the impact are within the prescribed limits

and to provide timely information if acceptable limits are being breached. The same has been applied to the proposed project.

6.4 ANTICIPATED POTENTIAL ENVIRONMENTAL IMPACTS

Characterization is done on the basis of significance, probability and prevalence of the potential impacts in the surrounding environment. Primarily, anticipated impacts have been categorized as direct, indirect and induced. These groups of impacts can be further broken down according to their nature into:

- Positive and negative impact
- Minor, major and moderate impact
- Local and widespread impact
- Temporary and permanent impact
- Short and long term impact

6.4.1 NOTION OF SIGNIFICANCE

Evaluation of impacts will be based on determining the significance of impacts as well as characteristics of impacts. Indicators considered for determining the significance include: predicted increase in the acceptable level (established standard e.g., SEQS) To determine the significance of impacts on bio-physical and socio-economic environment of the proposed project, impact characterization is discussed for construction and operation phase.

The criteria used to define the significance of impacts in terms of low, moderate and severe impact are as follows:

Negligible/No Impact: The impact, which has unapparent and negligible influence on natural and socio-economic environment.

Low Adverse Impact: The impact, which has a slight influence on the natural and socio-economic environment.

Moderate Adverse Impact: The impact, which can be eliminated/ mitigated after applying the appropriate mitigation measures.

Severe Adverse Impact: The impact, which can be partially/ but not fully mitigated by applying the mitigation measure.

Positive/Beneficial Impact: The impact, which improve/enhance the natural and socio economic environment.

6.5 ENVIRONMENTAL PROBLEMS DUE TO PROJECT LOCATION

The potential impacts assessed due to project location are change in land use pattern, pressure on the existing natural resources, natural hazards like floods, earthquake, changes in the socio-cultural patterns of the local community, local community displacement issues, and obstruction of accessibility to the community already residing in the locality. A detailed explanation of each potential impact is given hereunder in tabulated form.

6.6 ENVIRONMENTAL PROBLEMS DUE TO PROJECT LOCATION AT PROPOSED SITE

The proposed site of the project is at a desirable location within a designated area that was preplanned to have an educational facility built. During the site selection all measures were noted before commencement of project. All measures were in favor of project then it came to operational. All that measures since are adopted and never compromise with measures either they are health related or environment related.

Environmental problems related to location of the project are mostly in the areas of physical setting, socioeconomic setting, ecological setting and special areas. Field survey revealed that the impacts of the project due to its location are mostly insignificant in nature. A detailed explanation of each potential impact is given in table 6.1.

Table 6.1: Environmental Problems/Mitigation Measures Due to Project Location

	POTENTIAL IMPACTS	MITIGATION MEASURES
1.	**Change in Land Use Pattern and loss of habitat**	
	Any new intervention has its first and foremost impact of changing the land use pattern of the area. The impact of this nature is irreversible therefore site selection needs to have careful consideration of the impacts that may arise due to the changes in land use patterns.	During the site selection for the proposed project, due consideration was given to existing land use patterns. The present site is proponent owned. The proposed site is not an agriculture land. The land is barren with no commercial, agricultural or industrial activities happening on site. The project site is currently barren and the impacts on habitat changes are negligible. The proposed site is in an industrial estate.
2.	**Pressure on Resources**	
	Yet another impact to be considered prior to site identification is the availability of already existing resources e.g. water, gas, electricity, etc. as any new	Prior to starting a new project, it is important to assess utility needs during construction and operational phases. The increased demand in utility can be approved by the Government through its relevant

	intervention can exert pressure and marginalize the existing community. This could eventually create a sense of deprivation among the already existing community and may eventually result in social unrest.	departments. This is the case with LPG project. As the proposed project will ensure obtaining approvals for relevant utilities prior to project initiation. In addition, the proposed project will develop an effective and efficient network of infrastructure which will not only benefit the proposed project. Rather it will also help the local community. Water is a scarce resource in the area. The proposed project therefore will not rely on the groundwater. This situation will further be discussed in the mitigation measures proposed for project operations.
3.	**Natural Hazards**	
	It is very important to assess the extent of damage caused by natural hazard e.g. earthquake, floods, landslides.	The chapter on baseline study of the proposed project site clearly indicates that the proposed project does not fall under any earthquake of flood zone.

		The current topography of the site is such that the chances of landslide are none.
4.	**Displacement of Local Community**	
	Displacement of local community can tend to create social issues and aggravate negative feelings from the existing population towards the project.	Since the proposed site is already owned by the proponent, therefore it is not going to create displacement of local community.
5.	**Accessibility Issues to the Local Community**	
	Another important impact considered was obstruction or changes in the patterns of transportation and increase travel time/distance for the local community.	The proposed project is located at safe distance from the local community. However, the road that will be used for transportation of raw materials and finished products, will also be used by the local community. As part of the mitigation measures, the proponent will improve the current road infrastructure around the proposed project site.

		The proposed project will develop an effective traffic management plan. The arrival and departures of heavy vehicles carrying raw materials and/or finished goods will be timed according to the traffic rush hours on the access road. Movement of heavy vehicles during peak hours e.g. school on and off timings, will be discouraged. The drivers will be given proper trainings on social behavior. Good behavior of drivers towards the local community will be made mandatory. The local community members will be encouraged to register complaints regarding any incident to the site supervisor.
6.	**Presence of Sensitive Areas**	
	Development interventions can degrade the quality and life expectancy of ecologically, socially and historically sensitive areas.	This is not going to create any issues since the proposed site is not surrounding by any sensitive zone.
7.	**Availability of Existing Infrastructure and Services**	

	Unavailability of infrastructure can render the entire project void and impractical due to absence of important community infrastructure.	The proposed project is well connected to the rest of the city through access road. The proposed project is also planning to develop infrastructure for provision of adequate utilities facility including electricity, telephone, gas, water etc.

6.7 ENVIRONMENTAL PROBLEMS DUE TO PROJECT DESIGN

Environmental issues may also arise during project design phase which may cause potential threats to the overall project life is not considered timely. The potential problems associated with project design phase are identified in the **table 6.2** hereunder:

Table 6.2: Environmental Problems/Mitigation Measures Due to Project Design

	POTENTIAL IMPACTS	**MITIGATION MEASURES**
1.	**Increased Energy Consumption**	
	The design of building plays a vital role in determining the energy demand. Unplanned design may lead to overall rise in energy demand.	• Passive solar energy is an integral part of the design of the administrate block.

		• Energy consumption is directly proportional to losses in the system. Energy losses will be curtailed through regular maintenance of the wires and fixtures. • Transitioning to renewable energy source i.e. solar energy to reduce the energy demand pressure on national grid.
2.	**Traffic Congestion**	
	Unplanned traffic management and traffic infrastructure development may lead to traffic related issues such as accidents and traffic congestion.	• The proposed project will implement an effective traffic management plan that is beneficial for both the project as well as the local community. In this regard, the proponent has already planned to develop the front access road in order to avoid traffic related issues in the future. • Traffic management plan will be developed based on peak hours and the flow of heavy vehicles will be timed accordingly. • An extensive road infrastructure is planned within the boundary walls of the project to ensure movement accessibility are not restricted to any individual using the project site.

3.	**Fire Exits /Emergency Evacuation Plan**	
	Emergency evacuation plans is necessary to curb fire issues due to electric short circuit etc.	The project proposes Emergency Evacuation Plans in events of fire hazards. Quality of wiring work and gas lines will be ensured through installation of the highest quality wiring. The site will be equipped with proper firefighting equipment to ensure increased safety. Water and foam fire extinguishers will be fixed vertically at 6 ft. height from the ground for easy access.
4.	**Accessibility to Public Utility / Services**	
	Inaccessibility to public utilities will render the project uninhabitable.	This is not going to create any issues since the proposed site is planning to develop an extensive network of utilities. Public utilities will not be used during any stage of the project life cycle.
5.	**Careful Planning of Greenbelts/Horticulture Plan**	

	Unavailability of greenbelts would create aesthetic nuisance.	The design of proposed project involve establishment of green belts and aesthetically crafted lawns around the project building to increase its aesthetic value.
6	**Sewer /Drinking Water Lines**	
	Wires and pipelines lay open and above surface may consequently give rise to leakages, contamination and short circuits in the lines.	• The proposed project will undertake strict engineering and regulatory standards to ensure that pipelines are installed underground. • Drinking water lines must be constructed from materials that do not leach harmful substances into the water. • Sewer lines must be durable and resistant to corrosion to prevent leaks • Proper installation and regular maintenance are essential to prevent leaks and breaks in both sewer and drinking water lines. • Regular inspections and timely repairs are crucial for maintaining the integrity of these systems.

6.7.1 ENVIRONMENTAL PROBLEMS DUE TO PROJECT DESIGN

The design unit has sought to minimize any environmental potential impacts by ensuring that the project should be in according to the environmental standards. Local aesthetic value is another issue to be considered during project design. The proposed site is composed of the following major sections:

- Covered area for the plant
- Green belts
- Walkways and parking areas etc
- Amenities and supporting facilities
- Administrative block

6.7.1.1. IMPACT ON EXCAVATED SOIL

During construction phase the soil quality may be affected due to very small amount of discharges during vehicle and equipment maintenance and leakage from equipment and vehicles. The impact is not significant.

- **MITIGATION**
  - Control construction especially during wet/rainy conditions
  - Landscaping
  - Compact loose properly
  - Dispose excavated loose properly

6.7.1.2 TRAFFIC AND TRANSPORT IMPACTS

Due to the construction/development activities, the traffic in the project area will increase and may result in traffic disruption if proper parking facilities are not provided in the proposed building design. This will be a moderate negative impact.

- **MITIGATION**
  - Deliver materials on need basis.

- The personnel on the ground should guide traffic movements.
- Damaged drainage should be repaired and maintained after construction.

6.7.1.3 INCREASED SOLID WASTE GENERATION

- **MITIGATION**
  - Place litterbins at the site.
  - Ensure that there are elaborate programmes of waste removal frequently.
  - Waste generated should be contained appropriate.

6.7.1.4 . IMPACT ON AIR QUALITY

- **MITIGATION**
  - Wet or cover dust generating activities.
  - Provide PPE to the workers.
  - Switch off vehicle engine and machinery when not in use

6.8 POTENTIAL ENVIRONMENTAL IMPACTS AND THEIR MITIGATION DURING CONSTRUCTION

The potential problems associated with project construction phase are identified below:

6.8.1. VEGETATION LOSS/CHANGE IN NATURAL LAND PATTERN

Damage can occur to the vegetation on project site and the surroundings as a result of damage to the natural framework and landscape.

- **MITIGATION**

Presently there is less vegetation or significant species present at the site. Construction of the proposed Project will involve cutting of some bushes and herbs which are already present in very less quantity. This will be a minor negative impact. After construction besides introducing new ornamental plants, local tree and plants species, as uprooted from the project site, will be planted for landscaping. In addition to providing a better view to the area, the proposed vegetation will help minimize the excess noise, vehicular emissions and dust pollution.

6.8.2. DUST EMISSIONS/ AIR POLLUTION

Substantial quantity of dust in and around the active construction area may be generated from the excavation operations, traffic/machinery movement and transportation of construction material at the project site. Prolonged exposure to dust might result in respiratory tract infections and asthmatic problems to the construction workers, the natives of the area and commuters.

During construction, the continuous operation of machinery and movement of the heavy trucks and vehicles may generate gaseous emissions. These emissions may create public health risks and nuisance on the bio-physical environment. This will be a minor negative impact.

- **MITIGATION**

The majority of dust problems caused during the development/construction phase of the project can be effectively mitigated by the implementation of simple procedures by the Contractor by adopting measures other than as under:

- Watering all active construction areas when necessary.
- Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard. Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
- Sweep daily (with water sweepers) or sprinkle with water all paved access roads, parking areas and staging areas at construction sites.
- Fast growing trees will be planted around the project area to act as a wind breaker to reduce the particulate matter.
- Provision of PPEs to workers

6.8.3. DISPOSAL OF CONSTRUCTION WASTE/EXCAVATED MATERIAL

Dumping of construction wastes/excavated material in the surrounding area of the proposed project may limit the use of land in the project area. This will be a moderate negative impact.

- **MITIGATION**

Management of construction activities will ensure minimum degradation to the soil around the project area and dumping of excavated waste will be used for earth-filling and in the depressions within the project area. The administrator will be bound to take care of the waste generated from the construction activities.

6.8.4. NOISE

Noise pollution due to the moving machines (mixers, tippers, communicating workers) and incoming vehicles.

- **MITIGATION**

Mitigation measures mentioned below will be adopted to minimize the noise pollution. Those measures include, but are not limited to the following:

- Selection of up-to-date and well maintained equipment with reduced noise levels ensured by suitable in-built dampening techniques or appropriate muffling devices.
- Confining of excessively noisy areas and limiting the work to normal working hours in the day;
- Minimizing noise from vehicles and power generators by use of proper silencers and mufflers. Installation of generators with exceeding PEQS decibels will be discouraged through keeping in canopy and generator will be used only in load shedding hours.
- Providing the construction workers with suitable hearing protection like ear cap, or earmuffs and training them in their use; and
- Regular checkups and maintenance of the construction equipment, and oiling and greasing of the noise making mechanical parts.

6.8.5. OIL SPILLS

Oil spills from machines to be used on site and vehicles.

- **MITIGATION**

The contractor will control the dangers of oil spills during construction by maintaining the machinery in specific areas designed for this purpose hence will not be a serious impact as a result of the construction.

6.8.6. TRAFFIC CONGESTION AND DISTURBANCE TO PEOPLE

During the construction phase, the movement of heavy machinery and transportation of raw material and equipment may cause traffic congestions. As a result the daily activities of the people of nearby localities as well as of the visitors may be disturbed, which will require proper mitigation measures. This will be a moderate negative impact.

- **MITIGATION**

During construction, following mitigation measures will be followed:

- Observation of timing by the vehicles carrying construction material of infrastructure to cause minimum disturbance to traffic on existing road. The construction equipment and machinery must be stationed in the boundary premises to avoid the traffic congestion on the main road.
- Transportation of raw material and construction related machinery will be done early in the morning; and
- There will be coordinated planning of traffic movement by the traffic police and the Transport Department in accordance with the construction program with advance warnings to the affected residents and road users.
- During working hours all machinery will stay inside the periphery of the project so it will not cause disturbance in the traffic.

6.8.7. WORKERS ACCIDENTS AND HAZARDS DURING CONSTRUCTION

The construction activities impose certain negative impacts on health and safety of the workers and public in case of unsafe and/or unfavorable working conditions. Mitigation measures will be required to minimize health and safety related negative impacts of the project. This will be a minor negative impact.

- **MITIGATION**
  - Provision of appropriate and adequate Personal Protective Equipment (PPE) to employees.
  - Enforcement and proper use of PPE by all construction workers.
  - Provision of appropriate tools, equipment and machinery in sound working conditions to employees.
  - Proper arrangement of lighting to reduce accidents.

6.8.8. SANITATION AND SOLID WASTE DISPOSAL

There will be a health risk of sanitation to the workers. This will be minor negative impact.

- **MITIGATION**

All the solid waste will be disposed off in accordance with the regulations of concerned District Office Administration.

6.9 IMPACTS ASSOCIATED WITH CONSTRUCTION PHASE

The environmental and socio-economic impacts associated with the construction activities of the plant are the following:

- Soil Contamination
- Water Quality
- Water use
- Dust Emission and air pollution
- Construction Noise
- Change of Land Use
- Camp Effluent
- Hazardous and Non-Hazardous Waste Management
- Disturbance to Wildlife
- Socioeconomic Impact

- Community and worker's Safety
- Traffic Disturbance
- Local Employment Conflicts
- Archeological Resources
- Project and Community Interface

6.9.1 IMPACTS ON PHYSICAL ENVIRONMENT

6.9.1.1 SOIL CONTAMINATION

Potential Impacts: Spills of fuel during handling, transportation and storage may result in contamination of soil at the construction site. During a typical construction project spill of fuel, lubricants, can take place. As a result contamination of soil will occur, significance will depend on the nature of material, location of spill and quantity of spill.

The likely impacts of these activities may include:

- Physical scarring of the landscape
- Increased risk of land slippage
- Erosion from road sides, well pads and sloped surface as wells as soil and slit from the cleared area, results in increased sediment load in surface run off.
- Soil contamination

Impact Assessment: Soil contamination may occur due to spillage and leakage of fuels. This possibility of impact is more at fuel and chemical storage areas at campsites, vehicles and machinery used in the field and areas of vehicle fueling and maintenance.

There are no visible signs of any adverse impacts on the soils and to avoid such conditions following mitigation measures are provided and will be followed

MITIGATION MEASURES

- Spill Prevention and Response Plan fosterage, use and transfer of fuel and hazardous materials should be prepared.
- Workers should be trained on spill prevention and response plan.
- Fuels and lubricants should be stored in covered areas, underlain with impervious lining
- Maintenance and washing of vehicles and equipment should be carried out at designated areas
- Any hard surface or tarpaulin should be spread on area to prevent soil contamination.
- Regular inspections should be carried out to detect leakages in construction vehicles and equipment
- Appropriate arrangements, including shovels, plastic bags and absorbent materials, should be available near fuel storage areas.

Residual Impacts: No residual impact to soil will be caused provided the above-mentioned measures are implemented properly.

MONITORING REQUIREMENT

- Regular inspection of soil of the project area should be undertaken
- Document all related accidents of spillage to take corrective actions and to avoid reoccurrence.

6.9.1.2 WATER QUALITY

Potential Impacts: The quality of surface and groundwater supplies may deteriorate if pollutants mixes with surface runoff during rain are carried to water resources in the vicinity, or if pollutants leach into the ground.

Storage and handling of fuels and lubricants may also contaminate surface and groundwater resources, if there are spillages that wash into surrounding areas or seep into the ground.

Improper disposal of domestic effluent from the camp may result in contamination of soil and water and become a health hazard. A significant impact on the environment will be interpreted if the wastewater discharged is not in compliance with the Punjab Environmental Quality Standards for municipal effluent

Impact Assessment: A significant amount of sediment may get washed into fields and watercourses if it rains during the construction period; however the impact is not expected to be significant. Potential sources of pollution in such cases may include:

- Domestic waste (sanitary and kitchen discharge)
- Oil and grease from vehicles
- Sediments from altered land surfaces (campsites)
- Stored Fuel, and other chemicals

MITIGATION MEASURE

- Lined septic tanks will be provided
- Fuels and lubricants will be stored in areas with impervious floors
- Proper drainage will be provided to construction camp and construction site, especially near excavations.

Residual Impacts: Implementation of the proposed mitigation measures is not likely to leave any significant impact on the soil or surrounding land.

MONITORING REQUIREMENT

Periodic monitoring will include:

- Discharge rate of wastewater
- Chemical analysis of the wastewater

6.9.1.3 WATER AVAILABILITY

Potential Impacts: The extraction of water for the construction may affect the water availability for other water users. An adverse impact on the water resources will be interpreted if it is established that the water extraction during construction has directly affected the ability of the community to meet their water needs.

MITIGATION MEASURES

Following mitigation measures should be incorporated to minimize any impacts;

- Water conservation program will be initiated to prevent wastage of water.
- Ground water extraction is not a plausible option since underground water is saline.

Residual Impact: Since the project will not reply on underground water extraction, the anticipated residual impacts are none.

MONITORING:

The proponent will keep a record of water using on monthly basis. Changes in the water consumption records will underline the growing water demand or loss of water resource, depending upon inspection.

6.9.1.4 DUST EMISSIONS AND AIR POLLUTION

Potential Impacts: Particulate matter emitted during construction activities can result in deterioration of ambient air quality in the vicinity of the source, and be a nuisance to the communities and plant workers. The main health hazards are the particles smaller than 10 microns (designated as 'PM10') as they are respirable. Larger particles also tend to settle rapidly and often do not reach receptors. In cases where they reach the receptors, the dust is considered a nuisance as it may spoil property and affect visibility. A significant effect on the environment will be interpreted if there is an increase in visible dust beyond the boundaries of the power plant due to activities undertaken at the plant site, or the dust affects local property or results in complaints from the community. The potential sources of air pollutants vehicular exhaust emissions, use of generators.

Impact Assessment: Potential sources of particulate matter emission during construction activities include earthworks (dirt or debris pushing and grading), exposed surfaces, exposed storage piles, truck dumping, hauling, vehicle movement on unpaved roads, and concrete mixing and batching. The quantity of dust that will be generated on a particular day will depend on the magnitude and nature of activity and the atmospheric conditions prevailing on the day.

MITIGATION MEASURES

- The most effective means of reducing the dust emission is wet suppression. Watering exposed surfaces and soil with adequate frequency to keep soil moist at all times can reduce the total dust emission from the project by as much as 75%
- Dust emission from soil piles and aggregate storage stockpiles will be reduced by covering the piles, for example with tarpaulin or thick plastic sheet.
- Good quality (low-sulfur) fuel will be used for vehicle and machinery
- Construction materials that are susceptible to dust formation will be transported only in securely covered trucks to prevent dust emission during transportation.
- Provision of dust respirators to equipment operators who are exposed to dust while operating their equipment.
- Vehicle idling will be discouraged. On site trainings will be provided to those responsible for operation of construction vehicles regarding regular inspections. vehicle speed and fuel management.
- Generators and other machineries operating on the principles of combustion will be inspected and maintained regularly.
- Tree planting on open and disturbed areas which will not be used by the operations.

Residual Impacts: The effects of the dust nuisance are temporary with no long lasting impact expected after the completion of the construction.

MONITORING REQUIREMENTS

- Dust emission will be visually monitored.
- Ambient air quality will be monitored near or at project site.

6.9.1.5 NOISE

Potential Issues: Depending on the construction equipment used and its distance from receptors like local community and site workers, they may typically be exposed to intermittent and variable noise levels. During the day such noise results in general annoyance and can interfere with sleep during the night. The potential noise related issues during construction is the disturbance to workers and the surrounding communities of project site due to construction machinery operation on the plant site.

Impact Assessment: The potential sources of significant noise during the construction period include the construction machinery, generators at camps and construction related traffic. The noise will be maximum during the day time when construction activities are ongoing.

MITIGATION MEASURES

- Reduce equipment noise at source by proper design, maintenance and repair of construction machinery and equipment
- Minimize noise from vehicles and power generators by use of proper silencers and mufflers
- Use noise-abating devices wherever needed and practicable.
- The movement of vehicle should be restricted during night time.
- Providing workers with noise related PPE's
- Planting of trees that could serve as sound buffers.
- Noise barriers must be put in on and around the project boundary
- Hauling trucks shall be operated at low speed to minimize vibration, promote road safety

MONITORING REQUIREMENT

- Monitoring will be done on regular basis to avoid increase in noise beyond PEQS.

Residual Impacts: The impact is temporary and during the construction phase. Once the constructional activities are finalized, the nuisance will not occur.

6.9.1.6 GENERATION OF WASTEWATER

Potential Issues: Wastewater is a significant aspect of construction activities leading to negative impacts that could be potentially irreversible and long term. However, effective wastewater management can minimize the impact. Wastewater from construction site can be site runoff, washing activities including washing of construction equipment and tools, wastewater from workers camp and dewatering of foundation (if any). It is essential to note that the project location does not fall in flood prone area and the average precipitation is also on the lower side with an average 15.77millimeters annual rainfall.

Impact Assessment: In adequate wastewater management system can lead to water contamination as well as soil contamination. On a more severe scale, toxic chemicals have a chance to enter food chain posing health risk to human and biodiversity.

MITIGATION MEASURES:

- Implement erosion control measures to avoid surface runoff
- Construction proper septic tanks for workers camp site
- Creating designated washing areas for vehicles washing
- Creating retention ponds for surface runoff
- Apply the principles of water reuse, recycle where possible
- Provide onsite trainings to construction workers on best practices in water management

Residual Impacts: An effective water and waste water management plan can reduce the residual impacts to negligible level.

MONITORING:

Regular monitoring of wastewater generated during construction activities will be conducted based on the provision by the EPA, Punjab.

6.9.1.7 HAZARDOUS AND NON-HAZARDOUS WASTE MANAGEMENT

Potential Issues: Construction activities can lead to the generation of solid waste of both types; hazardous and non-hazardous. The hazardous waste is potentially generated due to spillage of chemicals, paints, adhesives. On the contrary, non-hazardous waste can be generated from workers camp, transportation and packaging related waste, excavation of soil and rock etc.

Impact Assessment: Improper management of solid waste can lead to significant impacts as it can damage the aesthetical value of the site. Windblown debris can liter the surrounding area. Organic waste, if not properly disposed can be a breeding ground for germs and vermin. Construction activities can also increase the volume of solid waste transported to landfill sites.

MITIGATION

- Devise a detailed integrated solid waste management plan
- Set targets for waste reduction and recycling
- Devise a plan for at-source segregation of solid waste
- Separate recyclable materials from non-recyclables.
- Hazardous waste should be properly marked and sent for incineration
- Organic waste should be used for composting
- Construction waste comprising of rocks, asphalt, soil should be used for backfilling as much as possible
- Camp site workers should be trained on the subject of solid waste impacts and mitigation. They should also be trained on efficient disposal and record keeping of solid waste.
- Discourage the use of single-use plastics

Residual Impacts: construction activities may create micro-plastics which can contaminate surface water and soil quality of the project site. An effective integrated solid waste management plan will ensure that residual impacts are effective marginalized.

Monitoring: Site supervisor will be responsible to keep a record of solid waste collection and disposal activities on site.

6.10 IMPACTS ON BIOLOGICAL ENVIRONMENT

6.10.1 VEGETATION LOSS

The project area is an open area owned by the proponent. As such there's not any natural vegetation on the project site. So there is no possibility of vegetation loss. But proponent has planned a Tree Plantation plan within the project area.

6.10.2 WILDLIFE AND HABITAT

During the construction phase, there will be considerable human interventions in the project area which can potentially affect the wildlife resources of the project area. Following mitigation measures will be followed for prevention of accidents of wildlife and birds

MITIGATION

- A 'no-hunting, no trapping, no harassment' policy will be strictly enforced.
- Trading of wild animals or birds by project personnel will also be prohibited.
- Wildlife protection rules will be included in the company policy
- Proper signs for birds protection will be placed

6.11 SOCIO-CULTURAL IMPACTS

6.11.1 POSSIBLE DISPLACEMENT

As the site is owned by proponent and resettlements and community are at a safe distance from site (almost 2km), so no displacement or relocation of people is expected.

6.11.2 LAND USE

Proposed land is open Barren land and it is going to be improved to industrial land so its value will be increased and positive land use will occur.

6.11.3 INDUCTION OF LABOR

During the proposed project, unskilled, semi-skilled, and skilled labor will be employed for various jobs. All of this means that the proposed program will create job opportunities for the local community. Families close to the project activities expect an improvement in their quality of life and employment not equitably and judiciously distributed between the tribes of the project area will result in intertribal conflict.

MITIGATION MEASURES

- A large number of unskilled jobs will be provided to the local communities.
- Before project, the local communities and other stakeholders in the project area will be informed of the employment policy in place and the number of people that can be employed from the local communities.
- Local people from villages closest to the project site (and therefore the most likely to be affected by project activities) will be given preference.

6.11.4 COMMUNITY HEALTH

People from the project area regularly travel to other cities, and thus cannot be considered isolated from the rest of the country. They are regularly exposed to illnesses common to urban populations, and have similar levels of immunity. Workers will undergo medical examinations before being hired, and will be screened for communicable diseases. In addition, there will be

very little contact between workers and local people. The project is therefore very unlikely to lead to an epidemic of any sort among local communities.

MITIGATION MEASURES

The crew will undergo medical examinations before being hired, and will be screened for communicable diseases. The project is therefore very unlikely to lead to an epidemic of any sort among local communities.

- All employees shall undergo regular check up with physician to ensure that they have good health.
- The proponent will provide regular medical practitioner for the regular checkup of the employees' health.
- Conduct free clinic and medical mission to regularly check the health condition of the residents of the community

6.11.5 SAFETY

POTENTIAL ISSUES

Safety always remains an area of utmost concern in any occupational activity; construction being one. Not only workers but the people from surrounding communities on the roads adjacent to the site are at stake of safety risks as well.

The safety issue is that of traffic entering and leaving project site for transport of goods and materials. Workers safety is also an issue because of machinery if they show carelessness.

MITIGATION MEASURES

To reduce the hazard, the following mitigation measures will be implemented:

- A stop sign will be put up on the access road
- A speed breaker will be constructed on the access road

- The speed limit for the access road will be kept low
- A public safety plan should be developed and displayed
- Community complaint register and other mean should be adopted for the community to complain.
- All entry points into the construction area should be staffed 24 hour a day. People who are not related to the project should not be allowed inside.
- No machinery should be left unattended, particularly in the running condition.
- Nighttime driving of project vehicles should be limited.
- Drivers will be trained to drive slowly following traffic rules.

6.11.4 INTERACTIONS WITH COMMUNITIES

There is expected to be very little interaction between crews and local communities, expect for the local people who are hired for the project.

MITIGATION MEASURES

Proponent will strive to maintain contact with major stakeholders, particularly local communities, through all stages of project implementation. This is necessary to engender sense of community in the project proponents and to ensure that the community's concerns are responded to at every stage. The purpose of such contact is to develop a relationship of trust with the local communities.

6.11.5 ARCHEOLOGICAL OR CULTURAL RESOURCES

It is possible that the project may damage structures, such as archaeological sites, houses, water wells and canals and water courses, owned and used by local people. No known sites of archeological or cultural value are known to exist near the proposed well site or along the access road. The project is therefore not expected to have any impact on archeological or cultural resources of the area

MITIGATION MEASURES

The following mitigation measures will be taken to reduce the impact on the area's cultural resources and infrastructure:

- All graveyards and shrines and other cultural sites in the vicinity of the project area will be identified before the survey.
- Communication will be established with the local spiritual leader and the communities to explain about the activities near the sites

6.11.6 SECURITY RISKS

During construction phase a large number of workers will be hired including engineers and laborers. The increase in people to the area, as well as the periods where some construction workers are unemployed could lead to an increase in crime and violence in surrounding areas.

MITIGATION MEASURES

- Proper Security will be provided
- Security guards will be appointed on all exit and entry points

6.12 IMPACTS DURING OPERATIONAL PHASE

The Environmental and Socio-Economic impacts associated with the operation phase of plant are following:

- Air Emissions
- Soil erosion
- Plant Noise
- Wastewater
- Exhaust Gas Emissions
- Water Resources

- Hazardous Material and Waste Handling
- Waste Management
- Occupational Health and Safety

6.12.1 IMPACT ON PHYSICAL ENVIRONMENT

6.12.1.1 WATER CONSUMPTION

The increased withdrawal of surface water for the Proposed Project may affect the water availability for the other users of the Project Area. A significant impact will be interpreted if water extracted for the project directly affects the ability of the community and other users to meet their water needs.

IMPACT ASSESSMENT

Main water usage will be for domestic use and for makeup water for evaporative losses.

MITIGATION MEASURES

- Water conservation program will be initiated in plant colony to prevent wastage of water.
- Reusing/recycling water.
- Provide barrels and integral piping structures for rainwater harvesting during the periods of monsoon. Under this project, the nearby population will also be provided with the tools required for rainwater harvesting.

6.12.1.2 WATER QUALITY

POTENTIAL IMPACTS

Discharge of effluent from plant can potentially affect the water resources of the project area.

MITIGATION MEASURES

- No process related wastewater will be generated
- Septic tanks will be provided for domestic water

6.12.1.3 AIR QUALITY

POTENTIAL IMPACTS

Construction of the proposed project is likely to result in a range of emissions including SOx, NOx, CO2 gases as well as particulate matter being emitted into the atmosphere. In terms of human health, SO2 emissions are part of the concern. SO2 can damage human respiratory functioning. Oxides of nitrogen are particularly harmful to children and can lead to respiratory diseases.

MITIGATION MEASURES

- Use of low sulfur coal as fuel
- Low NOx burners will be designed to minimize the NOx generation
- Thick plantation is recommended after completion of project to minimize land slippage and soil erosion impacts.
- Strict plantation is recommended after completion of project.

MONITORING REQUIREMENTS

Monitoring of project site with a frequency as mentioned in the Environmental Approval will be carried out to ensure the PEQS are met diligently.

6.12.1.4 NOISE AND VIBRATION

POTENTIAL IMPACTS

The Proposed Plant will result in increase in noise. The increased noise may be a source of disturbance to nearby communities and the plant workers colony. The significance of noise

impacts is linked to the type of surrounding land use in the area, and can be divided into residential, industrial, mining and agriculture.

IMPACT ANALYSIS

Noise, if emitted during the project operation can potentially be a nuisance for the nearby surroundings. In this project noise shall be emitted during running of machinery. Silencers will be installed with machinery to reduce sound. Sound proof room will isolate the noise to the room.

MITIGATION MEASURES

- The noise producing equipment will be placed inside the acoustic enclosures to reduce noise at source.
- Workers should be told and encouraged to use PPEs (ear plugs or ear muffs).
- Selecting equipment with lower sound power levels;
- Install silencers for fans
- Suitable mufflers or silencers should be installed in intake and exhaust channels
- Vibration isolation should be installed for mechanical equipment
- Reducing project traffic routing through community areas wherever possible;

RESIDUAL IMPACTS

Implementation of the mitigation measures proposed above will result in negligible / no residual impact due to plant noise on surrounding environment.

MONITORING REQUIREMENTS

During project operation, it should be ensured that the noise level at the project site does not exceed the prescribed limits.

6.12.1.5 SOLID WASTE MANAGEMENT

POTENTIAL ISSUES

The solid waste generated during the operational phase of Proposed Project can pose a health hazard; pollute soil, surface and ground water if not managed properly. A significant impact will be interpreted if the waste management is not carried out properly; witch may effect to health of workers, pollution of soil, surface or groundwater:

MITIGATION MEASURES

Key elements of the Waste Management System will be the following:

- Separate waste bins will be placed for different type of wastes
- All hazardous waste will be separated from other wastes. Hazardous wastes will be stored in designated areas with restricted access and proper marking. Hazardous wastes will be disposed off through approved waste contractors.
- Records of all waste generated will be maintained. Quantities of waste disposed, recycled, or reused will be logged on a Waste Tracking Register.

RESIDUAL IMPACTS

Proper implementation of the mitigation measures will ensure that the residual impact from waste is minimum. Monitoring and inspection will be undertaken to ensure compliance and minimize any residual impact.

6.12.1.6 FUEL MANAGEMENT

Fuel will be required both for combustion and for generators and vehicles. Adverse impacts of a temporary nature on the surface waters and ground water may result if accidental spill of petroleum products occur. Therefore, storing and transferring such materials at locations away from drainage ways will minimize the risk of such occurrence.

Following specific guidelines for fuel storage and handling should be considered:

- Proper warehouses or storage areas should be designated for fuel storage
- Training to the workers should be provided for fuel handling
- Fuel storage areas should be clearly marked or barricaded to ensure that moving vehicles do not damage them.

6.12.1.7 EMERGENCY RESPONSE

Incidents and accidents may take place unexpectedly during project operations no matter how effective, strong and efficient the mitigation measures for all adverse impacts; especially the safety issues may be adopted. These may include;

- Fire hazard

6.12.1.8 FIRE HAZARD

During operational phase of the project, fire hazard poses a serious threat.

MITIGATION

- Fire extinguishers should be properly maintained and checked periodically.
- Adequate fire hydrant system should be installed.
- Flammable materials should be prohibited in the premises.
- Fire alarm systems should be maintained for detection and warning of fire.
- Pressure gauges should be checked monthly.
- Adequate training of workers on use of firefighting system to deal with the situation.
- Administration of the unit will make a proper evacuation plans for emergency escape from all halls.
- Emergency call service must be made available.
- Firefighting team must remain ready at all times.

6.13 IMPACTS ON SOCIO-ECONOMIC ENVIRONMENT

6.13.1 SAFETY

It includes Occupational Hazards like physical injuries arising from accidents such as being hit by falling weak structures, being overrun by heavy equipment and etc. The major safety issues in operational phase are:

- Electrical hazards
- Machine guarding
- Eye, head and foot protection
- Fire and explosion hazards
- Housekeeping Issues

MITIGATION MEASURES

- Care will be taken to properly ground and insulate all equipment
- Standard procedures for confined space entries will be displayed in written form
- Proper machine guarding, which is critical for the prevention of injuries to workers by isolating them from moving machinery, will be provided
- Head, arms and foot PPE's will be provided
- Emergency Eye wash equipment should be placed in chemical room.
- Firefighting equipment will be available in the form of ABC fire extinguishers as a minimum, and their locations will be clearly marked.
- Exits from work places will be well marked and visible in dim light.
- Fire water will be located throughout the plant in well-marked piping.
- Housekeeping will be frequent and thorough to prevent slips, trips, and falls
- SOPs will be established for all the activities and will also be displayed wherever required.
- Training on observation of SOPs will be provided to the employees and the visitors, as may be required.

- Workers will be told and encouraged to use PPEs as may be standardized
- Workers' awareness and safety wall chart showing safety symbols will be displayed.
- First Aid Box will be kept in easy approach of all in case of any injury or mishap.
- Basic medical and health facilities will be provided to all employees
- Safety, health and educational drive should be given to residents living near the construction site.
- Safety and warning devices such as reflectors, lights, etc. shall be installed at designated spots

RESIDUAL IMPACTS

Implementation of the suggested mitigation measures may leave behind some residual impacts of safety incidents.

MONITORING REQUIREMENTS

Visual monitoring of hazards and accidents will be done during operational phase.

6.14 ENVIRONMENTAL PROBLEMS ASSOCIATED WITH PROJECT OPERATIONS

Table 6.4 provides a detailed overview of the environmental aspects and subsequent environmental impacts that may arise during project operational phase. Appropriate mitigation measures are also proposed for the remedy of any such potential impacts. This section will discuss the issues related to general activities which will be conducted on site.

Table 6.3: Environmental Impacts/Mitigation Measures during Operational Phase

	POTENTIAL IMPACTS	**MITIGATION MEASURES**
1.	**Solid Waste Management**	
	Improper and unplanned solid waste dumping can cause environment, health and safety issues. It also can potentially deteriorate the living quality of the residents besides reducing the aesthetic quality of site.	At the site, only solid waste will be domestic like paper, polythene bags etc. which will be collected by sanitary workers of that area.
2.	**Wastewater Disposal**	

	Wastewater generated due to domestic/commercial activities will result in the spread of vector borne diseases like dengue, malaria, as well as spread the nuisance of foul smell.	Effective water management during construction activities can significantly reduce the volume of wastewater. The wastewater will be from sanitation units mostly which will be treated through septic tank.
3.	**Energy Conservation**	
	Excessive use of energy will exert more pressure on the already dwindling energy resources of the city/country.	The workers/employees will be encouraged to follow energy conservation strategies developed during operational phase.
4.	**Noise Generation**	
	Noise emissions due to traffic and any activities will create issues to the residents.	Any activity that will lead to noise emission will be restricted. Installation of generators with exceeding NEQS decibels will be discouraged through keeping in canopy and generator will be used only in load shedding hours.

5.	**Emergency/Fire Hazards**	
	Emergencies e.g. fire incidents may lead to environmental, health and safety issues to the local residents.	Emergency exits in the rooms have already been planned. Firefighting equipment will be provided and adequate trainings will be provided to tackle any situation of fire hazards. Call points at suitable locations will be installed
7.	**Training of Staff**	
	Unskilled personnel will not be able to tackle environmental, health and safety related situations which may further aggravate any such issues and cause loss of human life and property.	Regular training of the staff will be conducted. Proper monitoring and reporting mechanism will be developed where the team will be responsible to communicate/report any illegal or hazardous situation to the team leader.
8.	**Groundwater Consumption**	

	The groundwater will be used for domestic at project site. Water storage will also be required for emergency response in case of a fire. Prolonged water consumption may in the long run lower/deplete the underground water table. This will be a permanent and moderate negative impact.	An effective 'Water Conservation Plan' will be developed and for domestic purpose water will be gained from ground water Following operational measures will be adopted for water conservation: • It will be made sure that all faucets, circulating pumps etc. do not leak and are in good repair; • Any leaking or dripping faucet, pump or toilet will be reported immediately; • All the utility bills will be kept in a safe place to track the consumption of water; and • Purchase and use of water-saving equipment will be practiced; • An effective residents' training program will be implemented about water conservation.

6.15 ENVIRONMENTAL PROBLEMS RESULTING FROM PROJECT OPERATION

Table 5.4 provides a detailed overview of the environmental aspects and subsequent environmental impacts that may arise during project operational phase. Appropriate mitigation measures are also proposed for the remedy of any such potential impacts.

6.15.1 SOLID WASTE MANAGEMENT

Solid waste generated will be mostly paper, plastics, polythene shopping bags and food waste. Total solid waste generated from the site will be approximately 20 kg per day which will have to be properly managed.

This will be a minor negative impact.

- **MITIGATION**

Small waste storage bins will be installed at suitable locations in each street/lane. The waste from these bins will be collected by the sanitary workers and will shift it to a big container / skip. The waste will be disposed of in accordance with the procedures of District Office, Lahore following the Suthra Lahore objectives in its true spirit.

6.15.2 WASTEWATER DISPOSAL

Wastewater generated from the proposed project will be domestic waste water.

- **MITIGATION**

The proponent of the project will lay down sewerage system of the whole project. All the wastewater will be discharged through main sewerage pipelines which have sufficient size to cater all sewage and drainage of project into the RUDA waste water drain after treatment.

6.15.3 NOISE GENERATION

During the operational stage, noise levels are anticipated to increase. Noise will be generated mainly due to movement of vehicles on the roads, for which proper mitigation measures are required. This will be a moderate negative impact.

- **MITIGATION**

World Bank's Pollution Prevention and Abatement Guidelines for ambient noise for the receptors are i.e. 55 and 45 dB (A) during day time and night time respectively for residential, institutional and educational areas and the same shall be maintained. There will be prohibition on the use of horns in the project. Plantation along the roads will act as a noise barrier.

6.15.4 GROUNDWATER CONSUMPTION

Prolonged water consumption may in the long run lower/deplete the underground water table. This will be a moderate negative impact.

- **MITIGATION**

Workers and visitors will be requested for effective water conservation measures such as use of water efficient/ economy appurtenances and reuse of wastewater for gardening. Less water consumption will also reduce the load on the sewerage system. Following operational measures will be adopted for water conservation:

  - It will be made sure that all faucets, circulating pumps etc. do not leak and are in good condition.
  - Repair any leaking or dripping faucet, pump or toilet will be reported immediately;
  - Use of water-saving equipment will be practiced both in houses and green areas.

6.15.5 TRAFFIC MANAGEMENT

After construction of the houses and commercial setups, the number of vehicles entering/ exiting the project area will increase. This may result in traffic jams, problems to the pedestrians, and poor condition of the main road, especially at peak hours. This will be a moderate negative impact.

- **MITIGATION**

Service lanes will be provided before main entrance to mitigate traffic congestion. To mitigate blockage in flow of traffic service lanes can be provided before entrance. On spot guards will ensure continuous flow of vehicles during peak hours.

5.16 POTENTIAL ENVIRONMENTAL ENHANCEMENT MEASURES

The proposed project is construction of a LPG plant; the following measures will be taken to enhance the environmental quality;

6.16.1 TREE PLANTATION

The quality of the environment will be enhanced by surrounding the project area with green belts. Trees will be planted around and within the premises and outside the proposed project to further beauty the surrounding area.

6.16.2 SOLID WASTE & WASTEWATER MANAGEMENT

All the solid waste will be managed in a sustainable way. All the solid waste shall be collected in a temporary solid waste collection facility and disposed of by the l workers in the municipal landfill site.

6.16.3 FIRE HAZARDS MITIGATION

The risk of fire and explosions emerged to be of paramount concern to the neighbors of the proposed project. The following measures will be put in place to reduce the likelihood of fires and explosions and to considerably manage such situations in case of occurrence;

- Leak detection devices will also be promoted at household level to warn on leakages that are likely to trigger fires. Workers will be trained on handling accidental spillage of flammable substances that may also trigger fires.
- No smoking signs will be displayed as appropriate and measures taken against those not adhering to this order.

6.16.4 HEALTH AND SAFETY

- PPEs will be provided at all stages of project cycle to all workers (at construction and operational phase) and it will be ensured they use them at all time.
- A policy on health and safety at the workplace will be developed.
- All the employees shall be trained on safety and health.
-

CHAPTER - SEVEN

ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAM

This EIA provides an Environmental Management Plan (EMP) for the project to keep it environment friendly as well as the monitoring plan to ensure the compliance of the established EMP.

Outline and key features of the EMP for operations phase is presented. As per the environmental legislation in Pakistan, the EMP for the operations phase, along with other documents, is to be submitted to the environmental protection agency to obtain confirmation for compliance and Environmental Approval for project operation.

Even after implementation of the suggested mitigation measures, the impact may remain significant, and require monitoring. This section also underlies the monitoring framework for both construction and operation phases to check compliance of the EMP and to take timely actions for correction in case any accidence of significant criteria, requirements or goals are found.

7.1 INSTITUTIONAL CAPACITY

The organizational structure for the Environment Management Plan is outlined below:

Primary Responsibilities: The primary responsibility for implementing EMP for this project is totally responsibility of management team of M/S Sky Star Energy.

Operation Management and Control: Conducting the operational activities in environmentally sound manner will be the responsibility of the proponent's management staff.

Supervision & Monitoring: Management staff/proponent will be responsible for all environmental issues and for the implementation of EMP.

Communications and Documentation: An effective mechanism to store and communicate environmental information during the project is an essential requirement of an EMP.

7.2 MEETINGS

Two kinds of environmental meetings will take place during the project:

- Kick-off meetings
- Monthly meetings

The purpose of the kick-off meeting will be to present the EMP to project staff and discuss its implementation and to discuss any event of environmental significance that has happened in the under-discussion industry or a similar industrial unit to investigate its route causes and develop its solutions.

The purpose of the weekly meetings will be to discuss the conduct of the operation and environmental issues and their management. The proceedings of the meeting will be recorded in the form of a monthly environmental report.

7.3 CHANGES-RECORD REGISTER

A change-record register will be maintained at the site, in order to document any changes in project design. These changes will be handled through the change management mechanism.

7.4 TRAINING SCHEDULE

Training is an integral part of a preventive strategy. Proponent will provide periodic Environmental and HSE trainings to workers working at the site. In order to effectively operate the EMP all the staff to be engaged in this activity should be trained extensively. The management of the project will develop SOPs for Health and Safety of workers.

As a trainer, competent consultant can be outsourced. Important training under the spectrum needs to include:

- Training on fire fighting and safety management
- Training on environmental safeguards and compliance
- Staff training on environmental monitoring and reporting

7.5 ENVIRONMENT MANAGEMENT PLAN

It lists all the mitigation measures identified in the IEE and the associated environmental or social aspect in line during operational phase with the administrative framework involving all the responsible implementing authorities who are required to take the planned actions/measures. It enhances project benefits by reducing its impacts and making it

environmental friendly. Environmental management Plan has been prepared and given below in Table 6.2.

Table 7.1: Environmental Management Plan

Project Activities	Type of Impact	Potential Impacts on Environment	Extent / Magnitude	Mitigation Measure	Institutional Responsibility	
					Implementing Body	Supervision
PRE-CONSTRUCTION PHASE						
Land acquisition and land use	Physical , Social and Aesthetical	Positive use of land but proper planning was required	Medium	• Land is owned by proponent and there was no settlement so no impacts were observed there.	Contractor	Proponent*
Use of local manpower	Social	Employment Generation	Less / Adjacent area	• Local people will be hired for less technical work or non-skilled work	Contractor	Proponent*

Project Activities	Type of Impact	Potential Impacts on Environment	Extent / Magnitude	Mitigation Measure	Institutional Responsibility	
					Implementing Body	Supervision
Wildlife protection	Biological	Accidents/ dangers to fauna	Less/ Adjacent area	• A 'no-hunting, no trapping, no harassment' policy was strictly enforced. • Trading of wild animals or birds by project personnel was also prohibited. • Wildlife protection rules will be followed.	Contractor	Proponent*
CONSTRUCTION PHASE						
Civil works	Physical, Social, Biological Aesthetical	Soil Erosion, Emissions, Water Contamination,	More/ Adjacent area	• Dust emission from soil piles and aggregate storage stockpiles will be reduced by keeping the material	Contractor	Proponent*

Project Activities	Type of Impact	Potential Impacts on Environment	Extent / Magnitude	Mitigation Measure	Institutional Responsibility	
					Implementing Body	Supervision
		Noise &Vibration, Wildlife affected, Employment, Health &Safety of Workers		moist by sprinkling of water at appropriate frequency • The workers will be given all the necessary PPE's • Covered the pile, for example with tarpaulin or thick plastic sheets, to prevent emission. • Noise control measures shall implement.		

Project Activities	Type of Impact	Potential Impacts on Environment	Extent / Magnitude	Mitigation Measure	Institutional Responsibility	
					Implementing Body	Supervision
				• Off-road driving will be minimized in order to avoid accidental killing of fauna.		
Movement and fueling of vehicles	Physical & Aesthetical	Soil &Water Contamination due to Fuel Leakages &Spillage, Emissions, Noise &Vibration	Moderate/ at the site	• Periodic maintenance and inspection of vehicles • Vehicles with leaks will not be operated. • No vehicle-related waste, such as oils, filters, old tires or parts, will be left in the field	Contractor	Proponent*

Project Activities	Type of Impact	Potential Impacts on Environment	Extent / Magnitude	Mitigation Measure	Institutional Responsibility	
					Implementing Body	Supervision
				• All vehicles will be maintained in good working condition		
Transportation of construction material	Bio-physical	Dust and Particulate Emissions, Noise Generation, Safety and Health Effects	Moderate/ Adjacent area	• Excessive use of horns will be avoided • PPE's will be provided to workers • Covering of transporting material trucks • Nighttime driving of project vehicles will be avoided whenever possible	Contractor	Proponent*

Project Activities	Type of Impact	Potential Impacts on Environment	Extent / Magnitude	Mitigation Measure	Institutional Responsibility	
					Implementing Body	Supervision
				• Low speed limit will be maintained on the section of the access road that is adjacent to the community and site. • The fence surrounding the site will be put in on during the construction to prevent access to the construction site		
Instrument installation	Physical & Social	Noise &Vibration, Spillage &Leakages, Health &Safety	Moderate/ adjacent area	• Use of PPE's • Proper maintenance and inspection of equipment and machinery.	Contractor	Proponent*

Project Activities	Type of Impact	Potential Impacts on Environment	Extent / Magnitude	Mitigation Measure	Institutional Responsibility	
					Implementing Body	Supervision
				• Warning signs will be provided to assure safety.		
Laying of Transmission lines	Physical	Effects on scenic beauty, Disturbance to birds, noise, safety	More/ adjacent area	• Planting vegetative screens to block views of the transmission lines • Provision of proper safety measures and tools • Signs for birds protection will be provided	Contractor	Proponent*
Use of local water resources	Physical, Social & Biological	disturbance to local community	Less/ adjacent area	• Initiation of water conservation program	Design engineer & Contractor	Proponent*

Project Activities	Type of Impact	Potential Impacts on Environment	Extent / Magnitude	Mitigation Measure	Institutional Responsibility	
					Implementing Body	Supervision
				• Where possible, water will be recycled		
Noise and vibrations	Physical, Social & Biological	disturbance to local community	Less/ adjacent area	• Any activity that leads to noise pollution is restricted. The noise will be generated but it will be within the limits set by PEQS. • Enhanced maintenance and management to reduce machinery noise and exhaust and its impact on the surrounding environment. • Green belts around the project area, peripheral and internal areas.	Operation Manager/EHS Officer	Proponent/EPA

Project Activities	Type of Impact	Potential Impacts on Environment	Extent / Magnitude	Mitigation Measure	Institutional Responsibility	
					Implementing Body	Supervision
				• Growing of tall tree species, green barrier, can have good noise reduction effect.		
Air Emissions	Physical, Social & Biological	disturbance to surrounding environment and local community	Less/ adjacent area	• No significant amount of exhaust gases will be produced during operation • Generators will be covered through canopy and will be timely maintained. • All emissions will be in compliance prescribed by the PEQS.	Operation Manager/EHS Officer	Proponent/EPA
OPERATIONAL PHASE						

Project Activities	Type of Impact	Potential Impacts on Environment	Extent / Magnitude	Mitigation Measure	Institutional Responsibility	
					Implementing Body	Supervision
Waste water	Physical, Social & Biological	disturbance to local community	Less/ adjacent area	• The wastewater will be domestic wastewater; it will be treated by a septic tank before disposal into the main sewer line.	Operation Manager/EHS Officer	Proponent/EPA
Solid Waste Management	Physical, Social & Biological	disturbance to local community	Less/ adjacent area	• Adequate facility of waste management will be provided from collection to disposable, recyclable waste shall be sold and sale record will be kept. • Small waste storage bins will be installed at suitable locations in each lane. From there the waste will be	Operation Manager/EHS Officer	Proponent/EPA

Project Activities	Type of Impact	Potential Impacts on Environment	Extent / Magnitude	Mitigation Measure	Institutional Responsibility	
					Implementing Body	Supervision
				collected through the sanitary workers, who will shift it to a big solid waste facility from where it will be disposed of in accordance with the procedures of TMA		
Health and Safety (Labor accidents, Diseases caused by pollution of water/air/nois	Physical, Social & Biological	Health hazards to workers	Less	• Special staff will be recruited to implement this Environmental Management Plan on regular basis. Administration will be responsible for establishment of successful implementation of EMMP. • Provide workers with appropriate protective equipment.	Operation Manager/EHS Officer	Proponent/EPA

Project Activities	Type of Impact	Potential Impacts on Environment	Extent / Magnitude	Mitigation Measure	Institutional Responsibility	
					Implementing Body	Supervision
e, fire hazards				• Use equipment that protects against shock. • Observe related standards and provide workers with appropriate facilities. • Proper firefighting trainings to workers.		
Noise and vibrations	Physical, Social & Biological	disturbance to local community	Less/ adjacent area	• Any activity that leads to noise pollution is restricted. The noise will be generated but it will be within the limits set by PEQS. • Enhanced maintenance and management to reduce machinery	Operation Manager/EHS Officer	Proponent/EPA

Project Activities	Type of Impact	Potential Impacts on Environment	Extent / Magnitude	Mitigation Measure	Institutional Responsibility	
					Implementing Body	Supervision
				noise and exhaust and its impact on the surrounding environment. • Green belts around the project area, peripheral and internal areas. • Growing of tall tree species, green barrier, can have good noise reduction effect.		

7.6 ENVIRONMENTAL MONITORING PLAN

Environmental monitoring is a vital component of the Environmental Management Plan. It is the mechanism through which the effectiveness of the environmental management Plan in protecting the environment is measured. The feedback provided by the environmental monitoring is instrumental in identifying any problem or lapse in the system under implementation and planning corrective actions. The main objectives of the environmental monitoring are:

- To provide a mechanism to determine whether the project construction contractors are carrying out the project in conformity with the EMP.
- To identify areas where the impacts of the project are exceeding the criteria of significance and, therefore, require corrective actions.
- To document the actual project impacts on physical, biological, and socio-economic receptors, quantitatively where possible, in order to design better and more effective mitigation measures.

Following environmental record should be maintained:

- Periodic inspection reports of the site
- Audit reports
- Incident record of all moderate and major spills and other incidents and accidents.

The monitoring of the EMP and the communication and documentation mechanism that will be employed during the operational phase will be based on the Environmental Management System (EMS) of the project proponents and the certification and legal bindings. The management system of the project proponents will be the same as the certified EMS in place at the company.

The record will include:

- Location of spill or battery limit of the accident

- Estimated quantity or the amount of injury for workers safety management plan (as may be reported in LTI or LWI)
- Spilled material or nature of injury or loss (temporary or permanent)
- Restoration measures
- Photographs
- Description of any damage to vegetation, water resource, or community asset.
- Corrective measures taken, if any
- Waste Tracking Register that will hold records of waste generated during the construction period. This will include quantities of waste disposed, recycled, or reused.
- Records of water consumption with use wise breakdown
- Survey reports, in particular, the following:
    - Vehicle and equipment noise.
    - Ambient noise survey reports.
    - Ambient level of PM
    - Vendor data—all vendors disturbed by the project and compensation paid Public infrastructure: Record of all damages and repair work undertaken.
    - Employment
    - Total number of unskilled, semi-skilled, and skilled jobs offered during Construction.
    - Name and domicile of the employed staff.
    - Project and Community Interface
    - Record of community complains and the measures taken to address them.

-
- Number of meetings held in various communities and data of persons who attended
- Environmental and social training records

Table 7.2: Environmental Monitoring Plan for Construction

Components	Objective of Monitoring	Parameter to be Monitored	Measurement	Frequency	Location	Responsibility
Noise Levels	To determine the effectiveness of the noise abatement measures on the sound level	Noise level on the site and adjacent area on dB(A) scale	A-weighted noise levels —24 hours, readings taken at 15 s intervals over 15min. every hour, and then averaged	Monthly	At noise generation source area and at least four locations on the unit boundary	Consultant / HSE Wing (Proponent)

Workers safety	To check and evaluate the effectiveness of the workers' safety plan	Injuries and accidents	Recording injuries	daily	Onsite	HSE Wing (Proponent)/contractor
Water conservation	To determine the effectiveness of the Water Conservation Techniques in Practice	leakages, spills and wastages	Visual inspection and record tracking	On monthly basis	at all points of use	Environmental officer/Manager
Dust emissions / air pollution	To confirm the ambient air quality is within SEQS	PM10 and other gaseous contaminant	1-hr and 24-hr concentration levels	Monthly	At least three points on construction site	Consultant / Environmental Manager

		present in the ambient air				
Vehicular emission	Ensure vehicle exhaust are not exceeding standards	Vehicle tailpipe emissions testing	Nosie, smoke and gaseous emission	Monthly	Construction vehicles	HSE Team / Contractors
Wastewater	Ensure wastewater is within SEQS	Discharge points	Flowrate, contaminants	Quarterly	Septic tank	HSE Team / Contractor
Soil Contamination and Erosion	Avoid surface land pollution and soil erosion	Uncovered land area of the project site	Record of spillage, Laboratory testing as and when needed	As per requirement	Chemical spillage point (if any)	HSE Team / Contractor

Solid waste management	Maintain the overall cleanliness and aesthetics of the project site	Identified solid waste generation, storage and disposal points	Quantity of solid waste generated, collected, stored and disposed	Daily inspections	Solid waste generation and storage points	HSE Team/ Contractor

Monitoring of the EMP and the communication and documentation mechanism that will be employed during the operational phase. Approximately 03 million PKR per year budget will be reserved for the Environmental Monitoring and measures.

Table 7.3: Environmental Monitoring Plan for Operational Phase

Components	Objective of Monitoring	Parameter to be Monitored	Measurement	Frequency	Location	Responsibility

Noise Levels	To determine the effectiveness of the noise abatement measures on the sound level	Noise level on the site and adjacent area on dB(A) scale	A-weighted noise levels —24 hours, readings taken at 15 s intervals over 15min. every hour, and then averaged	Monthly	At noise generation source area and at least four locations on the unit boundary	Consultant / HSE Wing (Proponent)
Workers safety	To check and evaluate the effectiveness of the workers' safety plan	Injuries and accidents	Recording injuries	daily	Onsite	HSE Wing (Proponent)/contractor
Water conservation	To determine the effectiveness of the Water Conservation	leakages, spills and wastages	Visual inspection and record tracking	On monthly basis	at all points of use	Environmental officer/Manager

	Techniques in Practice					
Drinking water / Surface water	Ensure the surface water consumed on site is within SEQS	SEQS parameters for surface water	Water quality assessment as per SEQS	Quarterly	Composite sampling of surface water from identified location	HSE / Contractor
Dust emissions / air pollution	To confirm the ambient air quality is within SEQS	PM10 and other gaseous contaminant present in the ambient air	1-hr and 24-hr concentration levels	Monthly	At least three points on construction site	Consultant / Environmental Manager
Vehicular emission	Ensure vehicle exhaust are not	Vehicle tailpipe emissions testing	Nosie, smoke and gaseous emission	Monthly	Construction vehicles	HSE Team / Contractors

	exceeding standards					
Wastewater	Ensure wastewater is within SEQS	Discharge points	Flowrate, contaminants	Quarterly	Septic tank	HSE Team / Contractor
Soil Contamination and Erosion	Avoid surface land pollution and soil erosion	Uncovered land area of the project site	Record of spillage, Laboratory testing as and when needed	As per requirement	Chemical spillage point (if any)	HSE Team / Contractor
Solid waste management	Maintain the overall cleanliness and aesthetics of the project site	Identified solid waste generation, storage and disposal points	Quantity of solid waste generated, collected, stored and disposed	Daily inspections	Solid waste generation and storage points	HSE Team/ Contractor

7.7 INSTITUTIONAL CAPACITY

The organizational structure for the Environment Management Plan is outlined below:

7.7.1 PRIMARY RESPONSIBILITIES

The primary responsibility for implementing different aspects of the EMMP within the company lies with the concerned departments of the plant.

7.7.2 OPERATION MANAGEMENT AND CONTROL

Conducting the operational activities in environmentally sound manner will be the responsibility of the concerned Manager; for which he will be trained.

7.7.3 SUPERVISION & MONITORING

Senior Supervisor will be responsible for all environmental issues and for the implementation of EMMP.

7.7.4 COMMUNICATIONS AND DOCUMENTATION

An effective mechanism to store and communicate environmental information during the project is an essential requirement of an EMMP. The Heath Safety and HSE Section will be responsible for conducting environmental performance reviews and monitoring plans. All documents related to environment will be stored with the HSE team. The HSE team, depending on the necessity, communicate information regarding environmental performance of the project with the extended team by using any communication method approved by senior management. The communication can be done via social media, emails, staff notices or any other mode of communication defined by the reporting authority.

Table 7.4: Communication and Documentation

Actions	Responsibility	Documentation

Devising a policy guideline for the plant outlining the aims and objects of the project at environmental conservation and sustainable development	HSE Section	Environmental Policy / Objective Document
Incidents and accidents	HSE Section	Incidents and Accident Report
Environmental monitoring plan	HSE Section / EPA Approved Lab	Environmental Monitoring Results
Compliance reports indicating environmental performance of the project	HSE Section	Compliance Status Report
Environmental audit of project activities	HSE Section / Third Party Audit	Environmental Audit Reports
Regular inspection of project site and its activities for environmental performance. Corrective action taken during routine inspections Review of environmental policy and objects	HSE Section	Environmental Performance Review

HSE* Health Safety and Environment

7.7.5 MEETINGS

Two kinds of environmental meetings will take place during the project:

- Kick-off meetings
- Weekly meetings

The purpose of the kick-off meeting will be to present the EMP to project staff and discuss its implementation and to discuss any event of environmental significance that has happened in the under-discussion industry or a similar industrial unit to investigate its route causes and develop its solutions.

The purpose of the weekly meetings will be to discuss the conduct of the operation and environmental issues and their management. The proceedings of the meeting will be recorded in the form of a weekly environmental report.

7.7.6 CHANGES-RECORD REGISTER

A change-record register will be maintained at the site, in order to document any changes in project design. These changes will be handled through the change management mechanism.

7.8 ENVIRONMENTAL TRAINING

M/S Sky Star Energy will provide periodic Environmental and HSE trainings. The management of Sky Star believes that HSE is important for moral, legal, and financial reasons. The management of Sky Star will develop strict SOPs for Health and Safety of workers. These SOPs includes SOP for Personal protective equipment, Risk Assessment, Permit to work, SOP for work at height, Fire Safety and Prevention, Confined Space entry etc. A comprehensive annual training calendar has also been developed for training on topics of HSE for management.

7.9 EQUIPMENT MAINTENANCE DETAILS

Equipment with high efficiency, good condition and reliability will be purchased by the Proponent. Maintenance of Equipment will be done twice year for the smooth operation of mining

7.10 EQUIPMENT MAINTENANCE DETAILS

Equipment and vehicles with high efficiency, good condition and reliability will be purchased by the Proponent. Maintenance of Equipment will be done twice year for the smooth operation of the project. Management practices may include the following

- Provision of reflective markings to on main roads to enhance visibility
- Maintain a log sheet for the maintenance routine of equipment

Table 7.5: Environmental Monitoring Plan

Components	Objective of Monitoring	Parameter to be Monitored	Measurement	Frequency	Location	Responsibility
Noise Levels	To determine the effectiveness of the noise abatement measures on the sound level	Noise level on the site and adjacent area on dB(A) scale	Noise level reading will be taken	Quarterly / or as will be mentioned in the NOC conditions for this project	Onsite	Consultant / HSE
Workers safety	To check and evaluate the effectiveness of the workers' safety plan	Injuries and accidents	Recording injuries	daily	Onsite	HSE/contractor
Water conservation	To determine the effectiveness of the Water Conservation Techniques in Practice	leakages, spills and wastages	Visual inspection and record tracking	Quarterly / or as will be mentioned in the NOC conditions for this project	Onsite	Environmental officer/manager

Dust emissions	To confirm the ambient air quality	Air quality at different points	Readings will be taken	Quarterly / or as will be mentioned in the NOC conditions for this project	Onsite	Consultant / Environmental manager

7.11 ENVIRONMENTAL BUDGET/ COST

Cost of measures for environmental safeguards should be treated as an integral component of the project cost and environmental aspects should be taken into account at various stages of the projects. Approximately 03 million PKR will be reserved as environmental budget/ cost for the Environmental Management and Monitoring measures. It will include will include the Environment, Health & Safety, for restoration, rehabilitation & landscaping of the area. The team leader will prepare the inventory of environmental improvement activities and communicate it with the rest of the team for implementation. Cost breakup of this budget is given below:

Table 7.6: Bifurcation of Environmental Cost/ Budget

Sr. No.	Component	Budget (Million, PKR)
1.	PPEs for sanitary workers	0.1
2.	Landscaping/ Plantation	0.5
3.	Participation in environmental awareness campaigns	0.1
4.	Environmental Monitoring	2.0
5	Any other environmental cost	0.3
	Total	**03**

CHAPTER - EIGHT

MITIGATION AND IMPACT ASSESSMENT

This chapter of EIA Report describes the assessment of impacts and their mitigation. It identifies the overall impacts of construction and operation activities on the physical, biological, and socioeconomic environment of the LPG project by Sky Star Energy and to provide mitigation measures that need to be adopted wherever necessary, to reduce, minimize or compensate for the negative impacts.

8.1 WHAT IS THE PROBLEM?

The proposed project involves the construction of plant. On the basis of the findings of the EIA, it is concluded that the project will not pose any adverse impact on the local population and the environment. A proper management plan shall be prepared in case of any accident like;

- Any health hazard to workers/other persons during construction or operation phase.

8.2 OCCURANCE AND ADDRESAL OF PROBLEMS

The problem will occur during the construction & operation phase. The problem should be addressed during the planning phase and satisfactory mitigation measures will be proposed and described in the EMMP.

8.3 WHERE PROBLEM SHOULD BE ADDRESSED

The problem should be addressed in environmental management and monitoring plan.

8.4 HOW THE PROBLEM SHOULD BE ADDRESSED

The problem should be addressed by creating the awareness among the workers, staff and communities.

The establishment of the project will involve the construction and operation of plant. The environmental aspects of the project identified by situation analysis are related to:

- Physical environment
- Ecological environment and;

- Socio-economic environment

A careful consideration of project aspect, their potential environmental impacts and mitigation measures are proposed in this chapter. Evaluation criteria are as follow:

- Magnitude: Type of impact (direct, indirect, and cumulative)
- Immediacy: Temporal extent (during construction, after construction)
- Spatial extent (local, widespread)
- Sustainability and Reversibility:
- Mitigability (fully, partially)
- Monitoring (fully, partially)

8.5 METHODOLOGY FOR IMPACT ASSESSMENT

The methodology adopted for impact assessment includes the Project Impact Assessment matrix and checklist. Impacts evaluated through Matrix are discussed below in tabular form.

8.5.1 PROJECT IMPACT ASSESSMENT MATRIX

The impact Evaluation matrix was developed by placing project activities on x-axis and different environmental parameters likely to be affected by the proposed project actions grouped into categories i.e. Physical, Biological and Socio Economic Environment. For the impact assessment, project impact assessment matrix is used by dividing the project action into different phases (Construction phase and operation phase).

The evaluation of impacts has been carried out on the basis of developing matrix, in which impacts have been rated on the basis of their significance. For rating impacts significance following criterion has been developed;

- NA – Not Available
- O– None /Insignificant
- LA– Low Adverse (Short term, reversible or less damage to environment)
- MA- Medium Adverse (Long term reversible damage to environment)
- HA – High Adverse (severe irreversible adverse damage to the environment)
- LB – Low Beneficial (Short term benefits or less beneficial to the environment)
- MB – Medium Beneficial (Long term benefits to environment)

- HB –High Beneficial (Continuous benefits to environment)
- ND –Not Determinable

8.6 POTENTIAL ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECT

An assessment of potential environmental impacts of the proposed project has been done and shown in table 7.1 which indicates the magnitude of the impacts.

Table: 8.1 Assessment Matrix of Impacts and their Magnitude of Proposed Project

Environmental Components / Project Activities	Physical Environment												Biological Environment								Social Environment					
	Agricultural Lands	Soil (Erosion/Stability)	Housing	Cultural/Religious Properties	Infra structure	Mineral Resources	Downstream River Flows	Flooding	Surface water quality	Ground water quality	Air quality	Noise	Aquatic Ecosystem	Wetland Ecosystem	Terrestrial Ecosystem	Endangered Species	Natural Flora	Wildlife	Disease Vectors	Public Health/Safety	Land Use	Communication System	Employment	Community Stability	Cultural and Religious Value

(During Installation and Operation)																										
Impact Assessment during Construction																										
Construction Camp	MA	LA	O	O	O	O	O	O	O	LA	LA	LA		O	O	O	O	O	O	LA		O	LA	O	LB	O	O
Project Site	LA	LA	O	O	O	O	O	O	O	O	LA	LA		O	O	O	O	O	O	O		O	O	O	LB	O	O
Topography and Soil	LA	LA	O	O	O	O	O	O	O	O	O	O		O	O	O	O	O	O	O		O	LA	O	O	O	O
E&M of Equipment	O	LA	O	O	O	O	O	O	O	O	LA	LA		O	O	O	O	O	O	O		LA	O	O	MB	O	O
Vehicular Movement	O	LA	O	O	O	O	O	O	O	LA	LA	MA		O	O	LA	O	O	O	O		LA	LA	O	O	LA	O
Solid Waste	LA	LA	O	O	O	O	O	O	O	LA	O	O		O	O	O	O	O	O	O		LA	O	O	O	O	O

Impact Assessment during Operation																										
Project operation	O	O	O	O	O	O	O	O	O	O	O	LA	O	O	O	O	O	O	O	LA	LA	O	MB	MB	O
Waste Water	O	LA	O	O	O	O	O	O	LA	O	O	O	LA	O	O	O	O	O	LA	LA	O	O	O	O	O
Better Roads & Infrastructure	LA	LA	MB	O	HB	LA	O	O	O	O	O	O	O	O	O	O	O	O	O	MB	LA	HB	HB	HB	HB
Community Development	O	O	O	O	HB	O	O	O	O	O	O	O	O	O	O	O	O	O	O	HB	O	O	HB	HB	O
Fire Fighting Arrangement	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	HB	O	LB	LB	MB	O
Health and Safety	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	HB	O	LB	LB	MB	O

8.7 WAYS OF ACHIEVING MITIGATION MEASURES

7.7.1 CHANGING IN PLANNING AND DESIGN

a) An educational building must be designed to appropriate standards
b) The materials used for the construction of the filling shed must be non- inflammable material.
c) The project must be fitted with adequate security devices and operated by skilled persons.
d) Any amendments made, must be submitted to concerned authorities for approval prior to implementation.

8.7.2 IMPROVED MONITORING AND MANAGEMENT PRACTICES

There shall be a suitable programme of monitoring and maintenance. Any improvement in monitoring and management practices shall be addressed to concerned authorities.

8.7.3 COMPENSATION IN MONETARY TERMS

The said project is situated on the open land. There will be no cutting of flora and no harm to fauna by this proposed project. There is no any structure or residence which will be damaged by proposed project so there will be no need for money compensation. Proposed project is environment friendly with respect to all aspects.

8.7.4 REPLACEMENT, RELOCATION AND REHABILITATION

There will be no any matter of replacement, relocation and rehabilitation as the proposed site is already owned by the project proponent.

CONCLUSION AND RECOMMENDATIONS

This EIA report has been prepared in accordance with the guidelines for Review and Preparation of IEE/EIA Reports. It aims to fulfill the mandatory obligation set forth in the legal framework developed by the EPA, Punjab. The EIA report of proposed project presents an overview of the project activities during construction as well as operational phase. A detailed baseline study has been developed for this project. Baseline of the project is a representation of the current environmental and socio economic setting of the proposed project site. Potential impacts, both in terms of environment as well as socioeconomic, have been identified. It is significant to note that the impacts are not always negative. During the course of compilation of this report, it was identified that the project possesses more positive impacts as compared to the negative impacts.

The EIA report includes a detailed description of project, screens potential impacts and provides adequate mitigation measures. An implementation mechanism for mitigation measures in the form of an Environmental Management Plan is included in the study.

The performed EIA showed all anticipated impacts (both positive and negative), associated with the project. Appropriate mitigation measures as explained in the environmental study shall reduce, if not eliminate, these impacts so that these are within acceptable limits. Moreover, no deterioration, depletion or exploitation of resources is expected to be caused by this project. Based on overall assessment of the environmental impact of the project, it is concluded that the project is not likely to cause any significant adverse impact on the social, physical and biological environment of the area, provided that suitable mitigation measures as identified in this study are implemented. It is accordingly recommended that Environmental Approval for the project may be issued by the Punjab Environmental Protection Agency, subject to payment of the requisite scrutiny fee by the proponent of the project.

9.1 RECOMMENDATIONS

The Environmental Impact Assessment study and survey results are finally evaluated to recommend the following:

- Implementation of EMP must be given top priority.

- Proper PPEs including ear plugs, ear muffs, mufflers, goggles, gloves and shoes etc. should be provided to workers
- Train workers to use PPEs
- Equipment maintenance and efficiency must be checked.
- No compromise on public health and environment should be allowed.
- Waste minimization practices should be employed and workers should be encouraged to adopt such methods.
- Wages should be distributed on time.
- Proper tree plantation plan should also be developed in order to make the unit environment friendly.
- Proper dispensary and first aid box should be provided for workers

9.2 CONCLUSION

In view of the above it has been concluded that the proposed LPG plant by Sky Star Energy is environmentally friendly with sustainable design and development and has no adverse effects on environment. The project has no significant adverse impacts on the environment. It is therefore requested to issue the environmental approval under section 12 of Punjab Environmental Protection (Amendment) Act, 2017 for the construction and operation of the said project.