

EIA REPORT

Environmental Impact Assessment Report of

Moderna Sciences (Pvt.) Ltd

Plot # 69 & 70, Vehari Industrial Estate, Vehari



Submitted By:

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Prepared By:



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1st Floor Allied Bank, A Block Commercial Market, Canal View Society, Lahore

DISCLAIMER

The data was based on the originality of project site shown by the project proponent/ stakeholders/ promoters, provided maps, verbal communications and all other related documents. The authenticity of supra-mentioned relies with the proponent/ stakeholders/ promoters, not with the environmental consultant. The EIA / IEE report can't be negotiated in any court of law.



Representative: EIA & IEE Team

GUIDELINES FOR PREPARATION AND REVIEW OF ENVIRONMENTAL REPORTS CHECKLIST

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EXECUTIVE SUMMARY

The executive summary is an outline of the key outcomes in EIA (Environmental Impact Assessment). The proponent intends to establish the veterinary medicines and feed additives manufacturing facility by the title “**M/s Moderna Sciences (Pvt.) Ltd**” located at Plot # 69 & 70, Vehari Industrial Estate, Vehari over an area of 42937 Sqft. The purpose of this project is for the health & safety of livestock, to meet the market demand and economic growth. The consultant company for this project is Enviro Stewards Company (Pvt.) Limited.

According to projects categorization for environmental assessment studies, the proposed project falls under **Schedule II** (list of projects requiring an EIA), **Category B** (Manufacturing and processing) and **sub sector 2 (Chemical Manufacturing Units including Pharmaceutical and cosmetics)** of the IEE / EIA Regulations 2022 made under section 12 of Punjab Environment Protection Act 1997 (Amended 2012), under which the Environmental Impact Assessment (EIA) for the proposed project is mandatory for getting Environmental Approval. This project falls in the category of EIA (Environmental Impact Assessment) which presents a detailed account of the foreseeable environmental and social impacts likely to emanate from the extension of the proposed project. The EIA (Initial Environment Examination) report is prepared to assess the potential impacts likely to occur from the project’s entire life cycle on the local environmental quality and communities. The assessment produced a list of impact mitigation measures for the project to undertake to minimize the detrimental impacts on the environment and communities nearby. Details of the process description are given in **Chapter 05** under the heading of process details.

Title and location of the project

The proponent intends to establish the veterinary medicines and feed additives manufacturing facility by the title “**M/s Moderna Sciences (Pvt.) Ltd**” located at Plot # 69 & 70, Vehari Industrial Estate, Vehari over an area of 42937 Sqft.

Name of the Proponent

The detail of the proponent is given below:

Table 1 Proponent detail

Detail of the Proponent	
Proponent name	Mr. Muhammad Asad Gulzar Rana
Address	Zain Ul Abideen Street Tariq Road, House # 35/9, Muhallah Nawa City, Multan

Name of the Consultant preparing report

The detail of the consultant preparing report is given below:

Table 2 Consultants Detail

Detail of the Consultant	
Company name	Enviro Stewards Company (Private) Limited
Address	1 st Floor Allied Bank A-Block Commercial Market Canal View Society, Lahore.
Contact	0301-1199600

Brief outline of the proposal

Table 3 Brief outline of the proposal

Title of the Project	M/s Moderna Sciences (Pvt.) Ltd
Proponent	Mr. Muhammad Asad Gulzar Rana
Total Area	42937 Sqft
Description of the project	The proposed project is to construct veterinary medicines and feed additives manufacturing facility to meet the demand of the market for livestock health and safety and for the economic growth as well
Location of the project	Plot # 69 & 70, Vehari Industrial Estate, Vehari
GPS Location	30.083999 N, 72.282408 E (Google map is attached A3 size with file)
Cost of the project	80 million
Capacity of the project	45-50 tons annually
Raw material	Mixtures of different salts, food color and preservative
Final product	- ADEK, Menthol with Eucalyptus oil, Multivitamin powder and liquid - Vitamin E 40%, Vitamin E with selenium
Land use	Industrial
Current status of the project	Open Land
Ground Water	100ft – 150ft
Manpower	Construction: 20-25 Persons
	Operation 60-65 Persons
Power Source	MEPCO
Period of Construction	Approx. 01 Year

Assessed Environmental issues	Solid and liquid waste will be environmental issues. So, these wastes should be disposed of via EPA approved vendor.
Solid Waste Management	Will manage by EPA approved vendor.
Wastewater Management	Generated wastewater will be disposed of after the treatment in Wastewater treatment plant (ETP).
Consultants	Enviro Stewards Company (Private) Limited
Compliance	Punjab Environmental Quality Standard (PEQS 2016) and time to time guidelines by EPA and other enforcement Department / Agencies.

Legal and Administrative Framework

The national guidelines and legislations relating to the environment considered for the project include, National Conservation Strategy (1992), National Environment Policy (2005), Pakistan Labor Policy (2010), Punjab Environmental Protection Act (PEPA 1997), amended PEPA, (2012), Punjab Environmental Quality Standards (PEQS), Land Acquisition Act (1894), Cutting of Trees (Prohibition) Act (1975), Punjab Wildlife Act (1974), Punjab Plantation and Maintenance of Trees Act (1974), Antiquities Act (1975) etc.

Environment related documents have been reviewed including submission of environmental assessment study report to obtain environmental approval was made mandatory by the Pakistan Environmental Protection Ordinance (PEPO), 1983 and the Pakistan Environmental Protection Act (1997). Section 12(1) of the PEPA (1997) amended 2012 stipulates that no project involving construction or any change in the physical environment can be undertaken unless an EIA or an EIA is conducted, and approval (NOC) is received from the relevant provincial environmental agency.

This EIA report has been prepared with due consideration of PEPA, 1997, Punjab Environmental Protection (Amendments) Act, 2012 and all other legal requirements of Pakistan and Punjab Government Including LAA, 1894.

Major Impacts

Since the project is the construction of veterinary medicines and feed additives manufacturing unit, it is therefore likely to produce effects onto the water quality, land, and air of the project site. Solid waste will also produce during activities. The impacts will be more unless appropriate mitigation measures are employed for balancing out the identified adverse impacts. Innumerable environmental and social impacts are expected during construction and operational phase, significant ones of which would be:

Table 4 Major impact during construction and operational phase

Pollutant	Constructional Phase	Operational Phase
Particulate matter (PM)/dust	Particulate matter will be generated during the construction and transportation activities at the site at limited level	Air emissions will chiefly arise from machinery along with solvent vapor, odor, from floor cleaning and from the generators
Gaseous emissions	Gases will be generated due to site generators and vehicles	Gases will be generated due to movement of vehicles and from the machinery used
Noise	Noise will be generated due to construction machinery and vehicles transportation	Noise will be generated due to vehicles and may be from the machinery if not properly managed
Solid Waste	Only a small amount of solid waste will be generated due to construction activity	Solid waste will be generated due to domestic source and during packaging
Soil Contamination	Soil may be contaminated due to leaching of any stored oil only during construction phase	Soil contamination is not foreseen during operation phase except mismanagement of solid waste collection and disposal
Wastewater	Wastewater will be generated from constructional and domestic sources	Wastewater will be generated from domestic sources and during operational/ process activities.
Socioeconomic	Positive impact due to generation of employment opportunity	Positive impact due to generation of employment opportunity

Mitigation Measures

The possible mitigation measures of potential environmental impacts resulting during construction and operational phase of the project are given below:

During Construction Phase:

- Mitigation measures recommended to be incorporated into the project include running the machines and vehicles on good quality (low-sulfur fuels) in good working order ensuring regular maintenance, tuning, servicing, and providing them with emission control devices, such as mufflers and silencers, solid waste handling facilities such as waste bins and skips in all sections of the factory.
- Installation of temporary housing facilities equipped with adequate water and sanitation facilities.
- Waste will be managed as per municipal practices.
- Management needs to regularly carry out checks of all machinery and carry out regular servicing and maintenance of it to keep the environmental impact on account of their emissions to its minimum level.
- For wastewater safely disposal, wastewater treatment plant (ETP) will be provided.
- For reducing fugitive dust, regular water sprinkling on roads has been carried out.
- All trucks used for transportation will be covered with tarpaulin, maintained, and optimally loaded.
- Moreover, the green zone has been developed and tree plantation activities during operational phase would ensure minimal impact of fugitive dust emissions.
- Generators will be installed with proper enclosure, tuning and maintenance to control emissions.
- Assignment of traffic aides
- Usage of low-noise construction machine

During Operational Phase:

- Proper domestic solid waste handling and management practices will be adopted.
- ETP of adequate capacity will be installed before disposing off in nearby wastewater drain.

- Installation of appropriate signage to avoid any accident during traffic on the road.
- Process solid waste will be disposed of through EPA Certified Contractor.
- A proper health and safety department will be established to provide a safe and healthy workplace(market) for employees. Reducing the number of accidents and injuries in the workplace (market). Improving morale within the workforce.
- Training regarding HSE should be given on the regular basis.
- It should be strictly enforced to wear PPEs (mainly gloves, and face masks) while working with ecru yarn.
- Incidents should be reported directly to the concerned authority.
- Moreover, the green zone will be developed and tree plantation activities of proponent during operational phase would ensure minimal impact of fugitive dust emissions.
- A proper ventilation plan, and regular monitoring for preventive maintenance of the generators and machinery, are the control measures which will check air pollution.

Proposed Monitoring

As it is the project requiring EIA so the impacts will be long term, significant or adverse. These impacts can be reduced by regular monitoring and implementing all the mitigation measures. Environmental Monitoring Program should be formulated which ensures effective surveillance of the environmental parameters at various stages of the project development and compliances with PEQS and legal obligations.

An environmental management and monitoring plan provide a delivery mechanism to address the potential environmental impacts of a project during its construction and operational phase, to enhance project benefits, and to introduce health and safety standards of good practice to be adopted for proposed project.

The proponent will ensure the proper implementation of mitigation measures for the concerned installation and operation and maintenance phase through adequate monitoring. Monitoring plan has been included in **Chapter 09**.

Conclusions and Recommendations

The major positive impacts of the project include job opportunities and new business opportunities. The project will raise the people's income, enhance social infrastructure, and improve socioeconomic conditions in the area. The project is expected to stimulate greatly the

local economies around the project area and to benefit people who have a low standard of living.

Negligible to low negative impacts can be foreseen during project implementation including Air Quality, Noise, Biodiversity and Dust. Mitigation measures will be implemented to minimize environmental impacts. All the impacts can be managed cost effectively. Careful mitigation and monitoring, specific selection criteria and assessment procedures for subprojects have been specified to ensure that minimal impacts take place.

It is recommended that the proponent should obtain an environmental approval (No Objection Certificate) from the Punjab-EPA before proceeding further into the construction activities as per regulatory requirements.

1 INTRODUCTION

1.1 General

Pakistan's main livestock consists of buffalo, cattle, sheep, goats, camels, horses, and chickens. These animals provide hides and skins, meat, eggs, and milk for the country and are a valuable source of trade internationally. The livestock industry plays a significant role in food security and supply. Various livestock products such as eggs, milk, meat, and wool contribute 16 %-31 % of global per capita calories and minerals.

Veterinary medicines/drugs are needed to maintain the level of food safety and availability. These medicines help minimize or eliminate the negative effects of animal health on human health. Such medicines guarantee the production of safe animal products (milk, meat, eggs).

1.2 Purpose of the Report

This report has been prepared to conform to the requirements of the Punjab Environmental Protection (Amendment) Act 2012 (PEPA), which states that:

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

The proponent feels its social, moral, and legal obligation to protect the environment. It is in this context that the company initiated the process of gaining Environmental Approval from the EPA, Government of Punjab. According to the direction of the EPA, as detailed in the preceding para under "Introduction" this EIA (Environmental Impact Assessment) is being submitted for issuance of the said Environmental Approval in compliance with the Punjab Environmental Protection Act -1997 (Amended 2012) Section 12.

The proponent affirms that environmental management order will prevail both during construction and regular operation in accordance with the Punjab Environment Quality Standards (PEQS).

The EIA (Environmental Impact Assessment) report considers socio economic, physical, and environmental, land use, forestry, crops, water bodies, biodiversity (flora and fauna), heritage, and other relevant aspects associated with the project itself and the area around the project. The

report also describes mitigation measures that will be adopted to undo environmental impacts on any segment of the environment i.e., human health and environmental health around the project site both during construction and normal operation of the project. The report provides relevant information, as required under the officially approved format, to help the decision makers (EPA Punjab in the Present case) before issuing the desired environmental approval.

1.3 Identification of the project and proponent

The detail of the project and proponent is given below:

Table 5 Proponent and project detail

Detail of the Project and Proponent	
Proponent name	Mr. Muhammad Asad Gulzar Rana
Proponent designation	CEO
Address of the proponent	Asad Ullah Sheikh Street, Bukhari Colony, Tariq Road, Multan
Project title	M/s Moderna Sciences (Pvt.) Ltd
Location of the project	Plot # 69 & 70, Vehari Industrial Estate, Vehari
Description of the project	The proposed project is to establish veterinary medicines and feed additives manufacturing facility to meet the demand of the market, for livestock health and safety and for the economic growth as well

1.4 Consultant Details

The proponent has engaged M/s Enviro stewards Company (Pvt.) Limited to conduct the EIA study of a foresaid project in accordance with guidelines issued by EPA, Punjab. For this purpose, M/s Enviro stewards Company (Pvt.) Limited has engaged a group of professionals which comprises of environmental specialists, environmental engineers, and chemical engineers. The details of the consultants are given below:

Table 6 Detail of consultants

Detail of the Consultant	
Company name	Enviro Stewards Company (Private) Limited
Address	1 st Floor Allied Bank A-Block Commercial Market Canal View Society, Lahore.

Contact No.	0301-1199600
Detail of the Team Leader	
Name	Miss Sara Fatima
Designation	Senior Environmentalist
Contact No.	0301-1198600

1.5 Nature and size of the project

The proposed project to establish the veterinary medicines and feed additives manufacturing facility by the title “M/s Moderna Sciences (Pvt.) Ltd” located at Plot # 69 & 70, Vehari Industrial Estate, Vehari over an area of 42937 Sqft. As a result of the project, around 20-25 people will get jobs during the construction phase and another around 60-65 persons will be engaged during the operation phase of the project.

Detail/Schedule of the proposed project area

Table 7 schedule/detail of proposed project area

Building-A (G.F)	14620	SFT
Building-B (G.F)	6995	SFT
Building-C (G.F)	970	SFT
Guard Room	200	SFT
Solid Waste Bin Area	155	SFT
Open Area of the Plot	19997	SFT
Ground Floor Covered Area	22940	SFT
Total area of plot	42937	SFT

1.6 Location of the project

The project site is located at Plot # 69 & 70, Vehari Industrial Estate, Vehari. The coordinates of the project area are **30.083999N, 72.282408E**.



Map 1 Location of the proposed project

1.7 Extent of the EIA study, scope of the study, magnitude of the efforts

This EIA (Environmental Impact Assessment) study has been accomplished following the requirements serial 2.3 of the "Guidelines for the preparation and review of Environmental Reports, October 1997". In compliance of PEPA, 1997 (amended 2012) requirements, an EIA report has been prepared by the team of environmental experts. This document covers all environmental impacts, due to the proposed project, in and around the project area comprising the physical, ecological, and socio-economic aspects together with identification of the potential positive and negative impacts. Any developmental activities outside the project area like rehabilitation of the road and establishment of the other factories outside the project vicinity have not been covered under this EIA (Environmental Impact Assessment) study.

The EIA (Environmental Impact Assessment) report covers the examination of the physical, biological, and environmental socioeconomic impact of the following:

- Construction activities including the leveling and marking of land.
- Relevant off-site construction activities like construction of access road if required.
- The environmental impacts due to constructional and operational activities.
- Positive impact for increase in the economy level.

2 POLICY, LEGISLATION, LEGAL & ADMINISTRATIVE FRAMEWORK

2.1 General

This section deals with the current policy as well as legal and administrative framework related to carrying out EIA (Environmental Impact Assessment) of various projects. A number of laws exist in Pakistan, containing a number of clauses concerning protection of the environment. Like other Projects, this project is also required to go through an Environmental Assessment for getting a NOC under Section 12 of the Punjab Environmental Protection Act – 1997 (Amended 2012).

According to environmental laws of the country development projects must undergo the process of Environmental Impact Assessment (EIA) or Environmental Impact Assessment (EIA) to predict and mitigate the impacts of the development at an early stage.

2.2 Screening

According to projects categorization for environmental assessment studies, the proposed project falls under **Schedule II** (list of projects requiring an EIA), **Category B** (Manufacturing and processing) and **sub sector 2 (Chemical Manufacturing Units including Pharmaceutical and cosmetics)** of the IEE / EIA Regulations 2022 made under section 12 of Punjab Environment Protection Act 1997 (Amended 2012), under which the Environmental Impact Assessment (EIA) for the proposed project is mandatory for getting Environmental Approval. Details of the process description are given in **Chapter 03** under the heading process description.

2.3 Existing Regulation and Framework

This EIA study has been carried out in the light of the policy guidelines for the preparation of EIA/EIA Reports under the procedure and practices formulated by the Provincial Environmental Protection Agency (EPA).

2.4 Relevant Legal / Institutional Framework

The applicable laws for the environmental study of the project are briefly given below. The proponent of the project will abide by the applicable laws and regulations.

2.4.1 National Conservation Strategy, 1992

On March 1, 1992, the Cabinet of Pakistan approved the National Conservation Strategy. It describes the stark reality of the country's deteriorating resource base and its implications for what is still largely a natural resource-based economy. It sets forth the beginnings of a plan to integrate environmental concerns into virtually every aspect of Pakistani economic life. The strategy has three overriding objectives: conservation of natural resources, sustainable development, and improved efficiency in the use and management of resources.

2.4.2 PEPO, 1983 and PEPA 1997 (Amended 2012)

In 1983, the Government of Pakistan issued an Environmental Protection Ordinance (EPO), which was replaced by the Pakistan Environmental Protection Act (PEPA) 1997, through an Act of Parliament. Now the PEPA 1997 has been replaced by Punjab Environmental Protection Act 1997 (Amended 2012) on 18th April 2012. Under Sec. 8 of Environment Protection Ordinance (EPO) 1983, it was necessary to carry out EIA/EIA for all development projects, but there were no EIA/EIA regulations under that ordinance.

Under section 12 of the Punjab Environmental Protection Act, 1997 (Amended 2012) it is mandatory to take an Environmental Approval Environmental Protection Agency for commencement of any construction of project.

2.4.3 National Environmental Policy 2005

The Government of Pakistan (GOP) has notified National Environmental Policy 2005, for different projects/aspects in which guidelines/priorities have been given to undertake the projects having significant environmental impacts.

2.4.4 Review of EIA and EIA Regulations, 2022

The GOP has issued Review of Environmental Impact Assessment and Environmental Impact Assessment Regulations 2022, to review the Environmental Impact Assessment (EIA) / Environmental Impact Assessment (EIA) Reports.

2.4.5 Guidelines for the Preparation and Review of Environmental Reports, 1997

The GOP has also framed guidelines for the preparation and review of EIA/EIA of projects in various developmental sectors.

2.4.6 Punjab Environmental Quality Standards (PEQS)

According to Punjab Environmental Protection Act, 1997 (Amended 2012), Punjab Environmental Quality Standards (PEQS) were established for municipal and industrial effluents and air emissions.

2.4.7 Guidelines for Sensitive and Critical Areas

GOP issued Guidelines for Sensitive and Critical Areas in October 1997. The objective of the guideline is to provide guidance to project proponents and other stakeholders in the environmental assessment process, so that the projects are planned and sited in a way that protects the values of sensitive and critical areas.

2.4.8 Policy and procedures for the Filing, Review and Approval of Environmental Assessments, November-1997

Environmental Assessment is the Primary means of managing the approval of new development proposals in Pakistan. Environmental Assessment allows for the systematic examination of proposals, clear procedures which provide for the interests of relevant Government Departments and other stakeholders to carefully consider.

2.4.9 Guidelines for Public Consultation, Pakistan Environmental Protection Agency October 1997

This guideline is part of a package of regulations and guidelines which include:

- Punjab Environmental Protection Act, 1997 (Amended 2012)
- Policy and Procedures for filing, review, and approval of environmental assessments
- Guidelines for the preparation and review of Environmental Reports
- Guidelines for sensitive and critical areas
- National Environmental Quality Standards (NEQS)
- Detailed sectoral guidelines

2.4.10 Punjab Wildlife Protection Act, 1974

This act was framed in 1974 by the province Punjab and is about the protection and conservation of Wildlife.

2.4.11 Forest Act, 1927

This act was filmed in 1927. The Forest Act, 1927 is still the basic charter for the forest departments in Pakistan. This law empowers provincial governments to manage forest areas.

2.4.12 Explosive Act, 1884

This act deals with explosives in prohibiting either absolutely or subject to conditions, the manufacture, possession, or importation of any explosive which is so dangerous in character that, in the opinion of the appropriate Government, it is expedient for public safety to issue the notification.

2.4.13 Punjab Local Government Ordinance, 2001

Schedules 4 and 8 of this Ordinance pertain to environmental pollution. Under the Ordinance, the local councils are authorized to restrict projects causing pollution to air, water or land. They may also initiate schemes for improving the environment.

2.4.14 Pakistan Penal Code, 1860

This defines the penalties for violations concerning pollution of air, water bodies and land. Sections 268 to 291 are about offences affecting public health. The offences relating to public health, safety and environment are as under:

Sec 268: Public Nuisance

Sec 269: Negligent act likely to spread infection of disease dangerous to life:

Sec 270: Malignant act likely to spread infection of disease dangerous to life:

Sec 278: Making atmosphere noxious to health:

Sec 284: Negligent conduct with respect to poisonous substance:

Sec. 290: Punishment for public nuisance in cases not otherwise provided for:

Sec. 291: Continuance of nuisance after injunction to discontinue.

2.4.15 Punjab Land Use Rules 2009

In January 2009 the Punjab Government notified “Punjab Land Use Rules 2009” for the clarification of Lahore Master Plan. In these rules permissible land use according to area type is defined.

2.4.16 Antiquities Act 1975

The law relates to protection of Antiquities, monuments, National & International heritage. Compliance of this Act is mandatory for the Installation of Generators. Under section 22 of the Act no development plan or scheme or new construction can be done within distance of 200ft from the boundary of the monuments/ National Heritage. There is no historical Site or monuments in the proximity of the project.

2.4.17 Solid Waste Management Rules 2005

The Solid Waste Management Department, CDGF, has notified these rules for proper waste management.

2.4.18 Labor Laws

The labor laws apply on child labor and measuring instruments.

2.4.19 Safety & Civil Defense Laws

The civil defense laws provide details about safety, fire protection and civil defense.

2.4.20 Guidelines for Critical and Sensitive Area

These guidelines have been prepared under section 12 of Punjab Environmental Protection Act 1997 (Amended 2012) for protection and safety of critical and sensitive localities.

3 SCOPING

The scoping in Environmental Impact Assessment involves a comprehensive assessment of the potential impacts of a project or activity, including direct and indirect impacts, cumulative impacts, and potential long-term effects. This assessment is carried out by a team of environmental and social experts, who analyze the proposed project or activity in detail and identify potential risks and impacts on various aspects of the environment, such as air quality, water quality, biodiversity, and cultural heritage. In this Environmental Impact Assessment, a public consultation has been involved, where members of the public and other stakeholders can provide feedback and raise concerns about the proposed project or activity.

3.1 Spatial and Temporal Boundaries of Environmental Assessment

Due to construction of current project, land use will change from open land to manufacturing unit of veterinary medicines and feed additives by named as M/s Moderna Sciences (Pvt.) Ltd. Within radius of 2-km, few residents are there represents in figure given below but current project will be installed by adopting proper mitigation measures to avoid disturbance in nearby area and local community. In current project no significant emission will be observed because in proposed project there will be only storage. Wastewater quality will be measured to ensure PEQS. No environmental sensitive area is present within safe distance that could be impacted



Figure 1 Location of the proposed project

due to proposed project.

3.2 Important Issues and Concerns Raised during Consultation

During consultation it was observed that many people were in favor of the project but some of the issues and concerns were raised. During survey following concerns of local community, Government Departments, Environmental Practitioners and Experts, nearby industries were noted:

- Local should be preferred for the job opportunities
- Proper training should be given to workers
- Noisy activities should be confined
- Air pollution should be controlled effectively
- Wastewater should not dispose of without proper treatment
- Solid waste must be collected timely
- A proper wastewater treatment plant should be installed
- Ensure the tree plantation in the vicinity of area
- Health and safety of workers should be ensured
- EMMP should be designed and enforced with great spirit
- Respective team officers should be responsible for the implementation of management plan and actions
- Avoid the excessive use of groundwater. Limited amount of water should be use
- Cleanliness of area should be ensured
- To reduce or avoid air pollution transport vehicles should be covered in the construction phase
- Proponent shall work for betterment of community

3.3 Significant Impacts and Factors to be Determined

The factors and impacts to be determined around the project site are:

- Dust and Particulate emissions
- Wastewater generation and its treatment
- Control Air emissions
- Solid waste management

- Occupational Health and safety
- Site Security
- Traffic Management
- Hygiene management
- Community impacts
- Job opportunities for locals
- Confined noisy activities.
- Resource conservation
- Avoid excessive water consumption.
- Energy efficient techniques must be adopted.
- Proper site restoration after construction
- Tree plantation at designated green areas
- Emergency preparedness

4 ALTERNATIVES CONSIDERATION

Alternatives are recommended and examined to determine the best method of achieving project objectives, while minimizing environmental impacts. The discussion and analysis of alternatives in an EIA (Environmental Impact Assessment) study should consider other practicable strategies that will promote the elimination of negative environmental impacts identified.

This section covers the project alternatives which were examined for the proposed project in the said location. An analysis of the available alternatives is necessary to establish that the most suitable management and technology options will be adopted for the project, while minimizing environmental impacts. This evaluation explains the selection of the most feasible alternative in terms of economics, environment, and health & safety. It outlines the following options that were considered for this project:

- Site Alternative their selection and rejection criteria
- Design/technology alternatives, their selection and rejection criteria
- Environmental Alternatives, their selection and rejection criteria
- Economic Alternatives, their selection and rejection criteria

4.1 Site Alternative

The location chosen for the project is in the industrial area. The chosen location for the establishment of proposed project, named as M/s Moderna Sciences (Pvt.) Ltd matches perfectly with the rest of the land use in the area. The site is also spacious enough to accommodate the proposed facility and its infrastructure. Based on the existing infrastructure and its strategic location, we believe that the chosen location is ideal and suitable for the proposed development. There are no historical sites or other recreational opportunities in the vicinity of the area. In addition, the building belongs to the proponent.

The site is suitable for implementation of said project owing to the following characteristics:

- The selected site is in the industrial area.
- Transportation infrastructure (road network) is available.
- The selected site is under the ownership of the proponent.

4.2 Design/Technology Alternative

For development of current project state of art technology will be selected to avoid long term environmental impact. Proponent will use updated technology and new machinery to run the process. This system emits less emissions and can work properly. Proponent is doing heavy investment for this project so latest/state of art technology will be preferred to ensure good quality products. Water mitigation techniques also considered at their best including wastewater treatment plant (ETP)s for wastewater treatment process.

4.3 Environmental Alternative

The unit site is located in an area which is away from any biodiversity including forestry, wildlife, migratory birds, flora and fauna, fishery. There is no cultural or any other heritage in the project area. There is no environmental sensitivity in the project area. These factors are also strongly supportive of the proposed project site. After completion of construction, proper landscaping will be done. The proponent is going to install fire frightening facility. Moreover, the proponent is very concerned and conscious about the quality and equally about the environmental protection and resource conservation.

4.4 Economic Alternative

Currently selected design is economically efficient. Tree plantation will be done that will reduce temperature of the area and act as noise barrier. Building design will be such that maximum use of day light and LED lights will be installed to minimize electricity consumption. Job opportunities for the local person as well as for the skilled person. The economy rate of the project site will also increase. The cumulative effect of this types project would result in noticeable economic growth.

5 PROJECT DESCRIPTION

The proponent intends to establish the veterinary medicines and feed additives manufacturing facility by the title “**M/s Moderna Sciences (Pvt.) Ltd**” located at Plot # 69 & 70, Vehari Industrial Estate, Vehari over an area of 42937 Sqft. The purpose of this project is to meet the market demand, for livestock health and safety and proponent economic uplift. The estimated cost for the subject proposed project will be about 80 million PKR.

The project will pose the positive impacts in terms of employment opportunities, will create jobs during construction and operation and will contribute to the country economy by meeting the market demand.

5.1 Type and category of the project

The capital cost of the project is 80 million PKR. The project will spread over an area of over an area of 42937 Sqft. As a result of the project, around 20-25 people will get jobs during the construction phase and another around 60-65 persons will be engaged during the operational phase of the project.

According to projects categorization for environmental assessment studies, the proposed project falls under **Schedule II** (list of projects requiring an EIA), **Category B** (Manufacturing and processing) and **sub sector 2 (Chemical Manufacturing Units including Pharmaceutical and Cosmetics)** of the IEE / EIA Regulations 2022 made under section 12 of Punjab Environment Protection Act 1997 (Amended 2012), under which the Environmental Impact Assessment (EIA) for the proposed project is mandatory for getting Environmental Approval.

5.2 Objective of the project

The objective of the aforesaid project i.e., establishment of Veterinary medicines and feed additives manufacturing facility for the economic growth, for livestock health and safety and to meet the market demand. The project will have following advantages:

- The project will provide additional income and gainful employment to local people.
- To meet the market demand and supply cost-effective products.
- The said project is itself a value addition project.
- Socio-economic up-lift of the proponent.

5.3 Location and Site Layout

The site under consideration for the establishment of “M/s Moderna Sciences (Pvt.) Ltd” is located at Plot # 69 & 70, Vehari Industrial Estate, Vehari. The location of the project is given below, and layout of project is attached within the file. The coordinates of the project site are 30.083999 N, 72.282408 E.

5.4 Land use of the site

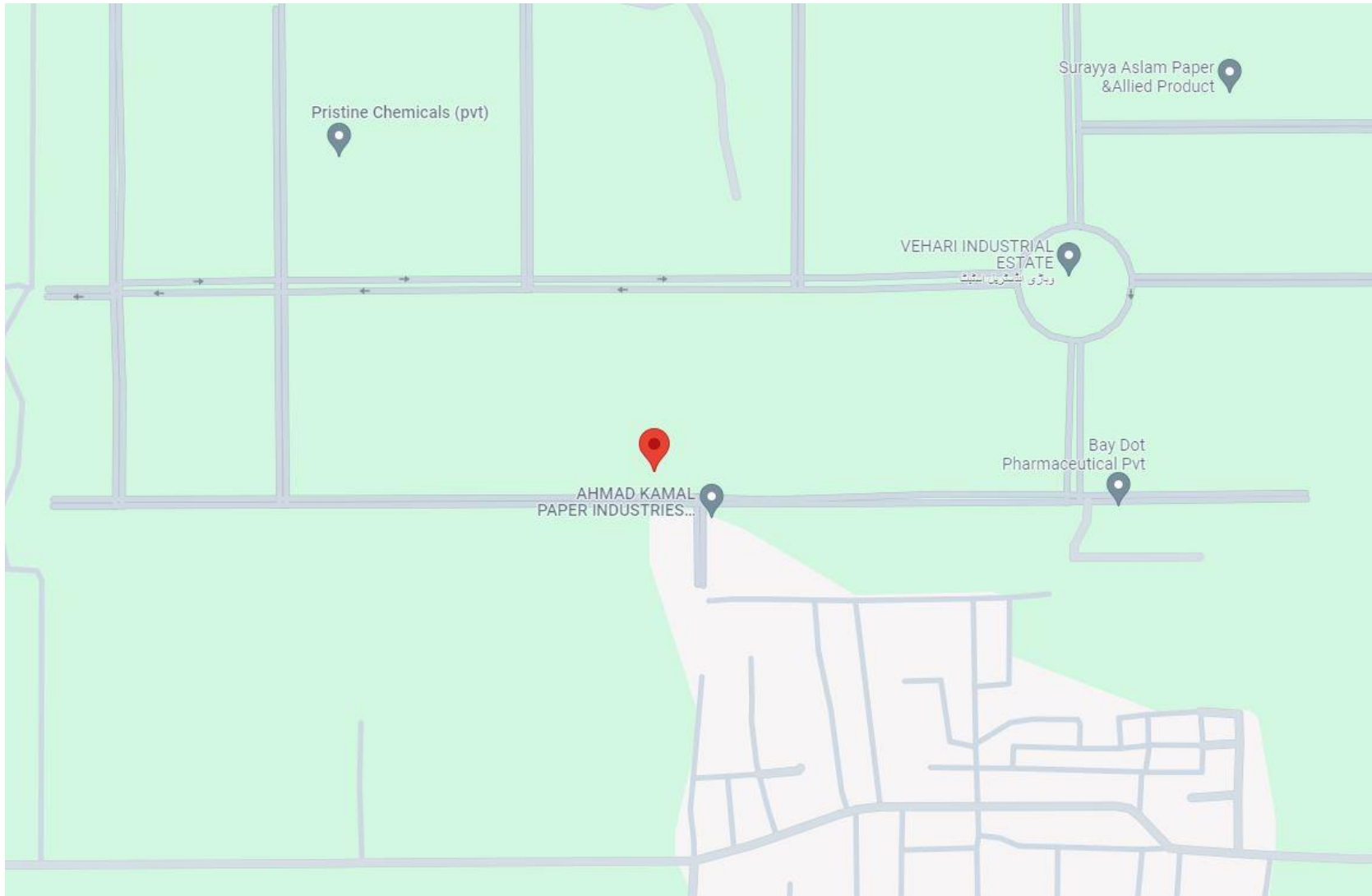
Land selected for the project is industrial in nature. The land use will not be changed as the area is already industrial in nature.

5.5 Road Access

There is paved road access to the project site. The road access is by the Main the main road of industrial estate near the proposed project site. Due to this main road availability, the access to project site is easy. All the constructional & operational activities and basic needs provision will be made easy by the road access. Following is the Road access map of proposed project site:



Map 2 Location of the project



Map 3 Road access map

5.6 Vegetative Features of Site

Nearby land of proposed project is agriculture and industrial both in nature. Number of green patches found there. During the operation phase, green belts will be developed near the project site, and it will serve as a useful buffer to control pollution from different sources mainly public and private vehicles. As a control measure of atmospheric pollution, as a barriers noise generated within the premises it is recommended to develop a green belt.

5.7 Plantation Plan

Approximately 1000-2000 plants will be planted in and around the project vicinity to enhance the landscape beauty and to make the ambient air quality better. These plants will include ornamental, coreopsis and daylily plants as well. But most trees will be shade providing.

5.8 Magnitude & Cost of the project

The estimated initial capital cost of the aforesaid project is approximately 80 million PKR. Purchase of said raw material, processing, manufacturing and other maintenance activities involved in the operation phase of said project. The equipment's safety will be assured if these operations are carefully managed. No separate fund allocation is required.

Table 8 Cost of the project

Amenities	Cost in PKR
Land cost	8 million
Infrastructure Development, machinery	33 million
Raw material	03 million
Plantation	01 million
Wastewater Treatment (ETP)	30 million
Solid waste, firefighting, health & safety training/equipment	05 million
Total Cost	80 million

Detailed site survey, planning and demarcation of the various regions during development of the proposed project will be done. However, the budget will be allocated for purchase and maintenance of standardized PPEs for workers, for waste management and environmental enhancement.

5.9 Proposed schedule for implementation (Tentative)

Stage I: The clearing of land, preparation of land for construction activity.

Stage II: During this phase machinery will be brought to the site and installed.

Stage III: In this phase all the outstanding activities will be completed, construction activities will be initiated.

Stage IV: After completing construction, employees will be hired, and staff will be assigned their respective work. The operation activities will be initiated.

Table 9 Schedule of implementation

Activities	Times Frame											
	Four Week			Four Week			Four Week			Four Week		
Preliminary Phase (Land Acquiring etc.)												
Design Phase												
Pre-Construction Activities Finalization												
Construction Phase												
Purchasing Phase												
Machinery Installation												
Commissioning Phase												
Recruiting Of Staff												
Operation Phase												

5.10 Description of the project

The proponent intends to establish the veterinary medicines and feed additives manufacturing facility by the title “M/s Moderna Sciences (Pvt.) Ltd” located at Plot # 69 & 70, Vehari Industrial Estate, Vehari over an area of 42937 Sqft. The purpose of this project is to meet the market demand, health & safety of livestock and proponent economic uplift. The estimated cost for the subject proposed project will be about 80 million PKR.

The project will pose the positive impacts in terms of employment opportunities, will create jobs during construction and operation and will contribute to the country economy by meeting the demands.

Detail/Schedule of the proposed project area

Table 10 schedule/detail of proposed project area

Building-A (G.F)	14620	SFT
Building-B (G.F)	6995	SFT
Building-C (G.F)	970	SFT
Guard Room	200	SFT
Solid Waste Bin Area	155	SFT
Open Area of the Plot	19997	SFT
Ground Floor Covered Area	22940	SFT
Total area of plot	42937	SFT

5.10.1 Process Description

The manufacturing process for veterinary medicines and feed additives within the industry involves several steps to ensure the production of high-quality and safe products. Here's a more detailed breakdown of the process:

In continuous manufacturing, raw materials and energy feed into the system at a constant rate, and at the same time, a continual extraction of output products is achieved. The process performance is heavily dependent on the stability of the material flow rate. For powder-based continuous processes, it is essential to feed powders consistently and accurately into the successive processes in the line, as feeding is characteristically the first step in manufacturing.

Feeders are designed to achieve performance reliability, feed rate accuracy, and minimal interruptions.

With pharmaceutical manufacturing, a wide range of non-active ingredients may be blended with the active pharmaceutical ingredient or ingredients to create the final blend used for the solid dosage form. The range of materials that may be combined presents many variables that must be addressed. These variables include the particle size distribution, the particle form (spheres, rods, cubes, plates, etc.), the presence of moisture, particle surface properties such as roughness and cohesion, and powder flow properties.

- **Liquid Injectable/Oral Medicines**

During the manufacturing process, milling is often obligatory to reduce the average particle size in a drug powder. There are several reasons for this, including increasing homogeneity and dosage uniformity and increasing the solubility of the drug compound. Sometimes repeated powder blending followed by milling occurs to improve the manufacturability of the blends.

- **Dry/powder antibiotics**

There are two general types of granulations:

1. Wet granulation
2. Dry granulation

Granulation can be seen as the opposite of milling. Small particles are connected to form larger particles called granules. Granulation is used for several reasons. It prevents the "de-mixing" of components in the mixture, by creating a granule which contains all of the ingredients in their required proportions, which improves flow characteristics of powders and increases compaction properties for tablet formation.

Hot melt extrusion is used in pharmaceutical solid oral dose processing to enable the delivery of drugs with poor solubility and bioavailability. Hot melt extrusion has been shown to disperse poorly soluble drugs in a polymer carrier molecularly. The procedure encompasses the application of heat, pressure, and agitation to mix materials and 'extrude' them through a tool die. Twin-screw high shear extruders blend materials and break up particles at the same time. The resultant particles can be combined and compressed into tablets or filled into capsules.

- **Drying/cooling process**

Labs may use dry ice to cool drugs for reaction selectivity, but this cooling process becomes complicated if used at an industrial size. The cost of cooling a typical reactor to this

temperature is high, and the viscosity of the reagent can increase as the temperature lowers, leading to difficult mixing.

- **Packaging:**

Filling:

Fill the final product into appropriate packaging, ensuring accurate dosage per unit.

Labeling:

Include required information on labels, such as dosage instructions, warnings, and batch details.

- **Storage and Distribution:**

Controlled Storage:

Store finished products in controlled environments to maintain stability.

Distribution:

Distribute products to wholesalers, retailers, and veterinary clinics while adhering to regulatory guidelines.

This detailed process is designed to ensure the production of veterinary medicines and feed additives that are safe, effective, and comply with regulatory standards throughout their lifecycle.

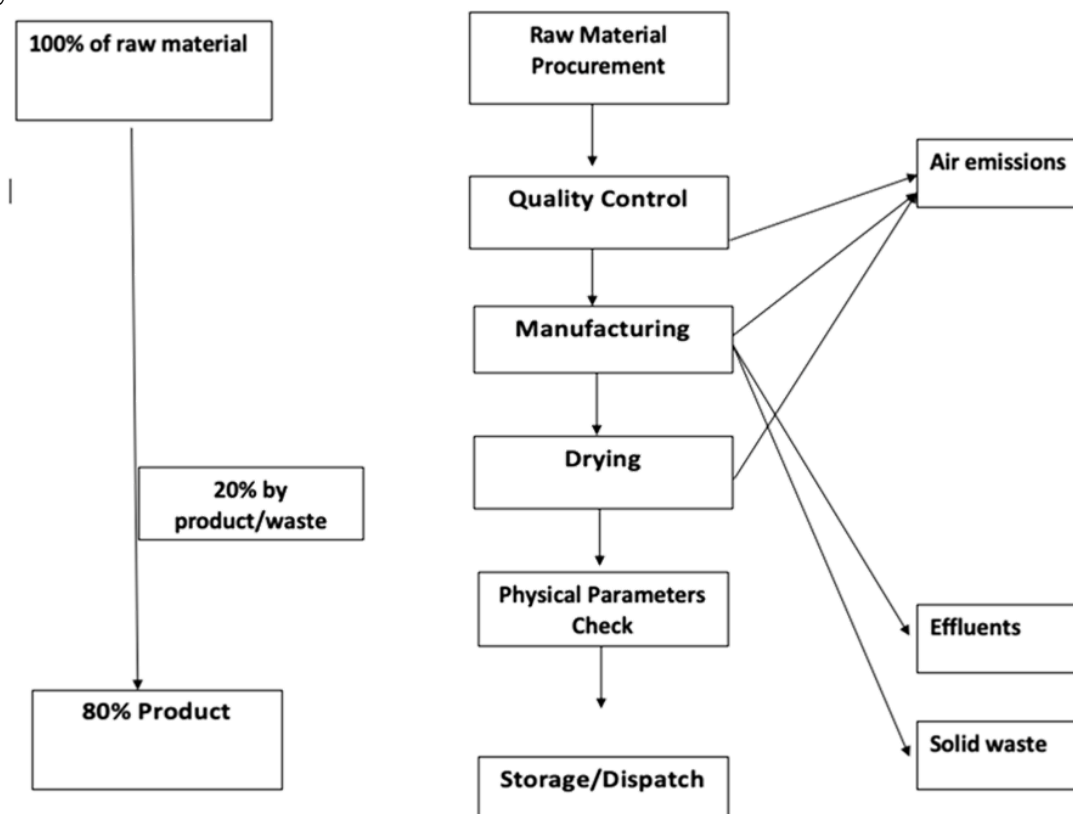


Figure 2 Process flow chart

5.10.2 List of Machinery

The list of machinery that will be used for the processing or manufacturing of veterinary medicines and feed additives is attached as Annexure.

Available facilities

Water Resource: The ground water will be used for water consumption.

Fire Fighting System: The firefighting system will also available in case of any emergency.

Wastewater Treatment System: For wastewater treatment, wastewater treatment plant (ETP) will be installed and operated.

Parking Area

Parking area will be provided for the vehicles.

Water Supply

The source of water for the proposed site is ground water at the depth of 100-150 ft. In development phase, 3-6 m³/day water will be used for domestic & constructional activities and water source will be ground water.

Use of Drugs and Narcotics

Drugs and narcotics are strictly prohibited during working hours in working area. Smoking will be only allowed in rest timings at properly isolated places.

Manpower

There will be approximately 20-25 workers during the construction phase and 60-65 workers on the unit during operational phase.

Personnel Protective Equipment

Following Personnel Protective equipment will be provided to the workers for their safety during construction and operational phase as per the requirement of specific activity:

- Protective Goggles
- Protective leather/rubber shoes
- Gloves

- Face masks
- Protective shields
- Helmets
- Overcoats

5.11 Details of restoration and rehabilitation

As the selected project location is in industrial area there is no local community there. There is no structure of significance that needs to be relocated or dismantled due the operation of the proposed project. No fresh land is to be occupied. Hence no relocation or restoration and rehabilitation are required. Project site notified by govt. as an industrial estate. The estimated life of the project is about 25 years approximately. All civil structures and related infrastructures will be extensively renovated. Rehabilitation would not be required as such at the current project site.

5.12 Government approvals and leases

As the approval from Environmental Protection Agency (EPA), Government of Punjab, and Lahore is mandatory before the start of construction of the project in compliance with Section-12 of the Punjab Environmental Protection (Amendment) Act 2012, therefore, this EIA report has been prepared to submit in EPA Punjab.

5.13 Health, Safety & Hygiene

Health, Safety & Hygiene includes the following:

First Aid facility

At workplace, workers and employers should have enough information, knowledge and training regarding first aid treatment in case of any emergency.

Safety Trainings

Workers and all the staff will be provided with proper training about the work and safety practices.

Use of Drugs and Narcotics

Drugs and narcotics are strictly prohibited during working hours in working area. Smoking will be only allowed in rest timings at properly isolated places.

5.14 Safety signs/Safety boards

At any workplace safety signs and symbols are very important to avoid many accidents. They must be in easy and understandable language to all the workers. Workers should have the knowledge of sign wordings and they must be trained and aware about them. Safety signs, symbols and boards must be provided by every department to protect the workers and employees from the risks of hazards that has not been controlled by other means. At the subject project, safety signs and boards are placed to avoid the workers and staff from any risk.



Figure 3 safety signs

6 DESCRIPTION OF ENVIRONMENT

An environmental baseline study is intended to establish a database against which potential impacts can be predicted and managed subsequently. The EIA of the proposed project covers a comprehensive description of the project area, including regional 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.

6.1 Data Collection

A site visit was conducted to survey the field area for collection of relevant data. Interviews were conducted with the general public and stakeholders of the project area in order to seek public opinion on the implementation of the proposed project. Various Governmental and Non-Governmental Organizations (NGOs) were also visited for the collection of relevant data and their views on the proposed project were recorded for incorporation into the EIA report. The environmental impacts of any activity or process will be assessed based on deviation from the baseline or normal situation. The following components form part of the baseline:

- i. Physical Environment
- ii. Ecological/Biological Environment
- iii. Socioeconomic Environment

6.2 Physical Environment

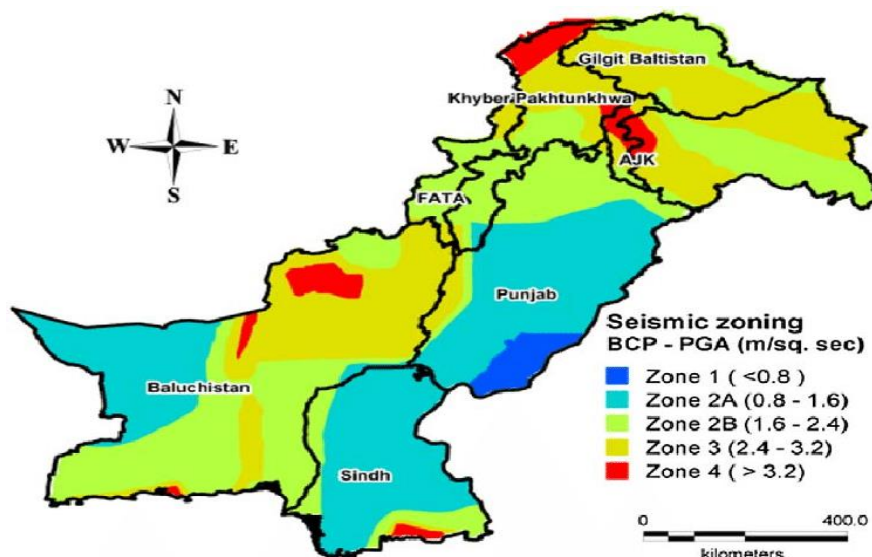
The proposed project lies in Plot # 69 & 70, Vehari Industrial Estate, Vehari over an area of 42937 Sqft where proponent intends to develop the proposed project. There are different industrial units within the project area in operational, constructional, and planning phase. The project lies in Vehari, Multan, and it has detail background history.

6.2.1 Geology

This part examines the physical resources such as topography, soil, climate, surface and ground water resources and quality, ambient air quality and geology of not only the project site but also the city to assess whether the project under assessment can or does have any impacts on any of these parameters. Development wise, it is more developed than the other tehsils of district Multan: Multan Saddar, Jalalpur Pirwala and Shujabad. City became more famous nationally and internationally after the General Elections of 2013 when allegations of rigging were put by the Pakistan Tehrik-e-Insaaf in National Assembly Constituency NA-154.

6.2.2 Seismicity

Pakistan lies on an active seismic belt of earth. Seismic observations indicate that hundreds of shocks originate every year. Mostly, these seismic waves are of low intensity and do not have significant effect. According to seismic zones of UN- Habitat the project area falls under Zone 2A. The seismic zoning is shown in the figure.



Map 3 Seismicity map of Pakistan

6.2.3 Climate

Climatically Multan is hot, arid, and very dry as it receives less than 125 mm of annual rainfall. May, June, and July are the hottest months and the mean maximum and minimum temperatures for these months are 42° C and 28 ° C respectively. Dust storms are a common occurrence in the city, and the monsoon rains, from June to September, can be severe. The metrology data of the site is briefly described below:

Table 11 Climatic data of project area

Month	Mean Temperature Max	Mean Temperature Min	Precipitation	Relative Humidity
January	19.7	5.0	33.8	66.2
February	21.6	7.7	50.0	60.0
March	26.0	12.5	60.5	53.8
April	33.0	17.7	36.5	41.8
May	38.1	22.0	31.8	32.5

June	40.5	25.8	51.6	37.8
July	35.7	25.8	23.3	67.8
August	34.4	25.3	22.2	70.8
September	35.0	23.0	77.7	65.5
October	33.1	16.6	12.2	55.6
November	27.8	9.9	9.9	62.7
December	21.5	5.7	30.4	68.9
Annual mean	30.6	16.4	36.6	56.4

6.2.4 Surface Water and Ground Water

There are no surface water resources like canal or ponds, near the project area. The area surrounding the project site is poorly drained. Ground water is the principal source of municipal water supply. 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 60-65 ft. feet and is generally good for direct consumption.

6.2.5 Season and rainfall

Rainfall also varies markedly and it's predictably not certain from year to year. A wet year may be followed by a dry year. Rainfall in the regions mainly occurs in July and August when the monsoon depression travels westward. Precipitation has marked seasonal fluctuation. The average annual rainfall based on the 32 years observation is 125 mm (4.921 inches), almost all of which occurs in the two months of July and August (Reference: The 2004 Baseline Survey on Millennium Development Goals in AACs, Pakistan).

6.2.6 Temperature

There are no surface water resources like canal or ponds, near the project area. The area surrounding the project site is poorly drained. Ground water is the principal source of municipal water supply. 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 60-65 ft. feet and is generally good for direct consumption.

6.2.7 Ambient Air Quality

Atmospheric pollution means the imbalance in the normal air chemistry. It can occur due to the addition of a new chemical into atmosphere or by the change in concentration of the chemicals already existing in the atmosphere. Atmospheric pollution particularly in urban area has a strong impact upon daily life. The reasons of such changes can both be natural as well as anthropogenic. Ambient air quality is a key to measure the concentration of the various chemicals in atmosphere; especially of the chemicals which pose detrimental effects on health, safety, and environment, to have a comparison with their safe concentrations, as established in WHO Standards and NAAQS.

6.2.8 Noise Levels

Noise is described as an unwanted sound emitted from unavoidable sources of anthropogenic activities. Daily based natural induced sources of noise are rare to none but human induced noise sources are plenty and un-avoidable. Physically, there is no distinction between sound and noise. Sound is a sensory.

The perception and the complex pattern of sound waves is labeled noise, music, speech, low altitude airplane flying etc. The noise pollution in the project area is a source of pollution and nuisance. Among eight noise measurement locations in the cities, the study says, on average, the noise level ranged from 57-60 dB (A) in and around the project site.

6.3 Ecological/Biological Environment

In this section, the baseline environmental conditions pertaining to biological environment are described. These conditions have subsequently been used to identify the potential impacts on the biological environment that are likely to arise from the project activities.

6.3.1 Fauna

There are no natural forest trees, grassland, or ecological important place. But the natural vegetation has been replaced by the agricultural crops. So, this sector consists generally of agricultural land irrigated by tube wells. Multan district is distinguished for its status in Agricultural production especially cotton and Mango. It has renowned Agricultural research institutes like i.e., Central Cotton Research Institute, Cotton Research Station, Mango Research Station, Agricultural College at Baha-ud-Din Zakria University.

Table 13 Type of fauna at the project site

Local Name	Fruiting Plant Specie
Mango	Mangifera Indica
Guava	Psidium guajava
Date Palm	Phoenix dactylifera
Local Name	Scientific Name
Kikar	Acacia nilotica
Sufaida	Eucalyptus camaldulensis
Albizia lebbeck	Siris
Peepal	Ficus religiosa
Tahli	Dalbergia sissoo
Beri	Ziziphus nummularia

6.3.2 Flora

The project area, on account of nature of vegetation and topography, is rich in vegetation and wildlife. Fauna of the project area consists of:

- Mammals
- Reptiles
- Amphibians
- Birds

The most common species are: List of the floral species in the project area are given in the following:

Table 11 Types of flora at the project site

Tree Species	Species name
Kikar.	<i>Acacia nilotica</i>
Talhi.	<i>Alhaji maurorum</i>
Kahi.	<i>Veazea nays</i>
Lawo.	<i>Tamarix indica</i>
Jhangoori Ber.	<i>Tamarixaphylla</i>

6.4 Socio Economic Environment

The project site is in industrial land; hence direct disturbance to communities will be minimum from the project activities. However, the physical extent of the study area extends up to 5km surrounding the proposed site (referred as project area) considering the physical, ecological, and socioeconomic boundaries beyond which the project is not likely to significantly influence local communities, and also with a view of covering a substantial sample size for collection of reliable and authentic socio-economic data.

6.4.1 Indigenous people

People inhabiting the project area are of different castes and races. Most of the families have been living here in these villages from 20 to 25 years which has led to homogeneity of culture and the development of a closed economy. There is no danger or damage or elimination of indigenous community as the locals are steeped in their customs and have no intention of relocating.

6.4.2 Religion, ethnic group and cast patterns

99% communities of these villages are Punjabi speaking only 1% community belongs to other ethnic groups like Sraiki, Pashto etc. Religion plays an important role in the social structure of the society. Sunni Muslims is primarily inhabiting these two villages except a few families of Ahl-e-tasheh and Ahl-e-Hadees also lives here.

6.5 Quality of Life Value

Overall, the social and physical infrastructure is not up to the mark in the project area. However, the project area is better as compared to the other rural areas of the province. A brief account of the education, health, infrastructure, and markets of the area is as follows:

6.5.1 Education

The level of literacy is low as compared to the literacy rate of the district Multan i.e., 45%. Average education of the community is Primary. Though there are higher secondary government schools, private sector schools and colleges for girls and boys are also available near the vicinity of project area. People go to Multan and other cities of Pakistan for university education.

6.5.2 Health facility

Basic Health Unit, Dispensaries and Private clinics exist in the surrounding villages of the project area. People also access to private hospitals in city and sometimes to nearby private dispensaries. Fever, malaria and chest congestion, Hepatitis-C were reported as the common diseases of the project area. In the project area, health conditions are much developed.

6.5.3 Economy of Area

District Multan is an industrial and commercial city having multi-occupations. The population of the area is having different occupation including government and private services as well as agriculture. The women also assist their men in the economic activity in different fields of business, service, education, and other institutions. Women mostly serve in schools, colleges, and hospitals.

Multan is generating many employment opportunities for its locals and outsiders. Industrial areas are using manpower, while nearby towns are providing business opportunities to the residents. In this semi urban area, people are involved in daily wages jobs, while some are involved in small business. They normally travel to adjacent areas for work. Some work in the industrial area and in the surrounding universities and colleges. People are also involved in agriculture. Area having access to irrigation water is another source of income. Similarly, livestock is a secondary source of income. It is safe to assume that livestock farming is practiced uniformly in both types of areas. Economy of the project area is dependent primarily on two occupations i.e., agriculture (maximum) and livestock (limited extent), while some locals are also involved in manual labor.

6.5.4 Agriculture

Agriculture is one of the most important economic activities in the project area. Major crops of the area are:

In Rabi: Wheat, Fodder, and some seasonal vegetables

In Kharif: Rice, Sugarcane, Fodder and Seasonal Vegetables

Irrigation in the area is primarily sustained through tube-well irrigation. Canals are the major sources of water supply for irrigation in the area.

6.5.5 Livestock

Livestock ownership has also developed in the project area; especially among poor families who sell animals during emergency days as mostly unemployed people depend on livestock and sometimes agriculture. The people have livestock which include cows, goats, sheep, and donkeys. All the animals are of native breed. Milk and butter from the livestock are consumed by the household and are sometimes sold in the market. Good breeds of buffaloes and cows are found in the project area. Goats, horses, asses, and mules are also part of the livestock in these villages.

6.5.6 Archeology and cultural sites

There were no archaeological sites near the project area although nearest Chaks do have mosques, graveyards and durbars.

7 IMPACT ASSESSMENT

This section discusses the potential environmental impact for the establishment of veterinary medicines and feed additives manufacturing facility by the name/title as M/s Moderna Sciences (Pvt.) Ltd. The impacts may include; soil contamination, water resources depletion, biological resources disturbance and socio- economic impacts and, where applicable, identifies mitigation measures that will reduce significantly, if not eliminate, its adverse impact. The assessment carried out in this section is based on potential impacts on overall environmental receptors within the project area.

- To find different alternatives and ways of carrying out the project activities, which may cause adverse environmental and social impacts on the surroundings.
- To enhance the Environmental and Social benefits of project.
- To avoid, minimize and remediate adverse impacts.
- To ensure that residual adverse impacts are kept within acceptable limits.

7.1 Impact Assessment Method

This section discusses the project's potential environmental impacts due to the proposed project. The adverse impact may occur on; the area's geomorphology, soil, water resources, air resource, biological resources and socio-economic condition and where applicable, identifies mitigation measures that will reduce significantly, if not eliminate, its adverse impact. The assessment carried out in the sub-sections below is based on potential impacts on overall environmental receptors within the project area. Impacts are evaluated on the basis of magnitude, immediacy and sustainability.

There are various methods for Impact assessment such as listed below:

1. Checklists
2. Matrices
3. Networks
4. Overlays
5. GIS and computer expert systems

The method used to evaluate the impacts of proposed project is **Checklist Method**. This method has been used to identify the significance and magnitude of the impacts as well as the

nature, reversibility and extent. The impact assessment done on the basis of project phases from construction to operation.

7.2 Evaluation of the Residual Impacts

Incorporation of suggested mitigation measures may reduce the magnitude of the environmental impacts of above stated 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.

It can be concluded in view of these reasons that the selected site is best suited for the project and the technology adopted for the proposed project. The said project will not pose any adverse impact or threat on any component of the environment, if properly managed.

7.3 Characteristics of Impact

Based on the nature of impacts further sub divisions can be as followed:

- Positive and Negative Impacts
- Long- and Short-Term Impacts
- Direct and Indirect Impacts
- Continuous and Intermediate Impacts
- Wide and Local Impacts
- Large, moderate and minor Impacts

DURING CONSTRUCTION PHASE

Basic Components	Impact Characteristics												
	Duration		Location		Frequency		Extent		Significant			Nature	
	Long	Short	Direct	Indirect	Continuous	Intermediate	Wide	Local	Large	Moderate	Minor	Positive	Negative
Soil Erosion		*		*		*		*			*		*
Air Quality		*	*			*		*			*		*
Ground Water Quality		*	*			*	*			*			*
Noise Level		*	*			*		*			*		*
Wastewater Generation	*		*		*		*		*				*
Solid Waste	*		*		*			*		*			*
Aesthetic		*		*		*		*			*		*
Flora		*		*		*		*			*		*
Fauna		*		*		*		*			*		*
Employment Rate		*	*			*	*			*		*	
Economic Uplift		*	*			*	*			*		*	
Health & Safety		*	*			*		*			*		*

DURING OPERATIONAL PHASE

Basic Components	Impact Characteristics												
	Duration		Location		Frequency		Extent		Significant			Nature	
	Long	Short	Direct	Indirect	Continuous	Intermediate	Wide	Local	Large	Moderate	Minor	Positive	Negative
Soil Erosion		*		*		*		*			*		*
Air Quality		*	*			*		*			*		*
Ground Water Quality	*		*			*	*			*			*
Noise Level		*	*			*		*			*		*
Wastewater Generation	*		*		*		*		*				*
Solid Waste	*		*		*			*		*			*
Machine Installation	*		*		*			*		*		*	*
Generator Installation		*		*		*		*			*		*
Aesthetic		*		*		*		*			*		*
Flora & Fauna		*		*		*		*			*		*
Salts & Preservatives		*	*		*			*		*			*
Economic Uplift	*		*		*		*		*			*	

The impact analysis of a veterinary medicines facility encompasses a multifaceted evaluation of the facility's influence on various stakeholders and sectors. Firstly, the unit significantly contributes to animal health and welfare by providing essential medications and feed additives that address a spectrum of health concerns in diverse species. This positively impacts livestock productivity and the overall quality of animal-based products. Moreover, veterinary medicines play a crucial role in disease prevention, reducing the risk of transmission from animals to humans. Economically, the unit contributes to the veterinary pharmaceutical industry, fostering innovation, research, and employment opportunities. The agricultural sector benefits from improved animal health, translating into enhanced farm productivity. On the regulatory front, the unit's adherence to stringent quality standards ensures product safety, bolstering public trust. Conversely, challenges may arise, including the environmental impact of pharmaceutical residues and the potential development of antimicrobial resistance. A comprehensive impact analysis has been considered to guide sustainable practices, regulatory compliance, and continuous improvement within the veterinary medicine's unit. By adopting proper PPEs and by following mitigation measures and EMP, the impact associating with this proposed project can be neglected.

8 ANTICIPATED IMPACTS AND MITIGATION MEASURES

This chapter provides a review of the potential impacts by the construction of Veterinary medicines and feed additives manufacturing facility located at Plot # 69 & 70, Vehari Industrial Estate, Vehari over an area of 42937 Sqft. The purpose of this project is to meet the market demand, livestock health and proponent economic uplift. The estimated cost for the subject proposed project will be about 80 million PKR. These impacts could be both positive and negative in nature and have been classified accordingly by a thorough review of the construction and operational phases of the project. This assessment numerates the magnitude of these impacts with the aid of environmental matrices and presents effective mitigation measures to counter their adverse nature.

8.1 Purpose of Environmental mitigation measures

For the project to be running successfully and compliance with environmental regulations mitigation of impacts caused by the project is required. The purpose of the need of mitigation can be answered by various questions as follows:

1. What is the problem?

When the resources of the environment are being used ruthlessly, it results in degradation of the environment to the extent that the environment loses its resilience and the carrying capacity reduces the resources found and the recovery process is too slow or nearly no recovery is possible.

2. When will the problem occur and when should it be addressed?

The problems that would occur fall within the project premises, and near the boundaries of the project location. The impacts would range up to the distance where project related activities are performed or up-to the geographical zone where the effects spread. Impacts would show their presence soon after the project development starts.

3. Where the problem should be addressed?

The problems should be addressed where they originated. That is at the project location.

4. How should the problem be addressed?

Problems can be addressed by using environmentally friendly practices. Such practices can be followed by following mitigation plans.

8.2 Impact Identifications Methodology

Potential impacts from the project activities were identified by a thorough review of the project activities, study of surrounding environment, review of literature, from previous similar studies and expert judgment.

8.2.1 Approaches for Mitigation Measures

Following approaches may be used to mitigate the impacts of the project:

Avoid: Change of route or site details, to avoid damage important ecological or archaeological features.

Replace: Regenerate similar habitat of equivalent ecological value in different Location.

Reduce: Filters, cyclones, noise barriers, dust, enclosures, visual screening, wildlife corridors and changed time of activities to reduce the impact.

Restore: Site restoration at the end of the operational activities.

Compensate: Relocation of displaced communities, facilities for the affected communities, financial compensation for the affected individuals, etc.

8.3 Potential Environmental Impacts and Mitigation Measures due to project location

The location is well linked to the other parts of the city through main Rd of Vehari Industrial Estate. There will be no enduring, high and adverse impact predicted due to the establishment of the proposed project at this location. The project site is mostly industrial in nature. The selected site is owned by the client and there is no clash associated with the ownership of the land. Moreover, the area is not inhabited by any ecologically important or protected flora and fauna specie as well as within 2.0 km vicinity of the project area no archaeology and historically important site is located.

8.4 Potential Environmental Impacts and Mitigation Measures due to design

All technical standards will be kept in mind while construction and operational activities. The waste will be generated during different project activities. The proper handling of waste will be ensured. The technology will be updated and new machines will be used for processing.

Advance and comprehensive method will be followed. The fuel used in machinery is more eco-friendly and will emit less emissions. The design proposed is latest and can be used easily. The transportation activities will be done through the main. Efficient infrastructure has been developed.

8.5 Potential Environmental Impacts and Mitigation measure during Construction Phase

Project construction phase whose activities will surely show effects on land environment, water, air, noise level, soil quality, socio-economic trend of area, etc. These impacts had been controlled effectively by adopting best management practices.

8.5.1 Air Quality

Potential Issues:

Impact on air quality will be arise due to moving of vehicles different gases like Sox, NOx, PM and other gaseous emission, transporting construction material cause spreading of dust particles in air. The machinery used in construction phase also emits gaseous particles.

Mitigation Measures:

These impacts will be reduced by:

- For reducing fugitive dust, regular water sprinkling on roads has been carried out
- Usage of low-noise construction machine
- Covering the transport vehicle by tarpaulin
- The construction machinery and equipment must be kept maintained on a regular basis
- Use the updated fuel in vehicle

8.5.2 Noise Quality

Potential Issues

During construction process compaction, blistering and mixing of raw material machinery granulation process, use of heavy machinery for clearing of the site and trolleys and trucks used for the transportation of construction materials will create some noise and vibration as well.

Mitigation Measures

These impacts will be reduced by:

- Avoiding the unnecessary use of horns.

- Proper maintenance of machinery engines.
- Noise control measures will take such as provision of silencers on the heavy construction vehicles.
- The green zone of plants will also help decrease sound levels.

8.5.3 Water availability

Ground water will be used for the water requirement. But due to increasing demand of water nearby water resources may be affected, however the impact shall be lesser in magnitude.

Mitigation Measures

- Water will be handled with great care.
- Pipes and containers will be used for further usage of water.
- Water will be saved at maximum possibility during construction.

8.5.4 Wastewater drainage

Potential Impact

There will be no impact on the natural drainage ways. During Construction, the generated wastewater may impact on the environment if not properly managed.

Mitigation Measures

- Municipal wastewater drainage will be properly handled.
- Punjab Environmental Quality Standards (PEQS) will be compliance for waste management and disposal.
- Wastewater will be disposed of in the drainage system after the treatment through wastewater treatment plant (ETP).

8.5.5 Solid Waste Management

Potential Impacts

The solid waste will be generated due to construction material like gravels, sand particles, and packaging bags of construction material. If not properly handled it can also damage the drainage system. Disposal of construction debris produce shall be properly disposing of otherwise it would have negative impacts on the site and surrounding area.

Mitigation Measure

The impacts will be minimized if:

- Solid waste will be collected timely.
- Waste bins will be provided on the site for disposal.
- Spreading of solid material will be avoided.

8.5.6 Ecological Impacts

Potential Issues

Impacts on wildlife may arise from the following project activities:

- Noise generated from project activities.
- Air pollution due to emissions
- Movement of personnel and vehicles
- Clearing of vegetation

Mitigation measures:

The following mitigation measures will reduce the adverse impact on the wildlife of the project area:

- Vegetation loss will be kept to an absolute minimum. Cutting of large trees will be avoided.
- Fires in the open will not be allowed.
- A 'no-hunting, no-trapping, no-harassing' policy will be strictly enforced, unless threatening to human life.
- Uncontrolled discharge of waste of any kind will not take place in the area.
- Discharging firearms will be explicitly prohibited.
- General awareness of the crew will be enhanced regarding the wildlife, through environmental training, notice board postings, tool box talks etc.
- The project staff will be educated and instructed to avoid killing. Feeding or harassment of wildlife will not be allowed.
- Physical disturbance to areas outside the work corridors will be avoided.
- The total duration of activities will be minimized by good management.

8.5.7 Impacts Related to Health and safety

Possibility of health and safety hazard of workers is always present during construction phases like laying of pipes, installation of scaffolding and machines installations. To avoid cuts and damages to the skin during sterilization, packaging of the medicines certain medical facilities must be present at the site during construction.

Mitigations

- To handle emergency medical situations, first aid facilities have already been made available for the workers at the site.
- Avoid all possible injuries during construction of the project.
- The contractor will ensure the availability of transport and driver to handle any emergency condition during construction activities at the project site.
- Safety equipment like belts, gloves and helmets should be strictly used by the labor at the work site.
- Implement training programs that support the achievement of the staff and personnel's competency in relation to health, safety and environment.
- Introduce methodology of motivating good safety and environmental performance.

8.5.8 Increase in Employment Opportunities

Due to installation of aforesaid project, the employment opportunity will be slightly enhanced. During construction phase, 15-20 workers will be hired from local community include; skilled and un-skilled workers. Locals will also have the opportunity to diversify their income by being employed. Hence, there will be an increased employment opportunity for the local people which will have a positive impact on the socio-economic status of the area.

8.6 Anticipated Impacts and Mitigation Measure during Operational Phase

The summary of the impacts and possible mitigation measures during the operational phase are as follows:

8.6.1 Impact on air quality

Dust will be generated due to the movement of vehicles carrying the raw-material and finished goods. During operational phase, suspended particulate matter and gaseous emissions will be the main pollutant, not in a significant amount.

Mitigation Measures

Following mitigation measures will be adopted:

- For dust suppression regular sprinkling of water will be carried out.
- Vehicles used for transportation of input material as well as finished product and the utility vehicles will be regularly serviced and maintained in order to keep the environmental impact on account of their exhaust emissions to its minimum level.
- Native tree would be planted along the boundary of project area to keep environment healthy.
- For removal one tree, 3-5 trees will be planted.

8.6.2 Impact of Noise

Noise, an unwanted sound, affects human being. Excessive exposure to noise produces varying degree of damage to hearing system. It leads to headache, fatigue, etc. Continuous exposure of increased level of noise will have an adverse impact on the health of workers as well as the people residing in surrounding area.

Mitigation Measures

In general, the following methods will be adopted to control the noise pollution from the proposed project: A thick greenbelt will be developed all around the plant which will be acting as noise barrier.

- The use of concrete and masonry walls & barriers keeping in view the benefits of stiffness weight & cavity construction & the need to provide well sealed sound attenuating doors & windows.

- Attenuation by use of sound absorbents on walls and fixed or suspended ceilings.
- All the transporters will be vised to carry out regular maintenance of their vehicles.

8.6.3 Solid Waste Management

Proper solid waste management system is necessary for the prompt, timely and efficient disposal of solid waste & sludge for the reduction of its impacts. Impacts due to solid waste are expected to be temporary and minor in nature.

Mitigation Measure

- Use separate waste bins for disposal of solid waste
- Timely collection of solid waste from site.

8.6.4 Impacts of Wastewater

Wastewater will be produced from the domestic sources and during the manufacturing of medicines. Direct dispose of can affect the drainage system. Improper or mismanagement of sewerage supply system can cause polluted water to spread out and can affect the land.

Mitigation Measure

- Provide proper drainage system.
- Wastewater will be disposed of in the drainage system after the treatment through wastewater treatment plant (ETP).
- Wastewater should meet the PEQS before discharging it to the drain.

8.6.5 Health & Safety of Workers

Improper handling of chemicals and raw material may cause various health issues such as; inhaling, injection, work place incident, physical hazards, chemical hazards, etc. It can cause allergy reaction and many other issues. To ensure the safety of workers these impacts need to be managed effectively.

Mitigation Measures

- Workers will be trained on the regular basis regarding personal safety, disaster management physical and chemical hazards.
- Training regarding HSE should be given on the regular basis.

- Workers will be given PPEs such as; helmets, mask, ear-plugs/muffs, safety boots, etc.
- It should be strictly enforced to wear PPEs while working.
- Incidents should be reported directly to the concerned authority.
- Unloading of the input-material and loads of the final products should be controlled, supervised, slow and smooth.

8.6.6 Impact on Flora and Fauna

No significant species present there. Some of common trees and animals found there. No adverse impact imposes on it.

Mitigation Measure

- After construction trees will be planted.
- Avoid unnecessary cutting and damage to habitats.

8.7 Environmental Enhancement Measure

The proposed project will be installed with all precautionary measures to enhance and safe the environment. Following necessary measures will be adopted during construction and operation:

- At workplace workers and employers have enough information, knowledge, and training regarding first aid treatment in case of any emergency. The project provides proper medical facilities to workers and staff to cope with any incidental accidents and tackle them
- Drugs and narcotics are strictly prohibited during working hours in working areas.
- The staff / attendants of the machinery will use proper protective gears.
- Sprinkling of water will be done on dusty road and tracks
- PPEs will be provided during construction activity
- Constructional waste and domestic solid waste will be disposed-off or utilized properly
- Local people will be informed in advance when work is about to start in an area
- Machinery will never be left unattended
- Efforts should also be made to discuss traffic conditions so that regular traffic is not disturbed. Transporters engaged for the project would be forced to adhere to the load specifications of the access road. No overloading would be allowed in any case.
- Safety signs and boards will be placed during construction
- Proper SOPs will be followed with proper schedule along with the HSE conditions
- Area will be restored with native plants. A proper tree plantation plan will be formulated to save the environment
- Solid waste will be handed over to contractors and agreement will be made.
- Noise will be controlled by adopting proper measures
- PPEs will be provided to workers during working
- Safety signs will be placed at all locations where required
- First aid facilities will be made available
- Any possible measure will be adopted to make the project safe and environmentally friendly.

9 ENVIRONMENTAL MANAGEMENT & MONITORING PLAN (EMMP)

A comprehensive management plan is necessary to implement the recommendations and suggestions for environmental protection included in chapter. The objective of the Environmental Management and Monitoring Plan (EMMP) is to address all the major environmental issues and provide a framework for the implementation of the proposed mitigation measures during the construction and operational phases of the project. The proper implementation of the EMP will ensure that all the adverse environmental impacts identified in the EIA report are adequately mitigated, either totally prevented or minimized to an acceptable level and required actions to achieve those objectives are successfully adopted by the concerned institutions or regulatory agencies.

For effective environmental management, the management of the project should assign the necessary responsibilities to its Health, Safety and Environment team, which should be responsible for environmental monitoring of the project.

9.1 Objectives of Environment Management Program

The EMMP provides a delivery mechanism to address potential impacts of the project activities, to enhance project benefits and to introduce standards of good practice to be adopted for all project works. The EMMP has been prepared with the objectives of:

- Defining roles and responsibilities of the project proponent for the implementation of EMMP and identifying areas where these roles and responsibilities can be shared with other parties involved in the execution and monitoring of the project.
- Outlining mitigation measures required for avoiding or minimizing potential impacts assessed in the EIA report.
- Developing a monitoring mechanism and identifying requisite monitoring parameters to confirm effectiveness of the mitigation measures recommended in the EIA report.
- Defining the requirements for communication, documentation, training and monitoring, management, and implementation of the mitigation measures.

9.2 Environmental Budget

Table 12 Environmental Budget

Environmental Component	Quantity	Amount Pak Rs.	Details/Basis
Landscaping/Plantation	1000-2000 approx.	01 million	Cost includes plantation and maintenance up to three years
Solid waste management	L.S	03 lacs	Lump Sum
Health & Safety Measures	L.S.	05 lacs	Lump sum
Miscellaneous Cost	L.S.	01 lacs	Lump sum
Air Quality Monitoring	2	10,000	2 samples @ 5000/sample
Water Quality Monitoring	2	10,000	2 samples @ 5000/sample
Noise Level Monitoring	2	10,000	2 samples @ 5000/sample
Soil Tests	2	10,000	2 samples @ 5000/sample
Training		10,000	Lump sum
External Monitoring		50,000	
Total Environmental and Social Management Cost		2 million	

9.3 Environment Management and Monitoring Plan (EMMP)

Table 13 Environment management and monitoring plan (MMP)

ENVIRONMENT MANAGEMENT AND MONITORING PLAN				
S. #.	Impact	Mitigation Measure	Responsibility	
			IMPLEMENTATION	MONITORING
A.	CONSTRUCTION STAGE			
1.	AIR QUALITY			
	Dust, SO ₂ , NO _x & CO emissions from trucks, cause health issues to workers.	Spray by water trucks to minimize the dust. Maintenance of construction machinery should be made mandatory to reduce emissions. Haul-trucks carrying earth, sand, aggregate and other materials will be kept covered with tarpaulin to reduce dust pollution.	Contractor	Proponent through Consultant
2.	NOISE			

	The impact of noise generated during construction.	Engines of vehicles visiting project site should be properly tuned-up. The green zone of plants will also help to decrease sound levels.	Contractor	Proponent through Consultant
3.	OCCUPATION, HEALTH AND SAFETY			
	There will always be the possibility regarding hazard to health and safety of workers to occur during construction stage, lying of piles, and machines installation.	First aid facilities should be readily available for the workers at the site. The contractor will ensure the availability of transport and driver to handle any misshape which may occur. Relevant safety devices like belts, gloves and testers should be strictly used by the labor force at the work site. Implement training programs that support the achievement of the staff and personnel's competency in relation to HSE.	Contractor	Proponent through Consultant
4.	DISPOSAL OF CONSTRUCTION DEBRIS			
	Each phase of the development shall produce solid waste, disposal of which, if not managed properly could have negative impacts on the site and surrounding area.	A site waste management plan should be made the responsibility of the contractor. The wastes should be properly segregated and separated to encourage recycling of some useful waste materials.	Contractor	Proponent through Consultant

		Train or educate the involved stakeholders on the importance and means of waste management and handling.		
5.	GROUND WATER QUALITY			
	No appreciable impacts on the ground water quality are anticipated.	Avoid accidental spills through good work practice.	Contractor	Proponent through Consultant
6.	SOIL CONTAMINATION			
	Any improper storage or handling of materials including paints, fuels, solvents, oil, cement, etc. would result in soil contamination.	The contractor should be required to impart proper training to their workforce in the storage and handling of materials.	Contractor	Proponent through Consultant
7.	FLORA & FAUNA			
	No negative impact on the ecological environment will take place on account of cutting of any trees in the project area and clearing of vegetation from the site.	Trees and ornamental plants shall be planted along the project boundary which increase the aesthetic value of the site and will combat pollution. Landscaping is deemed to be a powerful mitigation activity with a positive impact.	Contractor	Proponent through Consultant
8.	SOCIO-ECONOMIC ENVIRONMENT			

	Several categories of employees will be required during the construction phase. This would have a positive impact on the local economy and on regional unemployment.	Socially responsible attitude of the project management towards local people and resources can make project people friendly. Awareness and educational programs introduced by the project management or e area can reduce the fear among the people regarding non-local people.	Contractor & Proponent	SIE
B.	OPERATIONAL STAGE			
9.	AIR QUALITY			
	The slightly increased traffic as a result of project operation will not result in the significant increase in concentrations of emissions of flue gases as the number of visiting vehicles shall be limited for transportation of materials and 4 vehicles for staff per day.	Proper maintenance and tuning of the vehicles done by the proponent.	Proponent	EPA
10.	NOISE QUALITY			
	Noise due to movement of vehicles, during traffic of materials.	No Mitigations required except for keeping maintenance of vehicles. Plantation along with boundary will make buffer zone to avoid noise.	Proponent	EPA

11.	OCCUPATION, HEALTH AND SAFETY			
	There will always be the possibility regarding hazards to health and safety of workers to occur during the operational phase of the project. Loading and unloading of products also increase the chances of incidents.	All the workers involved in transport of the materials will be suggested to wear boots, gloves, safety cap to avoid injury Plantation of trees along the boundary walls will help in reducing the noise levels to enough extent. Noise absorbing paint should be used on indoor walls to minimize its impacts on the outer environment. All the vehicles should be properly tuned up and regular maintenance and periodic monitoring must be done. Strict rules should be made by the project administration to control speeds of vehicles.	Proponent	EPA
12.	SOLID WASTE			
	The solid waste may negatively impact the site, the workers, the visitors and the factory surrounding in different ways including aesthetically, occupationally as well as from health, safety and environment point of view. The packaging box waste will be produced	Solid waste will be collected by system, which will be managed by the management of proposed project. Recyclable material will be recycled.	Proponent	EPA

13.	WASTEWATER QUALITY			
	The sewage effluents shall be discharged after primary treatment into the main sewerage tank.	The system for the treatment (wastewater treatment plant (ETP)) of the sewage effluent should be appropriately installed and maintained.	Proponent	EPA
14.	FLORA & FAUNA			
	Excessive plantation shall be done on the walls. This will act as a buffer zone and bring healthy change in the environment during the operational phase of the project.	The process of plantation should be kept sustainable throughout project life.	Proponent	EPA
15.	SOCIO-ECONOMIC ENVIRONMENT			
	A few employees will be required in the operational phase and this would have a positive impact on the local economy and on regional unemployment.	The management of the project can capitalize the positive attitude of people of the study area towards this project by offering them maximum employment opportunities. Measurements and steps should be taken to keep undisturbed the privacy of adjoining workplaces.	Proponent	EPA

9.4 Proposed Monitoring/EMP reporting and Reviewing Mechanism

Table 14 Proposed monitoring and reviewing mechanism

Category	Impact	Project Activity	Monitoring Mechanism	Frequency	Monitoring Agency
Construction and Operational Phase					
Land Resource	Solid Waste	Implementation of Solid waste Management system	Record keeping and timely transfer of Solid waste from bags to the disposal site for disposal	Daily	Manager HSE/Project Proponent
	Soil Contamination	Implementation of Management Plan	Visual monitoring and complete soil analysis	Daily and annually	
Ecological	Flora	Uprooting of trees	Inventory of uprooted	During Baseline	
Air Resource	Air Emission	Dust emissions during Construction and Operation	Monitoring of the emissions as per applicable standards Water sprinkling will be done regularly to avoid dust emissions	Once before start of operation and after that as when required during operation	
	Dust				
Noise	Noise Pollution	Development/operational material transportation	As per applicable standards	Fortnightly	
Water Quality	Wastewater generation	Domestic wastewater, due to construction activities	Water quality testing	Monthly	
Health and Safety	Health risk	During construction and operational phase mainly due to more chemical usage	Keep record of workers as they use PPE's and follow safety signs and instructions	Daily	
Resource		During construction phase	Trees and vegetation during operation phase	Survey, once in a year and after the completion of the Project	

9.5 Training of Workers

One of the most important mechanisms for the enhancement of the project's overall environmental performance will be the implementation of a program of environmental training for the project personnel and the Contractor's team.

Environmental training will form part of the ongoing environmental management of the project. It will help to ensure that Proponent's environmental policies and principles are followed. The Contractor will be expected to implement a formalized training program.

Suggested components of an environmental training program may be as follows:

- Promotion of environmental protection measures in company literature, broadsheets, posters, project updates, etc.
- Provision of guidance notes on environmental protection to contractor/s.
- Clear signs at worksites highlighting prohibited activities (discarding of wastes, smoking).
- Clear signs indicating sanitary disposal areas, safe drinking water sources, etc.

9.5.1 Training schedule

A training log will be maintained by the management of the project and contractors. The training log will include:

- Topic
- Date, time and location
- Trainer
- Participants

Important training under the spectrum needs to include:

- Training on firefighting and safety management
- Training on environmental safeguards and compliance
- Staff training on environmental monitoring and reporting
- Training on occupational health and safety measures.

Table 15 Training Schedule

Participants	Date, Time & Location	Training Topics	Schedule	Responsible Authority
Staff of M/s Moderna Sciences (Pvt.) Ltd and the contractor	As specified	✓ Introduction to project EIA and EMMP ✓ EMMP communication, documentation, monitoring and reporting requirements	Every month	Project Manager
All site personnel	As specified	✓ Site induction training on HSE system and requirements at Incinerating Site ✓ Environmental sensitivities of the project area ✓ Communication of environmental problems to corresponding officials ✓ Waste disposal	After every week	Project Manager
Drivers	As specified	✓ Road safety ✓ Road restrictions ✓ Vehicle restrictions ✓ Waste disposal ✓ Defensive driving	After every 3 months	Project Manager
Camp Staff	As specified	✓ Camp operations ✓ Waste disposal ✓ Good housekeeping	Monthly	Project Manager

9.6 Environmental Management Team

Following functionaries will be involved in the implementation of EMMP:

- Mr. Muhammad Asad Gulzar Rana, as the proponent of the project and owner of Environmental Management Plan during construction as well as operation stage.

- Project contractor(s) as executors of the EMMP during the construction phase of the project.
- Operational & Maintenance (O&M) and the Health, Safety and Environment team of the project as an executor of the EMMP during the operational phase of the project.
- Environmental Protection Agency (EPA), Punjab as Government Department to review and monitor the implementation of remedial and mitigation measures as given in EIA.

9.6.1 Responsibilities of functionaries

Specific responsibilities of key role players are illustrated hereunder:

9.6.2 Responsibilities of management of project

Management of the project **M/s Moderna Sciences (Pvt.) Ltd** will be responsible for the environmental management and supervisory affairs during the project activities. Environmental personnel designated by the management of the project will look after the environmental related issues during the project activities. The responsibilities of environmental personnel are as follows:

- Monitoring progress of the project as per planned schedule of activities.
- Exercising oversight over the implementation of environmental mitigation measures by the contractor.
- Documenting the experience in the implementation of the environmental process.
- Preparing training materials and implementing programs.
- Maintaining interfaces with the other lined departments / stakeholders.
- Reporting to the management of the project on the status of EMMP implementation.

9.6.3 Responsibilities of project contractor

Contractor appointed for the commissioning of the project including the auxiliary facilities is responsible for:

- Implementation of all provisions of the EMMP and with any environmental and other codes of conduct required by the project.
- Provision of proper Personal Protective Equipment (PPE) to the workers and train them for their proper use.

9.6.4 Responsibilities of EPA

To review and monitor the implementation of remedial and mitigation measures as given in the EIA.

9.7 Equipment Maintenance Details

The proposed project is to establish the Veterinary medicines and feed additives manufacturing facility by the title “**M/s Moderna Sciences (Pvt.) Ltd**” located at Plot # 69 & 70, Vehari Industrial Estate, Vehari over an area of 42937 Sqft. The purpose of this project is to meet the market demand, Livestock health and proponent economic uplift. All tools, equipment and vehicles must be properly maintained so that workers are not in danger. Construction regulations require inspections of vehicles, tools, machines and equipment before use. We must always be aware that maintenance tasks themselves are potentially hazardous and can result in injury.

The successful maintenance program is:

- Well organized and scheduled
- Controls hazards
- Defines operational procedures
- Trains key personnel

9.8 Proposed Environmental Monitoring

Environmental monitoring can be categorized into two types:

- Compliance Monitoring
- Effects Monitoring

The environmental monitoring will be conducted according to EPA regulation.

9.8.1 Compliance Monitoring

Compliance monitoring will be carried out to ensure compliance with the requirements of the EIA and EMMP. The project staff and contractors will carry out the inspections on a routine basis. This will also include the routine monitoring at the project site as specified in EMMP.

9.8.2 Effects Monitoring

To monitor actual impacts of the project on selected sensitive receptors so that impacts not anticipated in the EIA report or impacts which exceed the levels anticipated in the EIA report can be identified and appropriate mitigation measures can be adopted in time. This objective will be achieved through effects monitoring.

9.8.3 Monitoring components

Baseline environmental monitoring will be carried out for the following essential parameters.

- Noise Levels
- Ambient Particulate Matter
- Ambient Air Gases
- Ground Water
- Wastewater
- Soil Contamination
- Solid Waste
- Vehicular Monitoring
- Flora & Fauna
- Health & Safety
- Machinery Maintenance

10 STAKEHOLDER CONSULTATION

Stakeholder's consultation is a tool used for communication with a diverse group of stakeholders having multifarious aims such as information dissemination, exchanging views, soliciting feedback and suggestions on issues pertaining to the project, plan future actions. This practice initiates a need assessment and identify areas of concern for all the parties that maybe affected by the project activities.

Stakeholders by definition are all those people and institutions who have an interest in the successful design, implementation and sustainability of the project. This includes those positively and negatively affected by the project.

Project can actively participate in decisions on planning and management. The stakeholders including regulators, government representatives and NGOs were met to appraise and discuss the environmental and social perspective of project activities related to the construction and operation of incineration unit. Their valuable concerns and suggestions were noted and thereafter incorporated in the EIA process and study.

All the stakeholders were briefed about the project verbally. Their feedback was noted, and all the concerns voiced in the discussion were relayed to the management team of the project.

10.1 Benefits and Objectives of Stakeholders Consultation

Consultation with stakeholders leads to an overall better understanding of the project on the part of the communities and gives the proponent a clearer understanding of the stakeholders' perspective. Effective public consultation can add substantial value to the EIA process. The information gained through public consultation on the stakeholders' concerns, interests, and their ability to influence decision-making helps identify key cause of environmental problems.

This can be used to evaluate direct and indirect environmental impacts and assess short term and long-term resource use implications. The input from local communities and NGOs can help evaluate alternatives and strengthen the management planning by incorporating local input and know-how.

An informed public will better understand the tradeoffs between project benefits and disadvantages; be able to contribute meaningfully to the project design; and have greater trust with the project proponent and support for the project, says the Asian Development Bank.

These factors contribute towards improved project implementation sensitized to the human environment of the area. The objectives of stakeholders' consultation are to:

- Promote better understanding of the proposed operation through explaining its objectives and its potential positive and negative impacts.
- Identify and address concerns of all interested and affected stakeholders.
- Provide a mechanism to resolve issues identified by communities, before project plans are finalized and development begins, thereby, avoiding public outcry and resentment.
- Instill trust between various stakeholders and the proponent to promote cooperation.

10.2 Identification and Classification of Stakeholders

During the field survey, significant efforts were made to identify the possible categories of stakeholders and their stakes. Identification of stakeholders is important for the sustainability of a developmental project and helps to evaluate and envisage the role of stakeholders.

All the stakeholders had different types of stakes according to their professions. The stakeholders that are likely to be influenced by the project activities or would like to participate in the project include:

- **Industries surrounding the project area:** Stakeholders can be classified depending on the influence of the project activities on them. The stakeholders for the project are classified as follows:
- **Industries:** Industries, groups or institutions directly affected by the project and can influence the project outcome.
- **Local communities:** Residential areas around the project site.

10.3 Views, Concerns and Suggestions of Various Stakeholders

The major socio-economic concerns and problems of the affected persons of various communities have been given in tabulated form along with their main concerns and remarks. Community showed a lot of concerns; a few are being mentioned here:

- Removal of shrubs and trees should be avoided, if any, to the extent possible in the case of clearance green zones should be established within the facility.
- Indigenous trees around the facility should be planted to control air pollution and as the compensation of construction activity.
- The project will become the source of income for local to earn their livelihood easily

and honorably, so locals should be preferred.

- For the solid waste management and waste disposal, proper disposal techniques should be adopted.
- Water spraying/sprinkling should be done on the regular basis during construction phase to avoid dust emissions.
- Employment opportunities will be generated and locals should be hired on the priority basis.
- The air pollution is one of the major impacts from which Punjab is being affected at the large scale. So, ambient air quality should be monitored regularly and air pollution expected to generate from the operation should be mitigated.
- Good relations with the local communities will be promoted by encouraging contractor to provide opportunities for skilled and unskilled employment to the locals as well as on-job training.
- Noise generated activities should be carried out during day hours.

10.4 Methodology for consultation

Stakeholder consultation is a two-way flow of information and dialogue between the project proponent and stakeholders, specifically aimed at developing ideas that can help shape project design, resolve conflicts at an early stage assist in implementing solutions and monitor ongoing activities.

Various techniques are used worldwide to carry out the stakeholder consultation that includes discussions, meetings and field visits. A series of scoping sessions and informal focus group discussions were carried out with local communities and local government representatives. The meetings were held at various locations.

10.5 Proponent's Environmental Management Team and Experts

Table 16 Responsible Authority

Sr. #	Managers	Responsibilities
1.	Contract Manager	• Implementation of EMP • Environmental issues identification during pre-construction phase. • Communication EMP to all employees.
2.	Contractor	• Ensure that the control measures identified during environmental surveys are implemented as they are relevant to their work/visit. • Ensure that the project management team is notified of any non-conformance of control measures or environmental incident where the environment has been put at risk.
3.	Site Manager	• Ensure site material and safe handling of hazardous waste. • Controlled access arrangement to avoid hazards. • Emergency egress arrangements to avoid any unfortunate incident. • First aid facilities/services should be readily available on-site.
4.	Site HSE Advisor	• Ensure good standards of workmanship. • Engaged health and safety to devise site waste management plan to be followed and implemented. • Daily checks & weekly checks. • Regular consultation with workers.
5.	Site Environment Advisor	• According to legislation and consent develop EMP. • Ensure application of EMP. • Carry out regular site inspection.
6.	Public Contact Officer	• First point of contact for members of the public. • Arrange and manage public forums. • Maintain relation with stakeholders. • Coordination with work.

10.6 The responsible Authority

Overall responsibility for implementation of EMP will be that of project proponent. He will appoint an HSE/Project Manager of relevant qualification. HSE/Project Manager will act as Environmental Manager and will manage all HSE condition at the PEQS.

10.7 Environmental Practitioners and Experts

Consultation with Environmental Practitioners and experts was done and following comments and suggestions were noticed.

Table 17 List of Experts

Sr. No	Name	Designation	Comments/Suggestions
1.	Engr. Muhammad Bilal	Environmental Engineer	Following comments are summarized to control the air pollution generation during operational phase - It should be ensured that the pollution abatement technique will be applied. - Health and safety measures will be followed.
2.	Sara Fatima	Environmentalist	- During construction emissions must be controlled properly. - Basic facilities should be provided to local Community.
3.	Zia ur Rehman Farooqi	Ph.D. Scholar Environmental Sciences	- Following mitigation measures should be adopted: - Tree plantation in designated green zones should be carried out. - Proper disposal of the solid waste. - HSE management measures should be adopted and implemented effectively.
4.	Mr. Saffi Ahmed	Environmentalist	- He said that locals should be preferred for employment. - Value addition of area. - Proper mitigation measures must be adopted while construction and operation of this project.
5.	Aleeza Kanwal	Environmental Engineer	- A proper Health and Safety Department and trained people should be there in case of any emergency. - Proper PPEs should be given to the workers for their safety.
6.	Kanza Fatima	Environmental Engineer	- Solid waste must be collected and dispose of properly. - In both construction and operational phase PPEs should be followed.

10.8 Other department and agencies

Following officers of government departments were consulted by the socio- environmental team of the consultants and concerned details about the project were noted down through personal interviews, group meetings, etc., in their offices, for instance.

Table 18 Department and agencies

Sr. #	CNIC/Designation	Concerns
Environmental Protection Department		
1	GM (General Manager)	Following comments area summarized to control the pollution: • Solid waste should be managed in Environmentally friendly manner. • Wastewater should be treated effectively & approval should be acquired from concerned agency before disposing off in nearby drain. • HSE* at the site should be managed effectively. • No impact is being foreseen due to the selected location. • Locals should be given job opportunity.
2	Environmental Inspector	
Social Welfare Department		
3	Deputy Director Officer	Following comments are suggested by the Deputy Director on the behalf of Social Welfare Department: • Final goods should be affordable for the locals. • The proposed product should facilitate locals and they should be economical. • Job opportunities should be given to the locals. • Wages should be given according to the work assign to them. • Life insurance of the workers should be given as well as all the facilities should be given as per labor laws.
Irrigation Department		
4	Sub Division	Following comments were suggested:
	Executive Engineer	• Untreated wastewater should not be disposed of in the nearby drains without proper treatment. • Beneficial as job opportunities will be available to the local residents.

Forest Department		
5	District Forest Officer	Following recommendation were suggested by the forest department: • Planation and landscape activities should be carried out on broader scale. Barna, Neem, Suharjna, Amaltas and Jaman should be planted. • Proper drainage system must be available at site.

10.9 Consultation with Affected and wider community

In addition, to the use of direct methods to evince the response of the various stakeholders in targeted population residing in study area was ascertained by conducting a sample survey, through specially formatted questionnaires. Questions posed to the public were related to creation of possible impacts, adverse impacts and beneficial impacts, including employment opportunities, income generation activities, change in living standards and provision of the basic amenity.

Personal views of the respondents on the establishment of proposed project possible disturbance to the residents near the AOI and infringement of their privacy were also recorded. Various rounds of public meetings and consultations were arranged in project and study area. The stakeholder category involves nearby resident, different industries, shopkeepers. The issues discussed with them are mostly related to the following:

- Activities of project.
- Impacts caused due to certain activities during construction and operational phase.
- The proposed mitigation measures.

PICTORIAL VIEWS





11 CONCLUSION

The project is aiming at development of veterinary medicines and feed additives manufacturing facility as proposed project. The project falls under the category of the projects requiring Environmental Impact Assessment (EIA).

At the end of this study, it has been found that:

- There are no sensitive elements/segments of environment around the project site.
- It has also developed ways and means for environmentally sustainable disposal of solid wastes to be generated from the project operations.
- The noise levels will be kept well within the required limiting values of the NEQS Pakistan.
- This project will create job opportunities during construction and operation stages leading towards reduction of poverty.
- Sewage will be passed through wastewater treatment plant (ETP)s before final treatment and disposal.
- It will help in the improvement of community/social service status in the local area. It will also provide such facilities for people from other places.
- Project site means the development criteria like electricity supply, gas supply, water supply and sewage system.
- EMP, as recommended in this EIA Report, is to be put in place during all operational stages of the project.
- Environmental monitoring by the project proponent and a third party also ensures that the project will run in accordance with legal requirements.
- Availability of water for the project is ensured from the underground water sources without any effect on the needs of the people around the project area.

Based on these findings of the EIA Report the project merits the issuing of Environmental Approval by the Environmental Protection Agency, Government of Punjab, and Lahore.

GLOSSARY

Accommodate	(of a building or other area) provide lodging or sufficient space for. "the cottages accommodate up to six people"
Assessment	The action of assessing someone or something. "the assessment of educational needs"
Aspects	A distinct feature or element in a problem
Adverse	– Preventing success or development; harmful; unfavorable. "taxes are having an adverse effect on production"
Authorized	– having official permission or approval. "an authorized dealer"
Amendment	a minor change or addition designed to improve a text, piece of legislation, etc. "an amendment to existing bail laws"
Ambient Air	Ambient air quality refers to the quality of outdoor air in our surrounding environment. It is typically measured near ground level, away from direct sources of pollution
Archaeological	the scientific study of material remains (as fossil relics, artifacts, and monuments) of past human life and activities
Annunciation	A formal public statement
Baseline	The existing conditions against which impacts of the proposed action and its alternatives can be compared.
Crushing	Deform, pulverize, or force inwards by compressing forcefully. "You can crush a pill between two spoons"
Containers	An object for holding or transporting something. "The cakes will keep for up to two weeks if kept in an airtight container"
Compliance	Acting according to certain accepted standards
Discrepancies	A difference between conflicting fact, claims or opinions
Disposal	the action or process of getting rid of something
Dumped	Deposit or dispose of (rubbish, waste, or unwanted material), typically in a careless or hurried way
Effluent	Any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapor
Environmental impact statement (EIS)	A document prepared to analyze the impacts on the environment of a proposed action and released to the public for review and comment. An EIS must meet the requirements of NEPA, CEQ, and the directives of the agency responsible for the proposed action.
Emission	The production and discharge of something, especially gas, or radiation." The effects of lead emission on health"
Evaluated	Estimate or determine the nature, value, quality, ability, extent or significance
Graded	Arranged in a sequence of grades or ranks; "stratified areas of the distribution"
Generation	The production or creation of something
Incinerator	A furnace or a container for burning waste materials
Inadequate	Not capable or competent; lacking
Implementation	The process of putting a decision or plan into effect; execution

Intends	To have in mind as something to be done or brought about; plan: to design or mean for a particular purpose, use, recipient, etc.
Landfill site	for the disposal of solid waste in which refuse is buried between layers of dirt so as to fill in or reclaim low-lying ground
Legislation	Law enacted by a legislative body
Mobilization	To release or make available, as cells or chemical substances
Mitigation	The action of lessening in severity or intensity
Noise	Loud, unpleasant, unexpected, or undesired sound that disrupts or interferes with normal human activities
Potential	Having or showing the capacity to develop into something in the future
Pedestrian	A person who goes or travels on foot; walker
Proponent	The person who proposes or intends to undertake a project
Sanitary	Relating to the conditions that affect hygiene and health, especially the supply of sewage facilities and clean drinking water
Segregate	Set apart from the rest or from each other; isolate or divide. "Disabled people should not be segregated from the rest of society"
Settlement	An official agreement intended to resolve a dispute or conflict. "Unions succeeded in reaching a pay settlement"
Ton	A short or net ton is equal to 2,000 pounds; a long or British ton is 2,240 pounds; a metric ton is approximately 2 to 205 pounds
Transportation	The action of transporting someone or something or the process of being transported. "the era of global mass transportation"
Ultimate	Being or happening at the end of a process; final. "Their ultimate aim was to force his resignation"
Violations	the action of violating someone or something
Working place	From the out by side of the last open crosscut to the face
Flora	All the plant life in a particular region or period
Fauna	All the animal life in a particular region or period
Demarcated	Separately clearly, as if by boundaries
Screening	The display of a motion picture
Substitutions	An event in which one thing is substituted
Smelting	extract (metal) from its ore by a process involving heating and melting
Regulations	An authorized rule
Recycling	process of converting waste materials into new materials and objects
Stakeholders	A person or organization with an interest or concern in something
Rehabilitation	The conversion of waste land into land suitable for use of habitation or cultivation

LIST OF ABBREVIATIONS

AA	Ambient Air
APHA	American Public Health Association
AOI	Area Of Influence
BOD ₅	Biological Oxygen Demand
CMS	Convention On Migratory Species
COD	Chemical Oxygen Demand
dB(A)	Decibel
EA	Environmental Assessment
EHS	Environmental Health Safety
EIA	Environmental Impact Assessment
EPD	Environmental Protection Department
PEPA	Pakistan Environmental Protection Act
EPA	Environmental Protection Agency
ESIA	Environmental And Social Impact Assessment
ESA	Environmental And Social Assessment
ESMP	Environmental/Social Management Plan
EMP	Environmental Management Plan
EC	Electrical Conductivity
GIS	Geographical Information System
GOP	Government Of Pakistan
GPS	Global Positioning System
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HSE	Health Safety & Environment
HWMS	Hazardous Waste Management System
EIA	Environmental Impact Assessment
I & D	Irrigation And Drainage
IAIA	International Association for Impact Assessment
IWM	Industrial Waste Management
IUCN	International Union for Conservation of Nature

KM	Kilometers
LGO	Local Government Ordinance
MW	Mega Watt
MEAS	Multilateral Environmental Agreements
MSDS	Material Safety Data Sheets
NEQS	National Environmental Quality Standards
PMD	Pakistan Meteorological Department
PPE	Personal Protective Equipment
PEQS	Punjab Environmental Quality Standards
NEAP	National Environmental Assessment Plan
NWFP	North West Frontier Province
Q&EHS	Quality, Environment, Health & Safety
O & M	Operation And Maintenance
PKR	Pak Rupees
PPM	Parts Per Millions
PAP	Project Affected People
PEPC	Pakistan Environmental Protection Council/Punjab
PSC	Project Steering Committee
QA/QC	Quality Assurance/Quality Control
RAP	Resettlement Action Plan
ROG	Reactive Organic Gas
SWM	Solid Waste Management
TDS	Total Dissolved Solids
TT	Technology Transfer
UNFCCC	United Nation Frame Work Convention On Climate Change
UNCC	United Nation Convention To Combat Desertification
UNEP	United Nations Environmental Programs
GOP	Government Of Pakistan
WHO	World Health Organization
R&R	Rehabilitation And Resettlement
WWTP	Waste Water Treatment Plant

LIST OF INDIVIDUALS AND THEIR FEEDBACKS

Sr.#	Name	Concerns
1	Kamran Ali Khan	During the survey in the study area following concerns of the local community were noted: - Air pollution should be controlled effectively, such as emissions generated from power generating activities. - Chemicals should be stored and handled properly only authorized persons should be allowed near the chemical storage area. - Locals should be preferred for the job opportunities. - Wastewater should be treated prior to final disposal in nearby drain. - Solid waste should be managed effectively by adopting the standard practices of the area. - Cleanliness of the area should be ensured. - An effective EMMP should be designed and enforced with true spirit. - Health of the workers should be ensured. - Planation should be carried out at extensive scale. - Construction activity should be carried out during day hours. - Noisy activities should be confined.
2	Muhammad Waqas	
3	Qaiser Farooq	
4	Ghulam Mujtaba	
5	Mehboob Alam Shahid	
6	Muhammad Latif	
7	Mazhar Hussain	
8	Shahbaz Khan	
9	Waseem Ahmed	
10	Rab Nawaz	
11	Allah Yar	
12	Ahmed Saeed	
13	Muhammad Jabbar	
14	Muhammad Ramzan	
15	Kamran Ali Khan	

SOURCE OF DATA

- Punjab Environmental Protection (Amendment) Act 2012 (PEPA)
- Guidelines for the preparation and review of Environmental Reports, October 1997
- Review of EIA/ EIA Regulation, 2022
- The 2004 Baseline Survey on Millennium Development Goals in AACs, Pakistan
- World Weather Online.com
- Water and Sanitation Agency (WASA), Lahore.
- RED Data Book of IUCN
- Material Safety Data Sheet (MSDS) of chemicals
- /www.wsask.ca/Global/Water%20Programs/Water%20Conservation/SWA-
- Water_Efficiency_on_the_Farm_Booklet_WEB.pdf
- <http://www.madehow.com/Volume-2/Lead.html>
- http://www.ijirset.com/upload/2013/november/18_Disposal.pdf

TERMS OF REFERENCES

- * According to regulation 7 of Review of EIA and EIA regulations, 2022, proponent shall pay, at the time of submission of EIA/EIA, a nonrefundable review fee to EPA, in accordance with rates specified in schedule-III.
- * Provide all documents/details required for completion of EIA report
- * Proponent shall be responsible for paying any fines/ penalties levied by the EPA Punjab or Environment Tribunal.
- * Proponent shall be responsible correctness and validity of all information and documents provided to the consultant for onward submission to EPA Punjab and consultants will bear no responsibility.

In M/s Moderna Sciences (Pvt.) Ltd

For Enviro Stewards Co. Pvt. Ltd.

Ms. Sara Fatima

Mr. Zia ur Rehman

LIST OF NAMES, QUALIFICATIONS AND ROLES OF TEAM MEMBERS CARRYING OUT THE EIA/EIA STUDY

Table 19 List of experts and practitioners

Sr. #	Name	Qualification
Team Leader		
1	Miss. Sara Fatima	M.Phil. Environmental Sciences
Environmental Scientist		
3	Mr. Zia ur Rehman Farooqi	Ph.D. Environmental Sciences (Scholar)
4	Hafiz Zeeshan Safder	M.Sc. Analytical Chemistry
5	Mr. Saffi Ahmed	M.Phil. Environmental Sciences
Environmental Engineers		
7	Miss Misbah Ali	B.Sc. Environmental Engineering
8	Engr. Muhammad Bilal	B.Sc. Environmental Engineering
Sociologist		
9	Qazi Muhammad Ahmed Raza	M. Phil Sociology

