DEEPAK FERTILISERS
AND PETROCHEMICALS
CORPORATION LIMITED

EIA for Expansion of NPK Fertilizer Manufacturing Unit, MIDC Industrial Area, Taloja, Raigad, Maharashtra

EIA Report

COMPLETE SOLUTIONS
IN WATER & ENVIRONMENT

Asian Consulting Engineers Private Limited, New Delhi

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

CHAPTER-1: INTRODUCTION

1.1 Agriculture in India..... 1-1
1.2 Fertilizer Production in India..... 1-1
1.3 Need of Project..... 1-6
1.4 Project Proponent..... 1-6
1.5 DFPCL Existing Products..... 1-8
1.5.1 Industrial Chemicals..... 1-8
1.5.2 Ammonium Nitrate..... 1-8
1.5.3 Agri Business..... 1-8
1.6 Brief Description about the Project..... 1-8
1.7 EIA Consultant..... 1-10
1.8 Purpose of EIA Study..... 1-10
1.8.1 Policy and Legal Framework..... 1-11
1.9 Scope of EIA Study..... 1-11
1.10 Approach and Methodology of EIA Study..... 1-15
1.10.1 Approach of EIA Study..... 1-15
1.10.2 Establishment of Baseline Environmental Status..... 1-15
1.10.3 Field Study/ Monitoring for Generation of Primary Data..... 1-16
1.11 Structure of the EIA Report..... 1-17
1.12 Compliance Report..... 1-18

CHAPTER-2: PROJECT DESCRIPTION

2.1 Project Overview..... 2-1
2.2 Justification of Project Location..... 2-3
2.3 Salient Features of Project..... 2-5
2.3.1 Salient Features..... 2-5
2.3.2 NPK Plant..... 2-6
2.4 Raw Materials Used..... 2-6
2.5 Basis of Design (Process Description)..... 2-7
2.5.1 Solid Circuit..... 2-7
2.5.2 Granulation..... 2-8
2.5.3 Drying..... 2-8
2.5.4 Screening Section..... 2-8
2.5.5 Cooling Section (Using a Rotary Cooler)..... 2-9
2.5.6 Product Coating..... 2-9
2.5.7 Liquid Circuit..... 2-10
2.6 Water Balance for Construction and Operation Phases..... 2-12
2.6.1 Construction Phase..... 2-12
2.6.2 Operation Phase..... 2-13
2.7 Storm Water Drainage System..... 2-13
2.8 Rainwater Harvesting System..... 2-13
2.9 Sewage Treatment Plant..... 2-13
2.10 Effluent Treatment Plant..... 2-14
2.11 Solid Waste Management..... 2-16
2.12 Hazardous Waste Management System..... 2-16
2.13 Occupational Health and Safety For Workers..... 2-16
2.13.1 Safety Training 2-17
2.13.2 Safety Manual..... 2-21

2.13.3 Safety Committee..... 2-22
2.13.4 Health..... 2-22
2.14 Power Requirement..... 2-26
2.15 Utilities..... 2-26
2.16 Employment..... 2-26
2.17 Land Details..... 2-26
2.18 Hazardous Materials Storage and Handling Facility..... 2-26
2.19 Air Pollution Control Systems..... 2-27
2.19.1 Air Scrubbing System..... 2-27
2.20 Fire Fighting System..... 2-28
2.21 Onsite Emergency Plan..... 2-28
2.22 Offsite Emergency Plan..... 2-28
2.23 Mutual Aid Response Group..... 2-28
2.24 Transportation of Hazardous Chemical..... 2-28

CHAPTER-3: DESCRIPTION OF THE ENVIRONMENT

3.1 General Setting of Site and Study Area..... 3-1
3.1.1 Study Area..... 3-1
3.1.2 Site Description and Its Environs..... 3-2
3.2 Topography and Geology..... 3-4
3.2.1 Topography..... 3-4
3.2.2 Geology..... 3-6
3.3 Hydrology and Hydrogeology..... 3-6
3.3.1 Hydrology..... 3-6
3.3.2 Hydrogeology..... 3-7
3.4 Soil Quality Monitoring..... 3-9
3.4.1 Methodology for Soil Monitoring..... 3-9
3.4.2 Soil Monitoring Locations..... 3-9
3.4.3 Soil Characteristics in the Study Area..... 3-11
3.5 Land Use and Land Cover..... 3-12
3.6 Water Environment..... 3-14
3.6.1 Surface Water..... 3-14
3.6.2 Ground Water..... 3-14
3.6.3 Raw Water and Waste Water from ETP..... 3-16
3.6.4 Methodology for Water Quality Monitoring..... 3-17
3.6.5 Surface Water Quality Monitoring Results..... 3-18
3.6.6 Ground Water Quality Monitoring Results..... 3-18
3.6.7 Effluent Treatment Plant Monitoring Results..... 3-19
3.7 Climate and Meteorology..... 3-20
3.7.1 Climate of Taloja..... 3-20
3.7.2 Relative Humidity..... 3-21
3.7.3 Cloud Cover..... 3-21
3.7.4 Cyclone..... 3-21
3.7.5 Micro-Meteorology..... 3-21
3.7.6 Atmospheric Inversion Level..... 3-23
3.8 Air Environment..... 3-24
3.8.1 Ambient Air Quality Monitoring..... 3-24
3.8.2 Parameters, Frequency and Monitoring Methodology..... 3-26
3.8.3 Ambient Air Quality Monitoring Results..... 3-26
3.9 Noise Environment..... 3-24
3.9.1 Ambient Noise Monitoring..... 3-28
3.9.2 Methodology..... 3-31
3.9.3 Observations, Regional Scenario and Effects..... 3-32
3.10 Biological Environment..... 3-33

3.10.1 General Setting..... 3-33
3.10.2 Flora..... 3-33
3.10.3 Threatened and Endangered Plant species..... 3-35
3.10.4 Economical Important Plant Species..... 3-35
3.10.5 Fauna..... 3-35
3.10.6 Eco Sensitive Areas..... 3-36
3.11 Socio – Economic Environment..... 3-36
3.11.1 Demographic Profile..... 3-38
3.11.2 Occupation..... 3-38
3.11.3 Infrastructural Facilities..... 3-38
3.11.3.1 Connectivity and Communication..... 3-38
3.11.3.2 Hospitals and Schools..... 3-39
3.11.3.3 Places of Religious/Archaeological and Other Importance..... 3-39

CHAPTER-4: ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 Introduction..... 4-1
4.1.1 Prediction of Impact..... 4-4
4.2 Impact on Air Environment..... 4-4
4.2.1 Impact During Construction Phase..... 4-4
4.2.2 Impact During Operation Phase..... 4-4
4.2.3 The Model..... 4-5
4.2.4 Model Input..... 4-5
4.2.5 Modeling Procedure..... 4-6
4.2.6 Modeling Results..... 4-6
4.2.7 Discussion on Modeling Results..... 4-11
4.3 Impact on Noise Quality..... 4-11
4.3.1 Construction Phase..... 4-11
4.3.2 Operation Phase..... 4-12
4.4 Impact on Water Quality..... 4-12
4.4.1 Construction Phase..... 4-11
4.4.2 Operation Phase..... 4-12
4.5 Impact on Land Environment..... 4-12
4.5.1 Construction Phase..... 4-12
4.5.2 Operation Phase..... 4-13
4.6 Impact on Biological Environment..... 4-13
4.6.1 Construction Phase..... 4-13
4.6.2 Operation Phase..... 4-13
4.7 Impact on Socio Economic Environment..... 4-13
4.8 Impact Evaluation..... 4-14
4.9 Impact Significance..... 4-15
4.10 Impact Mitigation Measure..... 4-16
4.10.1 Air Environment..... 4-16
4.10.2 Water Environment..... 4-16
4.10.3 Biological Environment..... 4-17
4.10.4 Occupational Health Hazard from Noise Pollution..... 4-17
4.10.5 Waste Generation and Management..... 4-17

CHAPTER-5: ENVIRONMENTAL MONITORING PROGRAM

5.1 Environmental Monitoring Plan..... 5-1
5.2 Ambient Air Quality Monitoring..... 5-1
5.3 Noise Monitoring..... 5-1
5.4 Water Quality Monitoring..... 5-2
5.5 Ecology..... 5-2
5.6 Occupational Health..... 5-2

5.7 Budget..... 5-3

CHAPTER-6: ADDITIONAL STUDIES

6.1 Introduction..... 6-1
6.2 Objectives and Methodology of the Risk Analysis Study..... 6-1
6.3 Hazards Classification..... 6-2
6.4 Risk Scenarios..... 6-3
6.5 Risk Assessment..... 6-3
6.5.1 Modelling Output..... 6-4
6.5.2 Interpretation of the Modelling Output..... 6-8
6.6 Safety Measures for Storage of Hazardous Chemicals..... 6-10
6.6.1 Fire and Explosion Hazard..... 6-10
6.6.2 Toxic and Reactive Hazard..... 6-10
6.7 Safety Measures for Handling /Storage of Other Hazardous Chemicals..... 6-11
6.7.1 Ammonium Nitrate..... 6-11

CHAPTER-7: PROJECT BENEFITS

7.1 Introduction..... 7-1
7.2 Accruals to the Exchequer..... 7-1
7.3 Green Belt Development..... 7-1
7.4 Corporate Social Responsibility (CSR)..... 7-1
7.5 Reduction in Liquid Effluent & Gaseous Emissions..... 7-9
7.6 Reduction in Overall Effluent..... 7-9

CHAPTER-8: ENVIRONENTAL MANAGEMENT PLAN

8.1 Structure of EMP..... 8-1
8.2 Proposed Environmental Mitigation Measures..... 8-1
8.3 Environmental Management Plans..... 8-6
8.3.1 Rainwater Harvesting System..... 8-6
8.3.2 Air Pollution Management Plan..... 8-6
8.3.3 Storm Water Management Plan..... 8-8
8.3.4 Sewage Management Plan..... 8-8
8.3.5 Effluent Management Plan..... 8-8
8.3.6 Solid Waste Management Plan..... 8-11
8.3.7 Hazardous Waste Management Plan..... 8-11
8.3.8 Green Belt Development..... 8-11
8.3.9 Industrial Health, Safety and Hygiene..... 8-15
8.3.10 Post Project Environment Management..... 8-15
Corporate Responsibility for Environmental Protection(CREP)..... 8-17
8.4 Environmental Monitoring Plan..... 8-19
8.5 EMP Budget..... 8-20

CHAPTER-9: SUMMARY AND CONCLUSION

9.1 Summary and Conclusion..... 9-1

CHAPTER 10: DISCLOSURE OF CONSULTANTS ENGAGED

10.1 Introduction 10-1
10.2 Quality of Services 10-1
10.3 Area of Specialization 10-1
10.4 Resources 10-4

LIST OF TABLES

Table No.	Title	Page No.

Table 1.1	GDP of Agriculture and Allied Sectors and its Share in the Total GDP(Rs. Crores)	1-1
Table 1.2	Production of Urea and Complex Fertilizers in India (Qty. In Lakh LMT).....	1-1
Table 1.3	NPK Consumption and Imports in India.....	1-2
Table 1.4	Brief Description about the Project.....	1-8
Table 1.5	Applicable Acts and Guidelines for the Proposed Project.....	1-11
Table 2.1	Salient Features of the Project.....	2-5
Table 2.2	Details about Water Requirement during Construction Phase.....	2-12
Table 2.3	Water Consumption for Various Activities during Operation Phase.....	2-13
Table 3.1	Brief Description of the Project Site.....	3-3
Table 3.2	Soil Sampling Locations.....	3-9
Table 3.3	Soil Characteristics in the Study Area.....	3-11
Table 3.4	Classification of Land Use and Land Cover.....	3-12
Table 3.5	Sampling Locations for Surface Water, Ground Water and Waste Water.....	3-17
Table 3.6	Physico-Chemical Analytical Results of Surface Water.....	3-18
Table 3.7	Physico-chemical Analysis of Ground Water Quality.....	3-19
Table 3.8	Physico-Chemical Analysis of Effluent Treatment Plant Discharge Quality.....	3-19
Table 3.9	Meteorological Data of Study Area.....	3-20
Table 3.10	Ambient Air Quality Monitoring Stations.....	3-24
Table 3.11	Summary of PM_{10} Levels Monitored in the Study Area.....	3-27
Table 3.12	Summary of $PM_{2.5}$ Levels Monitored in the Study Area.....	3-27
Table 3.13	Summary of SO_2 Levels Monitored in the Study Area.....	3-27
Table 3.14	Summary of NOx Levels Monitored in the Study Area.....	3-28
Table 3.15	Summary of CO, VOC and NH_3 Levels Monitored in the Study Area.....	3-28
Table 3.16	Location of Noise Monitoring Stations.....	3-30
Table 3.17	Permissible Ambient Noise Standards.....	3-31
Table 3.18	Summary of Ambient Noise Levels Monitored in the Study Area.....	3-31
Table 3.19	Comprehensive List of Plant Species.....	3-33
Table 3.20	List of Economically Important Plant Species Present in the Study Area.....	3-35
Table 3.21	List of Fauna in Study Area.....	3-36
Table 3.22	Villages within Study Area.....	3-37
Table 3.23	Demographic Profile of the villages in the study area.....	3-38
Table 4.1	Identification of Potential Impacts: Activities Impacts /Risk Interaction.....	4-3
Table 4.2	Stack and Emission Characteristics.....	4-5
Table 4.3	Predicted 24-hourly Maximum GLC of NO_x ($\mu g/m^3$).....	4-6
Table 4.4	Predicted 24-hourly Maximum GLC of SO_2 ($\mu g/m^3$).....	4-7
Table 4.5	Predicted 24-hourly Maximum GLC of PM_{10} ($\mu g/m^3$).....	4-8
Table 4.6	Predicted 24-hourly Maximum GLC of $PM_{2.5}$ ($\mu g/m^3$).....	4-9
Table 4.7	Predicted 24-hourly Maximum GLC of NH_3 ($\mu g/m^3$).....	4-10
Table 4.8	Impact Significance criteria.....	4-15
Table 4.9	Potential Environmental Impacts of Proposed Project activity (Without Mitigation Measures).....	4-16
Table 4.10	Potential Environmental Impacts of Proposed Project activity (with Mitigation Measures).....	4-17
Table 5.1	Environmental Monitoring (Construction Phase).....	5-2
Table 5.2	Environmental Monitoring (Operation Phase).....	5-3
Table 5.3	Budget for Environmental Monitoring during Construction Phase.....	5-4
Table 5.4	Budget for Environmental Monitoring during Operation Phase.....	5-4
Table 6.1	Potential Hazard Classification and Analysis of Chemicals to be Used in the Proposed Expansion Unit.....	6-2
Table 6.2	Identified Risk Scenarios.....	6-3
Table 6.3	Details about the Storage Tank Capacity and Dimension	6-4
Table 6.4	Threat Zone Levels and its Distance from the Storage Tank	6-8
Table 7.1	Details of Livelihood Programs Conducted in last Three Year	7-2

Table 7.2	Existing 7 Proposed Effluent Discharge and Emission Reduction Details	7-10
Table 8.1	Proposed Environmental Mitigation Measures	8-2
Table 8.2	Plant Species Recommended for Reduction of Noise Level	8-12
Table 8.3	Plant Species Recommended for Protection against Gases and Particulates	8-12
Table 8.4	Suggested Plant Species for Green Belt Development	8-13
Table 8.5	CREP for Fertilizer Sector Factories: Compliance Status for Present Operations	8-17
Table 8.6	List of Parameters to be monitored during Construction and Operation Phases	8-19
Table 8.7	Environmental Budget	8-20

LIST OF FIGURES

Figure No.	Title	Page No.
Figure 1.1	Location of DAP and other Complex Fertilizers Plants in India…….	1-3
Figure 1.2	Trends in Consumption of Fertilizer Products (1990-91 to 2010-11).....	1-4
Figure 1.3	List of DAP and other Complex Fertilizer Plants.....	1-5
Figure 1.4	Location Map for the Proposed Project.....	1-7
Figure 2.1	Plant Layout Map Demarcating Proposed Expansion Unit.....	2-2
Figure 2.2	Layout Map of Taloja Industrial Area.....	2-4
Figure 2.3	Flow Chart For NPK Manufacturing Process……	2-12
Figure 2.4	Water Balance Diagram……..	2-15
Figure 3.1	Location Map of Project Site……	3-2
Figure 3.2	Study Area Map (10 Km Buffer)……..	3-3
Figure 3.3	Terrain Map of Study Area……..	3-5
Figure 3.4	3-D Digital Elevation Model of the Study Area……...	3-6
Figure 3.5	Drainage Map of Study Area……..	3-8
Figure 3.6	Soil Monitoring Locations in the Study Area……...	3-10
Figure 3.7	LULC Map of the Study Area……..	3-13
Figure 3.8	Ground Water and Surface Water Monitoring Locations……	3-15
Figure 3.9	Wind Rose For Taloja (Winter Season January to March 2013)……	3-22
Figure 3.10	Wind Class Frequency Distribution of the Study Area……	3-23
Figure 3.11	Ambient Air Quality Monitoring Locations……	3-25
Figure 3.12	Noise Monitoring Locations…….	3-30
Figure 3.13	Ambient Noise Levels Monitored in the Study Area(Day Time)…….....	3-32
Figure 3.14	Ambient Noise Levels Monitored in the Study Area (Night Time)……	3-32
Figure 3.15	Habitation Map of the Study Area……	3-37
Figure 4.1	Isopleths plot of concentration for NO_x (µg/m^3).....	4-7
Figure 4.2	Isopleths plot of concentration for SO_2(µg/m^3)	4-8
Figure 4.3	Isopleths plot of concentration for PM_{10} (µg/m^3).....	4-9
Figure 4.4	Isopleths plot of concentration for $PM_{2.5}$ (µg/m^3).....	4-10
Figure 4.5	Isopleths plot of concentration for NH_3 (µg/m^3)	4-11
Figure 8.1	Process Flow Diagram For Scrubbing.....	8-8
Figure 8.2	Effluent Reduction Flowchart for the Proposed Unit……	8-9
Figure 8.3	Water Balance Diagram for entire complex including proposed NPK expansion.....	8-10
Figure 8.4	Proposed Green Belt Development in the Expansion Unit.....	8-14
Figure 8.5	Environmental Management Cell.....	8-16

LIST OF DOCUMENTS ATTACHED AS ANNEXURES

ANNEXURE I

- NOC obtained for the existing NPK Plant
- EC for IPA and Gas based turbine obtained in past.
- Compliance reports submitted to MOeF, Bhopal
- MSDS data sheets of all the chemicals used in proposed project
- Environment Statement – as submitted to MPCB
- Water Supply Agreement
- MSEDCL – Power Sanction Letter
- Plot allotment receipts from MIDC
- Disposal of hazardous waste – Certificate of CETP, Taloja and Mumbai Waste Management Ltd.

ANNEXURE II

- Consent to Establish for the proposed expansion
- Certified Report Copy from IIT, Mumbai – 1st page and last 2 pages attached for reference.

ANNEXURE III

- Recent copy of Consent to Operate

ANNEXURE IV

- Environmental Policy of DFPCL

ANNEXURE V

- Onsite Emergency Management Plan of DFPCL.

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

1. Introduction

The Deepak Group of Industries came in to existence during 1970's when Mr. C.K. Mehta set up Deepak Nitrite Ltd. In 1983, Deepak Fertilizers and Petrochemicals Corporation Limited (DFPCL) started commercial production of ammonia (in technical collaboration with Fish International Engineers (USA), using natural gas as feed stock. This marked the fulfillment of a need for lateral integration into the world of basic building block chemicals, premium fertilizers and petrochemicals. At that time, this was India's only merchant ammonia manufacturer. The International Finance Corporation initially supported this venture of Deepak group in the form of equity participation in DFPCL.

The company undertook major expansion and diversification in 1989 to achieve forward integration of Ammonia and diversification in Methanol.

In July 1992, DFPCL commenced commercial production of Low Density Ammonium Nitrate (LDAN), Nitro Phosphate (NP) Dilute Nitric Acid (DNA), and Concentrated Nitric Acid (CNA). This has resulted in a multi-product portfolio for DFPCL consisting of chemicals, petrochemicals, fertilizers and other agri-inputs. To ensure an uninterrupted supply of natural gas to its plant, DFPCL laid its own 43 km gas pipeline from the coastal fall point of Bombay High to its plants in Taloja, thus becoming one of the first companies in India to have its own gas pipeline.

DFPCL has a chemical storage terminal at Jawaharlal Nehru Port Trust (JNPT) to provide support to its logistics management system and ensure a window to the world trade in chemicals. It is in the process of adding new storage facilities for Ammonia, Methanol and other products. The company also leases port storage capacities at Bombay Port Trust and Visakhapatnam. In year 2012-13, DFPCL clocked Turnover of Rs. 2500 Crore.

Now, DFPCL proposed the expansion of complex fertiliser unit from 3,24,000 MTPA of Single Grades of ANP to 6,00,000 MTPA of Multiple Grades NPK Fertilizers at its Taloja facilities in Notified Industrial Estate of MIDC, Maharashtra.

2. Project Description

The salient features of the proposed project are given in the **Table 1.**

Table 1: Salient Features of the Project

S.No.	Items	Details
1.	Name of Project	Expansion of NPK fertilizer manufacturing capacity with the purpose of manufacturing multiple grades of NPK
2.	Name of Organization	Deepak Fertilisers & Petrochemicals Corporation

S.No.	Items	Details
		Limited.
3.	Project Location & Land acquired	Plot no K1 to K5, MIDC, Taloja, Dist. Raigad. Being a Brown field expansion, no additional land acquisition is required
4.	Total DFPCL Plant Area	96 Acres (Plant Area) 16 Acres (Green cover)
5.	Area allotted for the proposed expansion	10000 m^2. No additional land requirement as plant shall be built in the area occupied by godowns presently.
6.	Nearby features	DFPCL complex is located in MIDC, Chemical Zone Nearest Highways : 5 Kms Railways : 3.5 Kms Airport : 45 Kms Port : Mumbai, 40 kms Nearest City : Panvel 15 Kms Nearest Forest – No Forest area Sensitive place – Nil Historical place - Nil
7.	Power requirement & source	DFPCL has its gas based power plant of 17.9 MW. 10 MW is taken from MSEDCL .Additional 5 MW requirement for proposed expansion shall be taken from MSEDCL. Approval for additional power is received from MSETCL.
8.	Power backup (DG Sets)	Construction phase: Power required for construction shall be supplied from internal power source. Operation phase : 500 KVA emergency back up DG for lighting purpose.
9.	ETP Facility	ETP Capacity : 5000 M^3/Day(Includes Industrial & Domestic) Quantity of effluent treated in ETP : 3800 M^3/Day
10.	End Product	Multiple grades of NPK fertilizer
11.	Annual Production (MT)	Present : 3,24,900 MTPA (NP) After Expansion : 6,00,000 MTPA (NPK)
12.	Proposed facilities	Main Process plant, new bagging plant Raw Material Storage and Handling facilities, Waste Water Recycle unit , 100 KV sub-station.
13.	Annual stream hours	6600 Hrs
14.	Manpower requirement	No additional manpower. Requirement shall be met from within existing manpower.
15.	Project Time schedule	126 Weeks
16.	Indicative Annual Reqmt. of Raw material	
	A. Ammonia	<= 150 MTPD
	B. Phosphoric acid	<= 325 MTPD

S.No.	Items	Details
	C. Clay (filler)	<= 150 MTPD
	D. Zinc sulphate	<= 15 MTPD
	E. Borax	<= 15MTPD
	F. MOP/K_2SO_4	<= 550MTPD
	G. Sulphuric acid	<= 10 MTPD
17.	Raw Water	Total water required 550 m^3/day. As part of this project DFPCL shall install water recycle unit to treat present effluent. Reject from this unit shall be used in the process. No additional fresh water requirement is envisaged for the complex due to this project.
18.	Project capital cost (Rs. Crores)	360.0
19.	Capital cost (Rs. Crores) for environmental protection measures	Approx 20.0 water recycle unit. Approx 20.0 process scrubbers.
20.	Proposed Air Pollution Control measures	A wet scrubber unit shall be integrated with main process to meet environment norms of dust & ammonia.
21.	Solid / hazardous waste management & waste	No process solid waste generation envisaged from the expansion project. Machine Lube oil waste shall be generated which is already consented. No increase in consented quantity envisaged.

A typical composition/specification of all the raw material required is listed as below:

Ammonia

State :	Liquid
NH_3 Content :	99+/- 0.5% w/w min
H_2O Content :	0.5 % w/w max
Oil Content :	10 ppm max

Phosphoric Acid

P_2O_5 :	52-54% Wt
H_2SO_4 (as SO_4) :	0.5 to 2.5%
CaO :	0.05 to 0.25 % wt
Al_2O_3 :	0.3 to 1.5% wt
Fe_2O_3	0.2 to 1.5% wt
R_2O_3 (Al_2O_3+Fe_2O_3) :	3.0% Max
F :	0.3 to 0.7 % wt
MgO :	0.4 to 1.2 % wt
Cl :	250 ppm

Suspended Solids :	1.5 to 2.5% wt

Sulphuric Acid

H_2SO_4 Content :	98+/- 1.0% w/w

Potash

K_2O :	60% MIN
Moisture :	0.5% wt max
Size :	0.5-1 mm 90% min
Organic matters :	200 ppm Max

It should be free flowing, without anti-caking and lumps

Filler

Si_2O_2 :	70%
Moisture :	0.5% wt max
Size :	0.5-1 mm 90% min
Organic matters :	200 ppm Max
Bulk density :	1400-1600 Kg/m3
Angle of repose :	30-32^o

It should be free flowing, without anti-caking and lumps.

The following facilities are within existing facility for handling the raw materials required for NPK production:

- Ammonia storage tank – 18000 MT capacity & 3000 MT capacity.
- Ammonia unloading and loading facilities.
- Phosphoric acid storage tank – 3000 MT capacity – 2 Nos. Additional two tanks shall be made.
- Phosphoric acid unloading and loading facilities.
- Sulphuric acid storage tank – 600 MT – 1 No.

All raw materials shall be transported by road.

3. Baseline Environmental Status

3.1 Topography

The topographic set up of the Raigad district is very uneven and rugged and is characterized by alternative bluffs and curved bays having narrow hinterlands. The central region of the district has many plateau and hills rising from the valleys. The Eastern part of the district is much rugged merging with the Sahyadri, which are

running North-South direction. The eastern horizon is marked by Sahyadri hills. In the western direction a steep slope dropping from 869 m at Raigad to 3 m above M.S.L.

3.2 Geology

The entire district is covered by basaltic lava flows known as “Deccan Traps”. These Deccan Traps are capped by laterites. The Recent, Sub-Recent and Pleistocene laterites are observed within the study area.

3.3 Hydrology

The drainage system of the district may be divided in to three groups as follows:

Northern region : Drained by river Panvel, Ulhas, Patalganga and Amba.
Central region : Drained by Kundalika and Mandad
South region : Savitri and its tributaries

The peculiarities of the drainage system of the district are that all rivers are Westerly following. A small river (Kasardi River), which is non-perennial in nature, flow along the Taloja Industrial Area and finally drains into the Arabian Sea.

3.4 Hydrogeology

The requirements of water for irrigation and the domestic purposes, are fulfilled by the groundwater. The groundwater occurs in weathered mantle, fractures and joints in Deccan trap. The depth of wells ranges between 3.50 to 8.50 m bgl. The surface water level in winter ranges between 1 to 3.50 m and in summer ranges between 4 to 8.00 m. Majority of the wells goes dry in the summer season due to poor productive aquifer. The yield of the wells tapping in the trap is poor to moderate. Wells are mainly used for seasonal crops. The depth of the wells ranges from 3.50 to 7.00 m bgl.

3.5 Soil Quality

The texture of the soil was found to be sandy clay and loam respectively. The pH of the soil samples was in the range of 6.8 to 7.4, which show that the soil is near neutral in nature. The available Sodium, Calcium and Potassium, varied from 20 to 836 mg/g, 98 to 257 mg/g and 11 to 87 mg/g respectively, which signify that the soil has significant nutrient value. The Sodium Adsorption Ratio (SAR) is less than 5.6 for all the soil samples, hence, the soil is non-saline in nature.

3.6 Land Use Land Cover

The land use land cover map for the study area was prepared by processing LANDSAT TM satellite imagery with 30 × 30 m resolution, March 2013

The Study Area is covered by 38.5% of built-up in which industries are in majority. Next to built-up area, agricultural land and shrub land which covers 20.1% and 7.5% of area respectively. The study area consist of 8.2% water bodies and it includes

major rivers like Kasardi River and Taloje river and it drains out to Arabian Sea. Overall 14.4 % of barren land is present in the study area; it also includes bare exposed rock in mountainous area. The elevated hilly area consists of 11.3% of Forest.

3.7 Water Quality

The Surface Water Monitoring was conducted for studying the various parameters in three different locations within the study area, namely Kasardi River, Valap Gaon and New Panvel. The pH range varies from 7.0 to 7.2 and all other parameters are well within the limits. Hence, the water is devoid of any pollution.

The ground water quality monitoring was carried out to study the various physic-chemical characteristics of water in six different locations within the study area, namely Pale Bhudrug, Valap Gaon, Taloje Majkur, New Panvel, Existing Plant and Temboda Village. The pH range varies from 6.5 to 7.7 and TDS value varies from 253 to 360 mg/l. All parameters were found to be within the drinking water standards (IS 10500-1991). Hence, the ground water is not polluted.

3.8 Climate of Taloja

The climate of Taloja is typical of that on the west coast of India, with plentiful and regular seasonable rainfall, oppressive weather in the hot months and high humidifies throughout the year. The summer season from March to May is followed by the south-west monsoon season from June to September. October and November form the post-monsoon or the retreating monsoon season. The period from January to March is the cold season. The weather of Raigad is influenced by the proximity to seaside.

The analysis of the average wind pattern (during winter season January to March 2013) shows predominant winds blowing from SW and SE. The calm wind (wind speed < 0.5 m/s) conditions prevailed for 2.23 % of the total time.

3.9 Ambient Air Quality

Six sampling stations were chosen for monitoring of ambient air quality within the study area. These were within 10 km from proposed expansion locations. Three of the locations were situated in the predominant wind direction (South West and South East) as per the Windrose.

The air quality parameters like PM10, PM2.5, SO2, NOX, CO, NH3, VOC and HC are monitored out of which PM10, PM2.5, SO2, NOX, CO and NH3 are listed in the NAAQ standard 2009 and are found to be within the permissible limits of prescribed standards. The 24-hourly average PM10 level varied between 39.05 µg/m3 to 48.25 µg/m3. The 24-hourly average PM2.5 level varied between 7.81 µg/m3 to 9.65 µg/m3. The mean of 24-hourly average values of SO2 over the study area was varying between 3.1 µg/m3 to 4.15 µg/m3. The mean of 24-hourly NOx level over the entire study area was varying between 18.85 µg/m3 to 22.85 µg/m3. Air samples for Carbon

Monoxide, Volatile Organic Carbon and Ammonia were collected from six different sites within the study area and details result is given in the report.

3.10 Noise

Ambient noise monitoring was conducted to assess the background noise levels in the study area. Six locations within the study were selected for the measurement of ambient noise levels. Noise monitoring was carried out on a 24-hour basis to assess the baseline noise-levels and to evaluate the impact.

The values of noise level, which are recorded lies between 50.32-70.04 dB (A) at day time and 39.75-58.94 (A) at night time. The noise level in the daytime as well as in night time were found to be within the permissible limit although the noise levels at N1, N2 are slightly high in the day & night time because of the industrial activities taking place in the area. The day equivalent and night equivalent values observed for all the locations are within the noise standards specified by CPCB.

3.11 Biological Environment

The list of flora and fauna present in the project area are given in **Table 2** and **3**.

Table 2: Comprehensive List of Plant Species

S. No.	Scientific Name	Local Name
Tree		
1.	*Azadirachta indica*	Neem
2.	*Neolamarckia cadamba*	Kadam
3.	*Cocos nucifera*	Narial
4.	*Santalum album*	Chandan
5.	*Terminalia arjuna*	Arjun
6.	*Polyalthia pendula*	Ashoka
7.	*Tectona grandis*	Sagun
8.	*Terminalia catappa*	Badam
9.	*Ficus religiosa*	Peepal
10.	*Mangifera indica*	Aam
11.	*Syzygium cumini*	Jamun
12.	*Tectona grandis*	Sagun
13.	*Artocarpus heterophyllus*	Jackfruit
14.	*Acacia arabica*	Babul
15.	*Zizyphus jujuba*	Ber
16.	*Psidium sp.*	Guava
17.	*Acacia arabica*	Bakul
21.	*Aegle marmelos*	Bel
22.	*Acacia catechu*	Khair
Shrubs		
1.	*Sida cordifolia*	Bala
2	*Macaranga peltata*	Macaranga

S. No.	Scientific Name	Local Name
3.	*Strobilanthus callosus*	Karvi
Herbs		
1	*Adhatoda vasica*	Basak, adusa
2	*Aloe vera*	Aloe
3	*Cynodon dactylon*	Dub
4	*Jatropha gossypifolia*	Ratanjaun
5	*Lantana camara*	Lantana
6	*Ocimum sp.*	Bantulsi
7	*Mimosa pudica*	Chuimui
8	*Ricimus communis*	Castor bean
9.	*Euphorbia hirta*	Dudhi

Table 3: List of Fauna in the Study Area

S.No.	Common name	Vernacular name	Scientific name	Status/WPA Schedule No.
Mammals				
1	Common Hare	Khargush	*Lupus migricollis*	Least Concerned
2	Common House Rat	Chuha	*Rattus rattus brunneusculus*	Endangered, V (1991)
3	Indian Fox	-	*Vulpes bengalensis*	Endangered, II (1991)
4	Langur	Hanuman	*Presbytis entellus entellus*	Endangered, II (1991)
5	Monkey	Bander	*Macacus mulatta mulatta*	Endangered, II (1991)
Reptiles				
1	Python	Ajgar	*Python molurus*	Near Threatened
2	Cobra	Cobra	*Naja naja*	Not Evaluated
3	Wall Lizard	-	*Podarcis sp.*	Least concern
4	Indian Chameleon	Girgiti	*Chamaeleo zeylanicus*	Least Concern
Avifauna				
1	Crow	Kauwa	*Corvus brachyrhynchos*	Least concern
2	Common Myna	Mayna	*Acridotheres tristis*	Least Concern
3	Rock Pigeon	Kabutar	*Columba livia*	Least concern
4	Eagle	-	*Aquila hastata*	Vulnerable
5	House Sparrow	-	*Passer domesticus*	Least Concern
6	Baya Weaver	Baya	*Ploceus philippinus*	Least Concern
9	Owl	Ullow	*Otus sp.*	Least Concern

No Eco sensitive Zone like Biosphere reserve, National Park, Wildlife Sanctuary is present within 10 km of the study area or its vicinity.

3.12 Socio-Economic Environment

Pale Bhudrug, Valap, Taloje Majkur, Morbe, Devichapada and Dhamini are the major villages in the study area under Panvel Block.

There are 90 Gram Panchayat and 174 Villages in Panvel Block with 90,008 households. The total population of the block is 4,22,522 including rural population of 2,18,186 and urban population of 2,04,336. The literacy rate within the block is 81%. A large number of populations are engaged in industries at Taloja Industrial Area. Some others have their own small businesses (shop owners) and farming.

Apart from that, agriculture also provides livelihood to a large section. People are engaged in growing crops and plantations for commercial purposes. The major cash crops of the area are paddy, mango and vegetables. Some people also work as laborers in the agricultural fields.

Most of the villages have good connectivity and communication facilities. The villages nearby the Taloja Industrial Area are well connected with each other. There are state highway (SH-47), national highway (NH 17) and Mumbai-Pune Expressway, which passes along the study area thereby providing good connectivity to a very wide network of the national and state highways.

Panvel railway station is the nearest main railway station at approx. 10 km from the project site, which is well connected to the study area. Apart from railways and roadways, there are rivers flowing through the area that provides good inland navigational facilities.

Most of the villages in these tehsils have both mobile and landline telecom connections. They have post offices and many cooperative as well as regional level banks. All the villages have television/radio sets and are aware of national and international news/events.

The villages of the Panvel block do not have good medical facilities. Primary health centers exist in few of the villages along with some private doctors, so the villagers have to go to Panvel for any major disease. Therefore, medical facilities need to be developed in these villages. Although primary educational facilities are there in all the villages there is also a need for the development of higher level of educational institutes.

4. Identification of Impacts and Mitigation Measures

The impacts and mitigation measures with respect to the construction and operation phases of the proposed project are given in **Table 4.**

Table 4: Proposed Environmental Mitigation Measures

S. No.	Component	Impact	Mitigation Measures

S. No.	Component	Impact	Mitigation Measures
Construction Phase:			
1.	Air	Generation of Dust, CO_2, SO_X, NO_x (Short term for a period of 6 months and Local)	• Covering of construction material with sheets while transportation and storage. • Use of water sprinklers. • Personal Protective equipment for labours. • Project site is inside the existing industrial complex. No impact on general public.
2.	Noise and Vibration	• Increase in the noise levels due to movement of vehicles and construction activities. • Vibration due to movement of vehicles and construction activities. (Short term for a period of 6 months and Local)	• Proper service and maintenance of machines and vehicles to control noise. • Personal protective equipments for labours. • The impact due to vibration will be insignificant. • Project site is inside the existing industrial complex. No impact on general public.
3.	Water	• Water pollution due to disposal of sewage will be curtailed with the existing effluent treatment plant. (Short term, Minor, Local)	• Proper sanitation facilities in the construction site • Treatment of sewage in existing ETP having a capacity of 5000 KLD within DFPCL premises .This is a design capacity for 1200 persons. Presently only 600 people are using the facility.
4.	Land	• Removal of top soil and change in soil quality. • Soil pollution due to discharge of sewage and solid waste onto land will be curtailed with the existing effluent treatment plant. • No change in Land use pattern as project site is inside the existing industrial complex. (Minor and Local)	• Use of removed soil for landscaping purposes, improving aesthetics. • Sanitation facilities in the construction site as well as labour camps. • Treatment and disposal of sewage and solid waste as per MPCB guidelines.
5.	Biological • Flora • Fauna	• Disturbance due to increase in noise. (Short term, Minor and Local)	• Green belt development.
6.	Socio-Economic	Employment of construction workers (Direct, Positive)	• People from the study area to be employed as far as possible

S. No.	Component	Impact	Mitigation Measures
7.	Occupational Health and Safety	• Auditory ailment due to noise will be prevented. • Dust emission (Short term, Minor and Local	• The use of personal protective equipments will be made stringent. • Water sprinkling system for dust generating area.
Operation Phase: Project authorities (DFPCL) are planning to implement several measures to curtail pollution to the maximum extent. Environment management at design stage includes all the steps undertaken at the design stage by the project proponents to meet the statutory requirements and towards minimizing environmental impacts. The design basis for all process units will lay special emphasis on measures to minimize effluent generation and emission control at source. The specific control measures related to gaseous emissions, liquid effluent discharges, noise generation, solid waste disposal etc. are described below :			
1.	Air	• Increase in the air pollutant concentration will be addressed using cyclonic Separators and Venturi scrubbers • Dust generation possibility is minimum as raw materials handled are liquids and product will be bagged in the existing bagging plant (Direct, Local, sustainable)	• Use of cyclonic Separators and Venturi scrubbers to control dust and fugitive emissions within the limits of MPCB regulations • Personal protective equipments for labours. • Strict implementation of Hazardous Waste Rules Act 1989, while storage/handling/transportation of hazardous substances. • Regular monitoring of emissions. Provide high efficiency scrubbers.
2.	Noise and Vibration	• Increase in the noise levels will be minimised by using Equipments with noise level below 80db • Vibration during operation of manufacturing unit. (Direct, Minor, Local, sustainable)	• Equipments with noise level below 80db only will be used. • Proper service and maintenance of machines to control noise. • Personal protective equipments for employees like anti vibration gloves and ear plugs. • Project site is inside the existing industrial complex. No impact on general public. • By selecting low noise prone equipment • By isolating the noise prone unit from the working personnel's continuous exposure • By administrative control The administrative control would have a major role to monitor noise, take remedial

S. No.	Component	Impact	Mitigation Measures
			measures and ensure that no plant personnel are over exposed to noise. • The use of damping material such as thin rubber/lead sheet for wrapping the work places like turbine halls, compressor rooms etc; • Shock absorbing techniques should be adopted to reduce vibration impact; • Efficient flow techniques for noise associated with high fluid velocities and turbulence should be used (like reduction in noise generated by control levels in both gas and liquid systems achieved by reducing system pressure to as low as possible); • All the openings like covers, partitions should be acoustically sealed; • Inlet and outlet mufflers should be provided which are easy to design and construct; • Ear plugs will be provided to workmen working near high noise generating sources; • Noise levels should be reduced by the use of absorbing material on roof walls and floors; • Provision of separate cabins for workers/operators
3.	Water	• Insignificant on groundwater. • Degradation of quality due to discharge of sewage and untreated water will be prevented. • Discharge of effluent from the manufacturing unit. (Indirect, Negative, Minor, Local, sustainable)	• Proper sanitation facilities in the plant area. • Treatment of wastewater in existing ETP within DFPCL area. • The effluent generated from the manufacturing unit will be reused for dilution of phosphoric and sulphuric acids. Effluent discharge, if any due to cooling tower blow down, domestic effluent etc shall be treated in the proposed RO with a capacity of 550 m^3/hr. There will be no generation of effluent from the proposed project.
4.	Land	• Pollution due to discharge of sewage	• Proper sanitation facilities in the plant area.

S. No.	Component	Impact	Mitigation Measures
		waste will be prevented. • Dust generation possibility is minimum as raw materials handled are liquids and product will be bagged in the existing bagging plant (Direct,Negative,Minor ,Local,sustainable)	• Proper treatment and disposal of sewage and solid waste to CETP as per the guidelines of MPCB in existing ETP having a capacity of 5000 KLD This includes capacity for industrial and domestic effluents upto 1200 persons. Presently approxm. 600 persons are working in the complex. This is a design capacity for 1200 persons. Presently only 600 people are using the facility.
5.	Biological • Flora • Fauna	• Disturbance due to increase in noise. (Minor,Direct,Local ,sustainable)	• Operational activities of heavy machineries and transportation only in daytime. • Green belt development.
6.	Socio-Economic	Employment to local people (Positive, Local)	• People from the local area to be employed as far as possible
7.	Occupational Health and Safety	• Auditory ailment due to noise generated from the production unit will be minimised by using Equipments with noise level below 80db • Accidents due to handling/storage/ transportation of hazardous materials. (Local and sustainable)	• Equipments with noise level below 80db only will be used. • Wearing of personal protective equipments like gas masks, ear muffs etc. will be strictly enforced. • Training/awareness programme about the handling / storage / transportation of hazardous materials. • Signage's showing the hazardous nature and the method of handling near storage / handling area of all the hazardous materials. • First aid training for chemical /fire hazard related accidents.

5. Environmental Monitoring Plan

The parameters and respective frequency of monitoring as part of Environmental Monitoring Plan for both construction and operation phases are tabulated below in **Table 5:**

Table 5: List of Parameters to be monitored during Construction and Operation Phases

Component	Parameters	Frequency	Location
Construction Phase			
Air	PM_{10}, $PM_{2.5}$, SO_2 and NO_x	Thrice a year	At major construction sites (total 3 stations)
Noise	Equivalent noise level	Once in a week	At major construction site and

Component	Parameters	Frequency	Location
			near generator set
Water	Parameters as per CPCB standards	Monthly	Storm water drainage system, raw water from CETP within DFPCL, treated and untreated waste water.
Effluent from ETP	pH, BOD, COD, TSS, TDS	Monthly	Inlet and outlet of ETP
Air	PM_{10}, $PM_{2.5}$, SO_2 and NO_x	Thrice a year	At major construction sites (total 3 stations)
Operation Phase			
Air	PM_{10}, $PM_{2.5}$, SO_2 , NH_3, CO, VOC and NO_x	Monthly	Stack, generator set, three locations within 100 – 200 m of the project site, two locations within the plant near the production units, storage area for the raw material and fertilizer, packaging area for fertilizer.
Noise	Equivalent noise level	Weekly	Generator set, three locations within 100 – 200 m of the project site, two locations within the plant near the production units, storage area for the raw material and fertilizer, packaging area for fertilizer.
Water	Parameters as per CPCB standards	Thrice a year	Storm water drainage system, raw water from CETP within DFPCL, treated and untreated waste water.
ETP	Parameters as per CPCB standards	Monthly	Before and after treatment from ETP
Soil	pH, moisture content, texture, organic matter, chloride, SAR, CEC, nitrogen, phosphorous, fluoride, sulphur	Once in a year	Three locations around the project site within 200 m distance from the unit.
Ecology	Inventory	Once in a year	Within 2 km of the project site
Occupational Health	General and respiratory ailments check up	Once in a year	-

6. Additional Studies

Risk assessment study was carried out for the storage of Chemicals with the help of software ALOHA.

7. Project Benefits

The proposed expansion project will lead to the following benefits:

- Increase in production of complex fertiliser.

- Increase in agricultural productivity due to application of complex fertiliser.
- The project will result in the employment opportunities to the unskilled/skilled local people.
- Thereby, the quality of life of the employed people will increase.

8. Environmental Management Plan (EMP)

The following plans are proposed under the Environmental Management Plan:

- Rainwater Harvesting System
- Air Pollution Management Plan
- Storm Water Management Plan
- Sewage Management Plan
- Effluent Management Plan
- Solid Waste Management Plan
- Hazardous Waste Management Plan
- Green Belt Development
- Corporate Responsibility for Environmental Protection (CREP)

A total capital and recurring cost provision of about INR 41.45 Crores has been kept in the project cost towards the environmental protection, control and mitigation measures and implementation of the EMP. The budgetary cost estimate for the EMP is given in **Table: 6**

Table 6: Environmental Budget

S.No.	Items	Approx. Capital Cost Crores)
1.	Water pollution control (Capital cost of RO system and recurring cost of water & effluent quality monitoring)	20
2.	Air pollution control (Capital cost of stacks & air pollution control equipments and recurring cost of stack emission monitoring)	20
3.	Noise pollution control (Capital cost of DG room enclosure & acoustic treatment and recurring cost of noise monitoring)	0.05
4.	Solid wastes management (Capital cost of bins for solid wastes, storage space for hazardous wastes and recurring cost of handling & disposal)	0.10
5.	Rainwater harvesting system	0.50
6.	Storm water drainage system	0.05
7.	Fire fighting system	0.50

S.No.	Items	Approx. Capital Cost Crores)
8.	Landscaping	0.15
9.	Environmental management (recurring cost of annual monitoring, hiring of consultants and payment of various statutory fees)	0.10
Total		**41.45**

9. Summary and Conclusion

The environmental status of the project site and study area of 10 km radius is delineated with respect to air, noise, water, land, biological and socio-economic environment. The different project activities in the construction and operation phases are identified. To identify the impacts, the interaction between the project activities and different components of environment are classified phase wise. A summary of the identified impacts are given in the following paragraphs.

In the constructional phase, the transportation of construction material could have an impact, especially on air, noise, vibration, flora and fauna. However, since this project is proposed adjacent to existing NP plant inside the existing industrial complex with well-maintained infrastructure facilities, even this impact is minimal and temporary.

Additional strength of labourers could temporarily increase the pressure on the resources of the area. During the operational phase, there could be minor change in air quality .Transportation of raw material, storage and handling of hazardous material and the production process could cause a temporary disturbance to environment variables which will be prevented with the proposed mitigation measures proposed in Chapter 4.

With respect to occupational health, minimal impacts are anticipated on the health of the employees during operation phase.

In general, production of fertiliser will benefit the economy and generate employment opportunities.

1

INTRODUCTION

1 INTRODUCTION

1.1 Agriculture in India

Agriculture is the backbone of Indian Economy. About 70 per cent of the rural households and 8 per cent of urban households are still primarily dependent on agriculture for employment. The green revolution era resulted in significant increase in the agricultural yield per unit area. Due to recent industrialization, the economical importance is being slowly shifted from agricultural to industrial sector. This is evident from the falling GDP with respect to agriculture year after year (**Table 1.1**). There has been a continuous decline in the share of Agriculture and Allied Sectors in the GDP from 16.8 percent in 2007-08 to 13.9 percent in 2011-12 at 2004-05 prices. Falling share of Agriculture and Allied Sectors in GDP is an expected outcome in a fast growing and structurally changing economy. But despite India's Economic development, over 70% of the population still lives in rural areas and around 60% of the labor force are still engaged in agricultural related activities which are still higher as compared to 44% in China and 21% in Brazil**. Table 1.1** also shows the GDP of Agriculture and Allied Sectors and its share in the total GDP of the country during last 5 years.

Table 1.1: GDP of Agriculture and Allied Sectors and its share in the total GDP (Rs. Crores)

Year	2007-08	2008-09	2009-10	2010-11	2011-12
GDP of Agriculture and Allied Sectors	655080	655689	662509	709103	727161
Per cent to total GDP	16.8	15.8	14.7	14.5	13.9

Source: Central Statistics Office, Ministry of Statistics and Programme Implementation, Govt. of India.

1.2 Fertiliser Production in India

Due to increase in population, food grain demand is increasing. Fertiliser industry has expanded to meet this demand in last few years. NPK & DAP fertilizer requirement in India has almost tripled in last 20 years. **Table 1.2** below depicts production of Urea, DAP & Complex fertilizers in India.

Table 1.2: Production of Urea, DAP and Complex Fertilizers in India (Qty. in Lakh LMT)

S.No.	Fertilizer / Year	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
1.	Urea	202.6	200.6	203.1	198.6	199.2	211.3

S.No.	Fertilizer / Year	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
2.	DAP	51.85	46.28	48.52	42.12	29.93	42.47
3.	Complex Fertilizers	53.66	68.26	74.28	58.72	67.99	80.38

(Source: Department of Fertilizers, Govt. of India)

Despite of increase in fertilizer capacities, India is still net importer of fertilizer. **Table 1.3** depicts NPK consumption and imports in India in year 2010 -11.

Table 1.3: NPK Consumption and Imports in India

Country	NPK Consumption	Indigenous	Imported
India	9.82	8.7	1.12

Thus India has imported 11% of NPK fertilizer in 2010-11. Thus ever increasing demand has added huge subsidy bill for fertilizer & potential economic crisis looming around the corner. The Government along with industry has chalked out a strategy to combat concerns raised through:

1) Promotion of balanced fertilizer
2) Nutrient based subsidy.

Maharashtra is major consumer of NPK fertilizer & Maharashtra consumes 1.31 million tons (13.5% of total requirement) of NPK fertilizers. In Maharashtra, NPK fertilizer capacity is 0.69 million tones. Most of the NPK grades sold in Maharashtra are supplied by manufacturers who are located in other states (Ref. Fertiliser Statistics, FAI, 2010-11, I64 to I76). Location of DAP and other Complex fertilizers in India are shown in **Figure 1.1** and the trends in consumption of fertilizers products is shown in **Figure 1.2**.List of DAP and Complex Fertilizer Plants in India, shown in **Figure: 1.3**

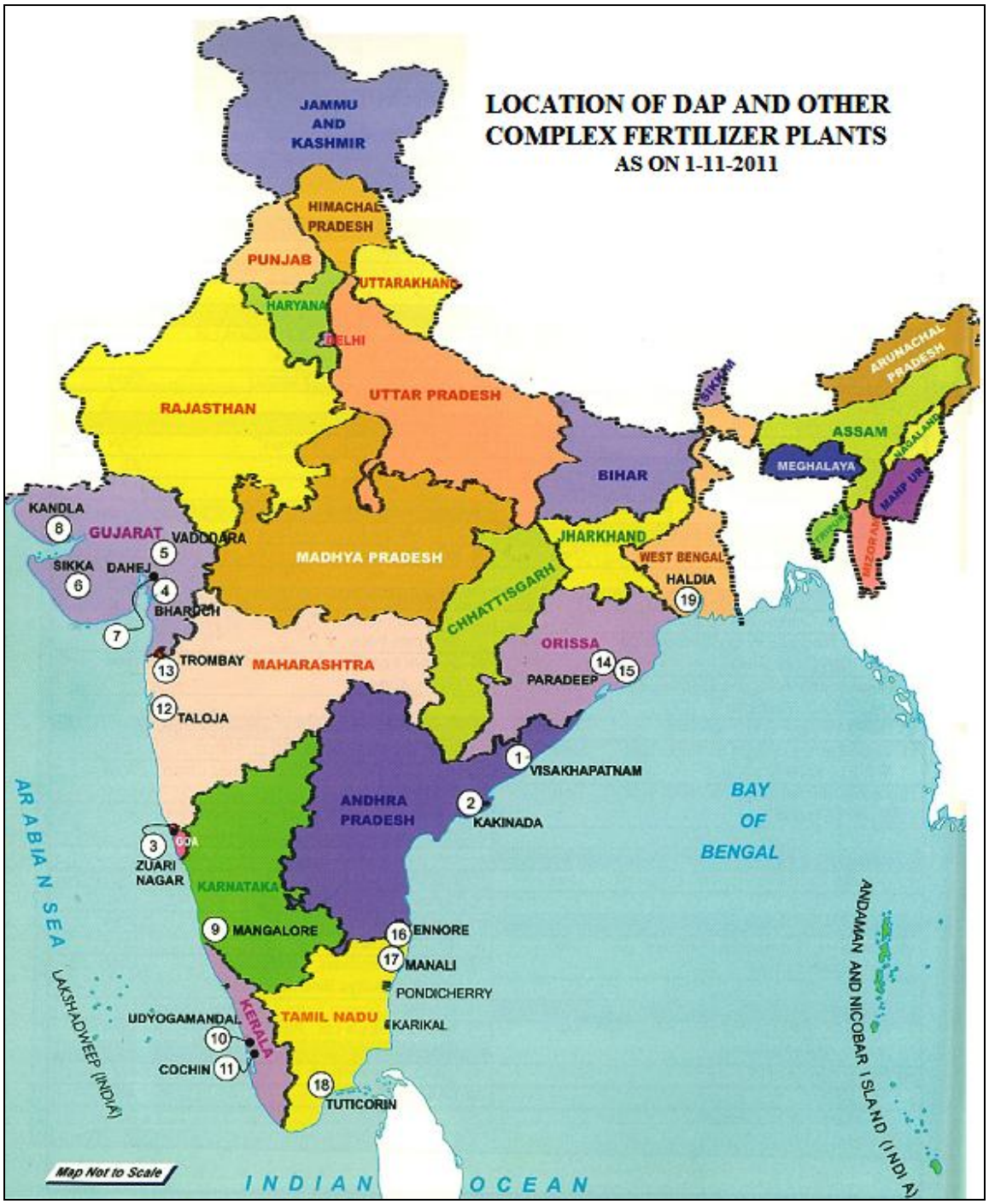


Figure 1.1: Location of DAP & other Complex Fertilizers Plants in India

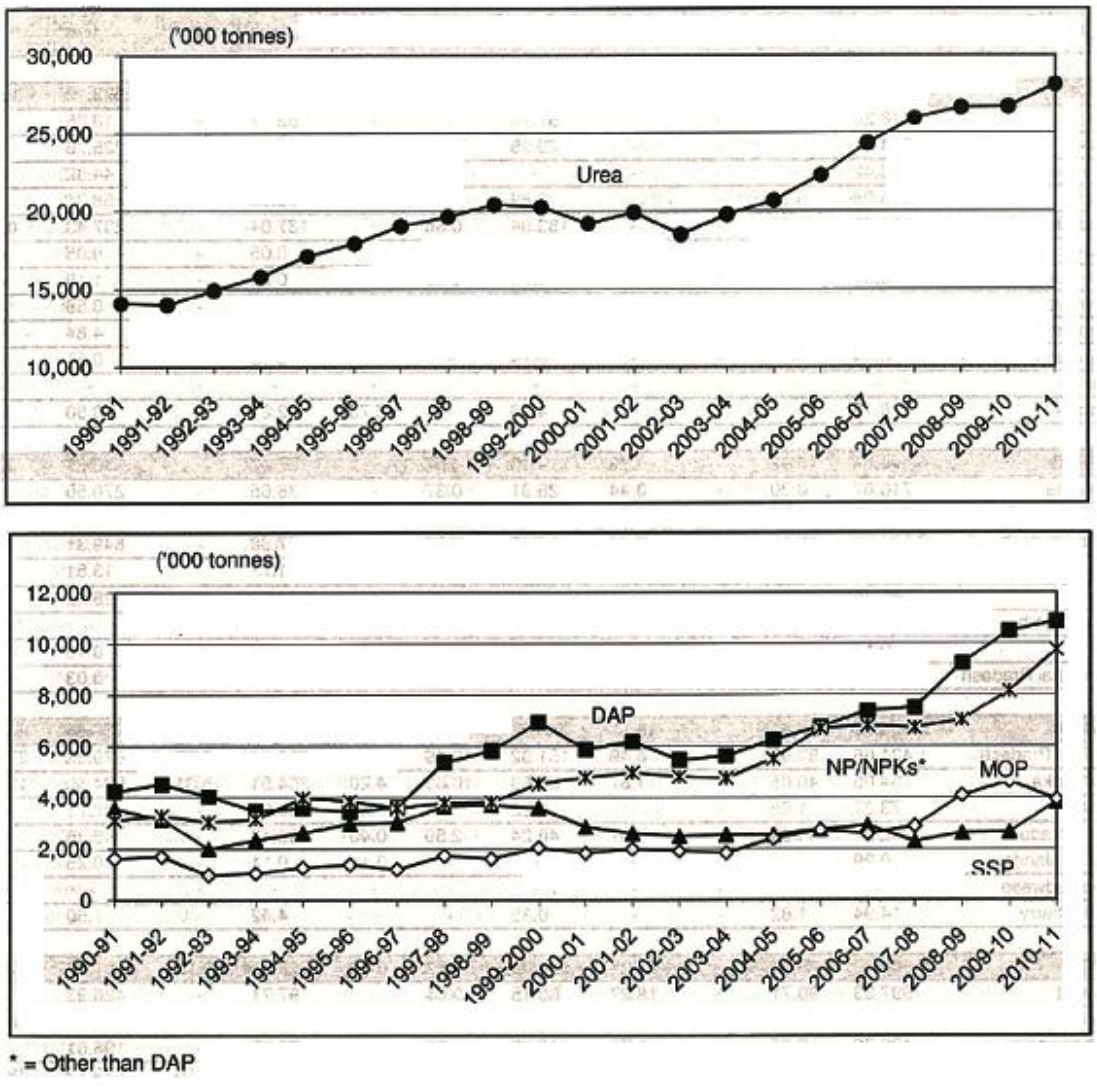


Figure 1.2: Trends in Consumption of Fertilizer Products (1990-91 to 2010-11)

LIST OF DAP AND OTHER COMPLEX FERTILISER PLANTS
(As on 1.11.2011)

Sl. No.	State/Name of the plant and location	End Product
	Andhra Pradesh	
1	Coromandel International Ltd., Visakhapatnam	DAP,APS/NPKs
2	Coromandel International Ltd., Kakinada	DAP, NP(APS)/NPKs
	Goa	
3	Zuari Industries Ltd. (ZIL), Zuari Nagar	DAP, NP(APS)/NPKs
	Gujarat	
4	Gujarat Narmada Valley Fertilizers Co. Ltd. (GNFC), Bharuch	ANP
5	Gujarat State Fertilizers & Chemicals Ltd. (GSFC), Vadodara	DAP, NP(APS)
6	Gujarat State Fertilizers & Chemicals Ltd., Sikka	DAP
7	Hindalco Industries Ltd., Dahej	DAP, NPKs
8	IFFCO, Kandla	DAP, NPKs
	Karnataka	
9	Mangalore Chemicals & Fertilizers Ltd. (MCFL), Mangalore	DAP, NP(APS)/NPKs
	Kerala	
10	Fertilisers & Chemicals Travancore Ltd. (FACT), Udyogamandal	APS
11	FACT, Cochin - II	APS
	Maharashtra	
12	Deepak Fertilisers & Petro Chemicals Corpn. Ltd., Taloja	ANP
13	Rashtriya Chemicals & Fertilizers Ltd. (RCFL), Trombay (I & IV)	Nitrophosphate; ANP
	Orissa	
14	IFFCO, Paradeep	DAP, NP/NPKs
15	Paradeep Phosphates Ltd., Paradeep	DAP, NP(APS)/NPKs
	Tamil Nadu	
16	Coromandel International Ltd., Ennore	NP(APS)
17	Madras Fertilizers Ltd. (MFL), Manali	UAP, NP(APS)/NPKs
18	Southern Petrochemical Industries Corpn. Ltd. (SPIC), Tuticorin	DAP, NP(APS)
	West Bengal	
19	Tata Chemicals Ltd. (Phosphatic Division), Haldia	DAP, NP/NPKs

Figure 1.3: List of DAP and other Complex Fertilizer Plants

1.3 Need of the Project

The proposed expansion will reduce supply-demand gap and will give better nutrient composition option for crops. Product will have good market in Maharashtra covering requirement in this region.

1.4 Project Proponent

The Deepak Group of Industries came in to existence during 1970's when Mr. C.K. Mehta set up Deepak Nitrite Ltd. Since then the company grew up by leaps and bounds, and won many prestigious awards like Sir P.C. Ray award, for being the best Chemical Industrial unit in India.

In 1983, Deepak Fertilizers and Petrochemicals Corporation Limited (DFPCL) started commercial production of ammonia (in technical collaboration with Fish International Engineers (USA), using natural gas as feed stock. This marked the fulfillment of a need for lateral integration into the world of basic building block chemicals, premium fertilizers and petrochemicals. At that time, this was India's only merchant ammonia manufacturer. The International Finance Corporation initially supported this venture of Deepak group in the form of equity participation in DFPCL.

The company undertook major expansion and diversification in 1989 to achieve forward integration of Ammonia and diversification in Methanol.

In July 1992, DFPCL commenced commercial production of Low Density Ammonium Nitrate (LDAN), Nitro Phosphate (NP) Dilute Nitric Acid (DNA), and Concentrated Nitric Acid (CNA). This has resulted in a multi-product portfolio for DFPCL consisting of chemicals, petrochemicals, fertilizers and other agri-inputs. To ensure an uninterrupted supply of natural gas to its plant, DFPCL laid its own 43 km gas pipeline from the coastal fall point of Bombay High to its plants in Taloja, thus becoming one of the first companies in India to have its own gas pipeline.

DFPCL has a chemical storage terminal at Jawaharlal Nehru Port Trust (JNPT) to provide support to its logistics management system and ensure a window to the world trade in chemicals. It is in the process of adding new storage facilities for Ammonia, Methanol and other products. The company also leases port storage capacities at Bombay Port Trust and Visakhapatnam. In year 2012-13, DFPCL clocked Turnover of Rs. 2500 Crore.

Now, DFPCL proposed the expansion of complex fertiliser unit from 3,24,000 MTPA of Single Grades of ANP to 6,00,000 MTPA of Multiple Grades NPK Fertilizers at its Taloja facilities in Notified Industrial Estate of MIDC, Maharashtra. The location for the proposed project is shown in **Figure 1.4**.

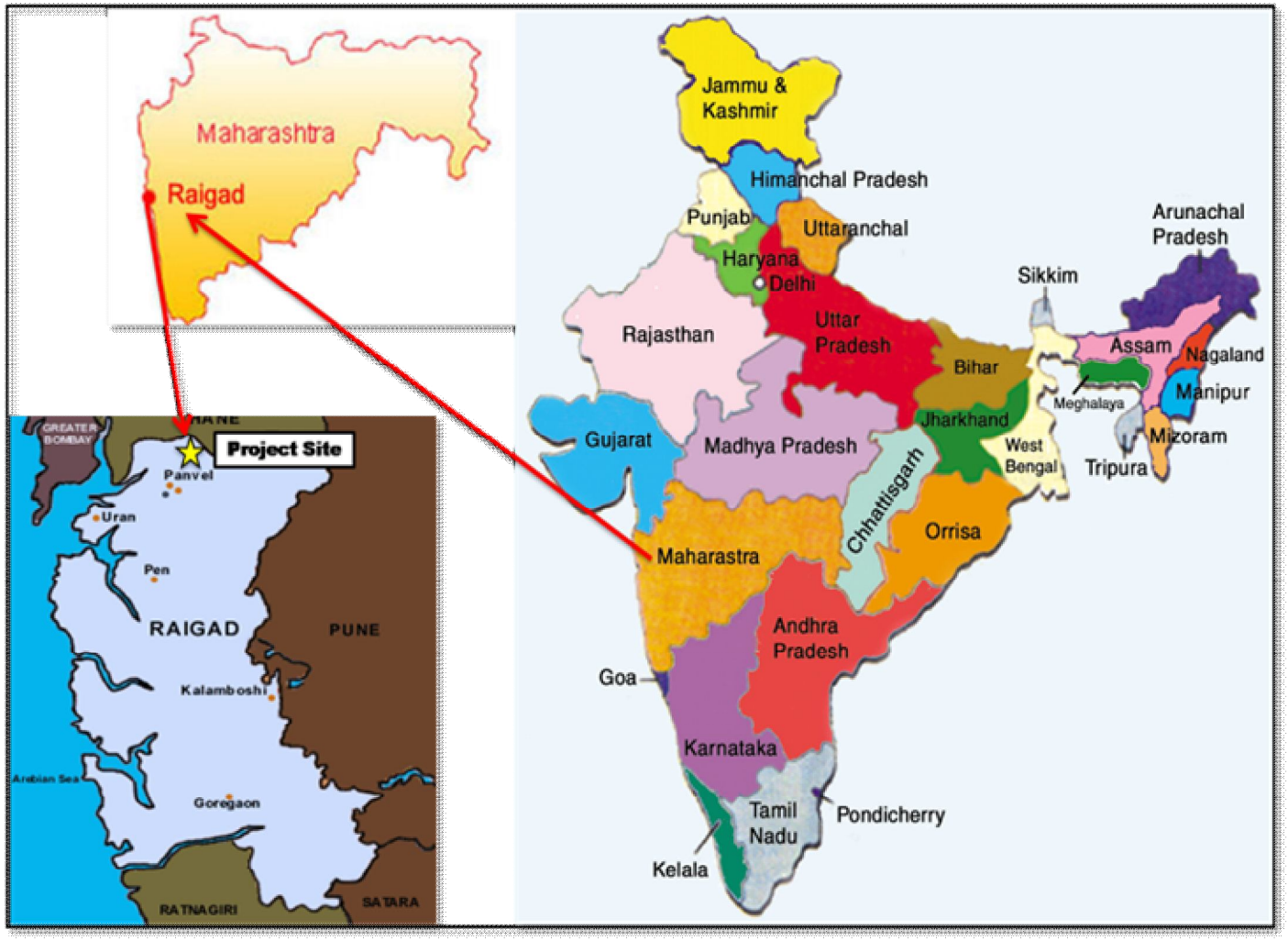


Figure 1.4: Location Map for the Proposed Project

1.5 DFPCL Existing Products

DFPCL's business can be broadly categorized into the following divisions

- ❖ Industrial Chemicals
- ❖ Ammonium Nitrate
- ❖ Agri-Inputs – Marketing
- ❖ Crop Science Division

1.5.1 Industrial Chemicals

In this division, DFPCL manufactures Methanol, various grades of Nitric Acid and Ammonia. DFPCL is one of the largest producers of Methanol in India, which in turn is used to manufacture drugs, pharmaceuticals, DMT, pesticides, methylamines, formaldehyde, etc.

DFPCL is also one of the largest manufacturers of various concentrations of Nitric Acid (60%, 68%, 72% and 98%). DFPCL also manufactures Iso- Propyl Alcohol. IPA plant was set up in 2006. Deepak is the only manufacturer of IPA in India.

1.5.2 Ammonium Nitrate

In this division, DFPCL manufactures ammonium nitrate in India and the only one making Prilled Ammonium Nitrate (AN). Their products are used for open cast mining, underground metalliferrous mining and construction industry.

The explosive division manufactures Low Density Ammonium Nitrate, which is used for making Ammonium Nitrate-fuel oil (ANFO), blasting agents and also emulsified ANFO (HANFO).

1.5.3 Agri Business

In this division, DFPCL manufactures prilled Ammonium Nitro Phosphate (23:23:00) and specialty fertilizer Bentonite Sulphur (BENSULF). These fertilizers are marketed under brand "Mahadhaan" through network of more than 1000 dealers.

1.6 Brief Description about the Project

The details about the proposed expansion project are given in **Table 1.4**.

Table 1.4: Brief Description about the Project

S.No.	Items	Details
1.	Name of Project	Expansion of NPK fertilizer manufacturing capacity with the purpose of manufacturing multiple grades of NPK
2.	Name of Organization	Deepak Fertilisers & Petrochemicals Corporation Limited.
3.	Project Location & Land acquired	Plot no K1 to K5, MIDC, Taloja, Dist Raigad, Taloja. Being a Brown field expansion, no

S.No.	Items	Details
		additional land acquisition is required
4.	Total DFPCL Plant Area	96 Acres (Plant Area) 16 Acres (Green cover)
5.	Area allotted for the proposed expansion	10000 m^2. No additional land requirement as plant shall be built in the area occupied by godowns presently.
6.	Nearby features	DFPCL complex is located in MIDC, Chemical Zone Nearest Highways : 5 Kms Railways : 3.5 Kms Airport : 45 Kms Port : Mumbai, 40 kms Nearest City : Panvel 15 Kms Nearest Forest – No Forest area Sensitive place – Nil Historical place - Nil
7.	Power requirement & source	DFPCL has its gas based power plant of 17.9 MW. 10 MW is taken from MSEDCL .Additional 5 MW requirement for proposed expansion shall be taken from MSEDCL
8.	Power backup (DG Sets)	Construction phase : Power required for construction shall be supplied from internal power source. Operation phase: 500 KVA emergency power DG set for general lighting purpose.
9.	ETP Facility	ETP Capacity : 5000 M3/Day Quantity of effluent treated in ETP : 3800 M3/Day
10.	End Product	Multiple grades of NPK fertilizer
11.	Annual Production (MT)	6,00,000 MTPA
12.	Proposed facilities	Main Process plant, new bagging plant Raw Material Storage and Handling facilities, Waste Water Recycle unit , 100 KV sub-station.
13.	Annual stream hours	6600 Hrs
14.	Manpower requirement	No additional manpower. Requirement shall be met from within existing manpower.

S.No.	Items	Details
15.	Project Time schedule	126 Weeks
16.	Indicative Annual Requirement of Raw material	
	A. Ammonia	<= 150 MTPD
	B. Phosphoric acid	<= 325 MTPD
	C. Clay (filler)	<= 150 MTPD
	D. Zinc sulphate	<= 15 MTPD
	E. Borax	<= 15MTPD
	F. MOP	<= 550MTPD
	G. Sulphuric acid	<= 10 MTPD
17.	Raw Water	Total water required 550 m^3/day. As part of this project DFPCL shall install water recycle unit to treat present effluent. Reject from this unit shall be used in the process. No additional fresh water requirement is envisaged for the complex due to this project.
18.	Project capital cost (Rs. Crores)	360.0
19.	Capital cost (Rs. Crores) for environmental protection measures	Approx 20.0 water recycle unit. Approx 20.0 process scrubbers.
20.	Proposed Air Pollution Control measures	A wet scrubber unit shall be integrated with main process to meet environment norms of dust & ammonia.
21.	Solid / hazardous waste management & waste	No process solid waste generation envisaged from the expansion project. Machine lube oil is already consented is expected. However, there shall be no increase in consented quantity. Oil is disposed to MPCB approved agencies of recycle.

1.7 EIA Consultant

M/s Asian Consulting Engineers (ACE) Pvt. Ltd., New Delhi is the EIA consultant for this proposed project. ACE is QCI-NABET accredited EIA consultant organisation (Certificate No.: NABET/EI/1013/012) for 13 varied sectors including Chemical Fertilisers. The Quality Management System of ACE is ISO 9001:2008 certified.

1.8 Purpose of EIA Study

The purpose of Environmental Impact Assessment (EIA) study is to identify the possible impacts due to the proposed project on its surrounding environment and to suggest ways for mitigating and minimizing impacts. The study also identifies possible beneficial impacts on to the environment and society after implementation of the project.

1.8.1 Policy and Legal Framework

The project developer, Deepak Fertilizers & Petrochemicals Corporation Ltd. (DFPCL) will ensure that it conforms to all National legislations, regulations, and conventions, relating to various aspects of chemical and Fertiliser development in India. **Table 1.5** shows list of various applicable Acts and Rules as set by MoEF, CPCB and MPCB.

Table 1.5: Applicable Acts and Guidelines for the Proposed Project

Issues	Applicable Legislation
Water	1) The Water (Prevention and Control of Pollution) Act, 1974, and amendments thereafter.
	2) Water Cess Act, 1977 and amendments thereafter.
Air	3) The Air (Prevention and Control of Pollution) Act, 1981 and amendments thereafter.
Hazardous Substances and Wastes	4) Hazardous Wastes (Management and Handling) Rules, 2008. 5) Manufacture Storage and Import of Hazardous Chemicals 1989 and Amendments thereafter.
Other Issues under the Environment (Protection) Act, 1986, and Rules	6) The Public Liability Insurance Act, 1991 and Rules 1991.
Environment Protection	EIA Notification 2006 and its amendment thereafter.
Noise	7) The Environment (Protection) Second Amendment Rules, 2002 (Noise Limits for New Generator Sets).
	8) The Noise (Regulation & Control) Rules, 2000.
Other Acts	9) River Boards Act, 1956.

1.9 Scope of EIA Study

An EIA study is useful to understand and to mitigate the impacts of the project on various parameters of the environment. Therefore, the scope of the EIA study includes detailed characterization of the existing status of the land, water, air and biological environment in the proposed project and its impact area. Consequently, it involves identification of the potential environmental impacts of the project.

The scope of this EIA is according to the Terms of References (TORs) approved by the MoEF (**Letter No. J-11011/320/2012-1A11 (1) Dated 22/03/2013**).

TOR approved by MoEF

F. No. J-11011/320/2012- IA II (I)
Government of India
Ministry of Environment and Forests
(I.A. Division)

Paryavaran Bhawan
CGO Complex, Lodhi Road
New Delhi – 110 003

E-mail : aditya.narayan@nic.in
Telefax : 011: 2436 0549
Dated 22nd March, 2013

To,

Shri Ranjan Basu (Sr. Vice President Operations)
M/s Deepak Fertilizers and Petrochemicals Corporation Ltd.
Plot K-1 to K-5, MIDC, Taloja, District Raigad,
Maharashtra- 410208

E-mail: ranjan.basu@dfpcl.com ; Fax No. : 022-27412413

Subject: Expansion of NPK Fertilizer Manufacturing Unit at DFPCL Complex, K-1 to K-5, MIDC Industrial Area, District Raigad, Maharashtra by M/s Deepak Fertilizers and Petrochemicals Corporation Ltd.- regarding TORs.

Ref. : Your letter no. DFPCL/RRJ/NPK/MOEF/2012/058 dated 20th August, 2012.

Sir,

Kindly refer to your letter no. DFPCL/RRJ/NPK/MOEF/2012/058 dated 20th August, 2012alongwith project documents including Form-I, Pre-feasibility Report and draft 'Terms of Reference' as per the EIA Notification, 2006. It is noted that proposal is for expansion of NPK Fertilizer Manufacturing Unit at DFPCL Complex, K-1 to K-5, MIDC Industrial Area, District Raigad, Maharashtra by M/s Deepak Fertilizers and Petrochemicals Corporation Ltd.

2.0 Draft Terms of Reference (TOR) have been discussed and finalized during the **5th Reconstituted Expert Appraisal Committee (Industry) held during 31st January, 2013– 1st February, 2013** for preparation of EIA/EMP report. Following are the 'TORs':

1. A separate chapter on status of compliance of Environmental Conditions granted by State/Centre to be provided. As per circular dated 30th May, 2012 issued by MoEF, a certified report by RO, MoEF on status of compliance of conditions on existing unit to be provided in EIA/EMP report.
2. Executive summary of the project
3. Justification of the project.
4. Promoters and their back ground.
5. Regulatory framework.
6. Recommendation of Maharashtra Government that project proposal is complying with the provisions of the RRZ policy of the Government of Maharashtra.
7. Environment clearance for the existing unit issued by the Ministry (reasons, if not obtained), Consent to Operate and Authorization accorded by the Maharashtra Pollution Control Board.

8. Data for the stack emissions, fugitive emissions; water requirement and water balance chart; wastewater generation, treated effluent quality, re-utilization and disposal of solid/hazardous waste for the existing unit.
9. A map indicating location of the project and distance from severely polluted area
10. Project location and plant layout.
11. Infrastructure facilities including power sources.
12. Total cost of the project alongwith total capital cost and recurring cost/annum for environmental pollution control measures.
13. Project site location alongwith site map of 10 km area and site details providing various industries, surface water bodies, forests etc.
14. Present land use based on satellite imagery for the study area of 10 km radius.
15. Location of National Park/Wild life sanctuary/Reserve Forest within 10 km radius of the project.
16. Details of the total land and break-up of the land use for green belt and other uses.
17. List of products alongwith the production capacities and list of solvents and its recovery plan.
18. Detailed list of raw materials required and source, mode of storage and transportation.
19. Manufacturing process details alongwith the chemical reactions and process flow chart of each products.
20. Action plan for the transportation of raw materials and products.
21. Ambient air quality monitoring at 6 locations within the study area of 10 km., aerial coverage from project site as per NAAQES notified on 16th September, 2009. Location of one AAQMS in downwind direction.
22. One season site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall and AAQ data (except monsoon) for PM_{10}, $PM_{2.5}$, SO_2, NOx, CO, NH_3 including VOCs should be collected. The monitoring stations should take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests. Data for surface and ground water and noise monitoring should also be included.
23. Air pollution control measures proposed for the effective control of gaseous emissions within permissible limits.
24. Plant-wise air pollution control measures proposed for the control of emissions from all the sources particularly uncontrolled NOx emission and method to control NOx.
25. Details of water and air pollution and its mitigation plan.
26. Action plan to control ambient air quality as per NAAQES Standards notified by the Ministry on 16th September, 2009.
27. Determination of atmospheric inversion level at the project site and assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. Air quality modelling for proposed plant.
28. Details of water requirement for the proposed and expansion project. Water balance chart including water intake, effluent generated, recycled and reused and discharged is to be provided.
29. Reduce fresh water requirement. Methods adopted/to be adopted for the water conservation should be included.
30. Source of water supply and 'Permission' for the drawl of proposed water from the Competent Authority.
31. Design details of the ETP and STP as well as air pollution control equipments (Bag filters/ wet scrubber etc.).
32. Action plan for Zero Discharge of effluent as proposed should be included.

33. Ground water monitoring minimum at 6 locations should be carried out. Geological features and Geo-hydrological status of the study area and ecological status (Terrestrial and Aquatic).
34. The details of solid and hazardous wastes generation, storage, utilization and disposal particularly related to the hazardous waste calorific value of hazardous waste and detailed characteristic of the hazardous waste. Action plan for the disposal of fly ash generated from boiler should be included.
35. Precautions to be taken during storage and transportation of hazardous chemicals should be clearly mentioned and incorporated.
36. Plan for the implementation of the recommendations made for the fertilizer plants in the CREP guidelines must be prepared and included.
37. Details of captive landfill alongwith design details as per CPCB guidelines. Location of secured land fill/TSDF.
38. Authorization/Membership for the disposal of solid/hazardous waste in TSDF.
39. An action plan to develop green belt in 33 % area
40. Action plan for rainwater harvesting measures at plant site should be included to harvest rainwater from the roof tops and storm water drains to recharge the ground water.
41. Details of occupational health programme.
    i) To which chemicals, workers are exposed directly or indirectly.
    ii) Whether these chemicals are within Thresh Limit Values (TLV)/ Permissible Exposure Levels as per ACGIH recommendation.
    iii) What measures company have taken to keep these chemicals within PEL/TLV.
    iv) How the workers are evaluated concerning their exposure to chemicals during pre-placement and periodical medical monitoring.
    v) What are onsite and offsite emergency plan during chemical disaster.
    vi) Liver function tests (LFT) during pre-placement and periodical examination.
    vii) Details of occupational health surveillance programme.
42. Socio-economic development activities should be in place.
43. Detailed Environment management Plan (EMP) with specific reference to details of air pollution control system, water & wastewater management, monitoring frequency, responsibility and time bound implementation plan for mitigation measure should be provided.
44. EMP should include the concept of waste-minimization, recycle / reuse / recover techniques, Energy conservation, and natural resource conservation.
45. **Corporate Environmental Responsibility**

    (a) Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.

    (b) Does the Environmental Policy prescribe for standard operating process/procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA report.

    (c)What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the EC conditions. Details of this system may be given.

    (d)Does the company have a system of reporting of non compliance / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism should be detailed in the EIA report.

46. Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof.
47. A tabular chart with index for point wise compliance of above TORs.

The following general points should be noted:

i. All documents should be properly indexed, page numbered.
ii. Period/date of data collection should be clearly indicated.
iii. Authenticated English translation of all material provided in Regional languages.
iv. The letter/application for EC should quote the MOEF file No. and also attach a copy of the letter.
v. The copy of the letter received from the Ministry should be also attached as an annexure to the final EIA-EMP Report.
vi. The final EIA-EMP report submitted to the Ministry must incorporate the issues in this letter. The index of the final EIA-EMP report must indicate the specific chapter and page no. of the EIA-EMP Report.
vii. 'Certificate of Accreditation' issued by the QCI to the environmental consultant should be included.

3.0 These 'TORs' should be considered for the preparation of EIA / EMP report for expansion of NPK Fertilizer Manufacturing Unit at DFPCL Complex, K-1 to K-5, MIDC Industrial Area, District Raigad, Maharashtra in addition to all the relevant information as per the 'General Structure of EIA' given in Appendix III and IIIA in the EIA Notification, 2006. The public hearing was exempted as per Section 7 (i), III Stage (3), Para (i) (b) of EIA Notification 2006.

4.0 You are requested to kindly submit the final EIA/EMP prepared as per TORs to the Ministry for considering the proposal for environmental clearance ***within 2 years as per the MoEF O.M. No. J-11013/41/2006-IA.II (I) dated 22nd March, 2010***.

5.0 The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India / National Accreditation Board of Education and Training (QCI/NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other Organization(s)/Laboratories including their status of approvals etc.

(A.N. Singh)
Dy. Director (S)

Copy to : The Chairman, Maharashtra Pollution Control Board, Shri Chatrapati Shivaji Maharaj Municipal Market-Building, 4th Floor, Mata Rambai Ambedkar Road, Mumbai - 400 001, Maharashtra

(A.N. Singh)
Dy. Director (S)

1.10 Approach and Methodology of EIA Study

1.10.1 Approach of EIA Study

The EIA study includes establishment of the baseline environmental scenario in the project area. EIA report consists of study of the specific activities related to the project and evaluation of the probable environmental impacts, thus leading to the recommendations of necessary mitigation measures. The entire EIA study has been carried out on the basis of the applicable environmental legislation, regulations and guidelines of the MoEF.

1.10.2 Establishment of Baseline Environmental Status

A comprehensive database on the baseline environmental status/conditions of the study area has been established through review, compilation & analysis of

i) Existing published secondary data/literature/information, and

ii) Primary data generated/collected through field study, surveys and monitoring.

1.10.3 Field Study/ Monitoring for Generation of Primary Data

The collected secondary data has been supplemented and validated by conducting the necessary primary data generation/collection through field study/monitoring in post-monsoon season (February 2013 – April 2013) and the monitoring has been conducted as per the guidelines of CPCB and requirement of the MoEF. The field monitoring is being regularly carried out in the existing plants and hence the primary data would be taken from the already monitored sites within the plant. Field study/monitoring/data collection is carried out for the following subcomponents:

a) **Soil Monitoring:** To study the soil characteristics in the study area, four locations were selected from where the soil samples were collected and analyzed for important relevant physical & chemical parameters.

b) **Ground Water Quality Monitoring:** The existing data on ground water was collected to analyze the quality of water from six different locations.

c) **Surface Water Quality Monitoring:** To study the existing quality of surface water, four different locations were selected and the surface water was analyzed for important parameters.

d) **Ambient Air Quality Monitoring:** For drawing up the baseline status of ambient air quality in the study area, ambient air quality monitoring in respect of NH_3, PM_{10}, $PM_{2.5}$, SO_2, NO_x, for all the stacks were conducted at six locations based on the preliminary analysis of the meteorological conditions, particularly predominant/frequent wind directions. 24-hours sampling schedule was adopted.

e) **Noise Monitoring:** To establish the ambient noise scenario in the study area, monitoring of ambient noise level was carried out at seven different locations in the study area using a suitable portable sound level meter over a period of twenty-four hours.

f) **Geology:** Information about the regional geology in and around the project area was collected from available reports/literatures.

g) **Hydrology:** Similarly, the data related to hydrology of the proposed project site was also collected from the available literature.

h) **Land Use Pattern:** Study of Land use pattern in the study area was carried out by standard methods of analysis of remotely sensed data followed by ground truth verification and visual interpretation of satellite data. For this purpose, digital satellite data was procured from National Remote Sensing Agency, Hyderabad and processed

using remote sensing and GIS techniques and software's to arrive at land use land cover pattern of the study area.

i) **Terrestrial Ecology:** The primary survey for this component was carried out using quadrant method of sampling. The primary data on fauna was collected using pugmarks, spotting of animals, and locating of the habitats. Secondary data on terrestrial ecology was collected from Forest Department and Department of Wild Life, Government of Maharashtra.

1.11 Structure of the EIA Report

The following chapters will be included in the EIA report:

Chapter 1: *Introduction* - provides a background to the project, the project proponent, and the process of environmental impact assessment.

Chapter 2: *The Project Description* - describes the characteristics of the proposed plant, the chemical processes, location details and operations associated with the construction of the NP Plant.

Chapter 3: *Baseline Environmental Status* - describes the background environmental characteristics and the other economic activities in the area.

Chapter 4: *Anticipated Environmental Impacts and Mitigation Measures* - The major impacts both adverse and positive are predicted and the consequent mitigation measures are provided in this chapter. The impacts are identified with respect to the present environmental baseline conditions.

Chapter 5: *Environmental Monitoring Program* - The monitoring to be carried out in the construction and post project implementation phases will be described in detail along with the frequency and sampling locations.

Chapter 6: *Additional Studies* - This chapter includes Risk Assessment, Identification of Major Hazards & its Control Measures. Also, the Disaster Management Plan & Emergency Response Plan is given in detail.

Chapter 7: *Project Benefits* - This chapter is devoted solely for the positive outcomes which are anticipated out of this project with respect to the socio-economic as well as environmental scenarios.

Chapter 8: *Environmental Management Plan* - Environmental Management Plans which will mitigate the adverse impacts of the project on the environment is proposed in this chapter. Also, the overall budget for the environmental management and monitoring plans is given.

Chapter 9: *Summary and Conclusion* – This chapter summarizes the major findings of the EIA study and delineate the conclusion drawn out of the study.

Chapter 10: *Disclosure of Consultants Engaged* - This chapter briefly describes the Quality of Services and Area of Specialization of the Consultant engaged for conducting EIA Study.

1.12 Compliance Report

Point wise Compliance to ToR Approved by MoEF in the EIA Study (Will be completed once all chapters are finalized)

S.No.	ToR	Reference in the EIA Report			
		Chapter No.	**Section No.**	**Page No.**	**Title**
1.	A separate chapter on status of compliance of Environmental Conditions granted by State/Centre to be provided. As per circular dated 30th May, 2012 issued by MoEF, a certified report by RO, MoEF on status of compliance of conditions on existing unit to be provided in EIA/EMP report.	**Annexure I**	--	--	The existing NPK plant was established in 1990. The procedure for issuance of Environmental Clearance was not established at that time. Hence, NOC certificate obtained for the same is attached Relevant correspondence with MOEF, Bhopal on the subject including compliance report and recent compliance status submitted to MOEF, Bhopal is attached. The MSDS data sheets of all the chemicals used in the proposed project is also annexed.
2.	Executive summary of the project	Separate	--	--	Executive Summary
3.	Justification of the project	Chapter-2	2.2	2-3	Justification of Project Location
4.	Promoters and their background	Chapter-1	1.4	1-6	Project Proponent
5.	Regulatory framework	Chapter-1	1.8.1	1-10	Policy & Legal Framework
6.	Recommendation of Maharashtra Government that project proposal is complying with the provisions of the RRZ policy of the Government of Maharashtra	**Annexure II**	--	--	Maharashtra Pollution Control Board has issued Consent to Establish for the proposed expansion. Matter was exempted from referring to RRZ committee as project

S.No.	ToR	Reference in the EIA Report			
		Chapter No.	Section No.	Page No.	Title
					meets criteria laid by RRZ Policy. MPCB had asked certification from IIT, Bombay for confirmation of meeting RRZ norms. IIT, Bombay has certified same.
7.	Environment clearance of the existing unit issued by the ministry (reasons, if not obtained), Consent to operate and Authorization accorded by the Maharashtra Pollution Control Board.	Separate **Annexure III**	--	--	The existing NPK plant was established in 1990. The NOC obtained for the existing unit has been attached. Following plants were established post 2006, under EIA notification 2006 1) IPA (70000 MTPA) 2) Gas based turbines (17.9 MW) EC for above are attached (Annex.) Recent copies of Consent to Establish attached, which cover all product & capacities.
8.	Data for the stack emissions, fugitive emissions; water requirement and water balance chart; wastewater generation, treated effluent quality, re-utilization and disposal of solid/hazardous waste for the existing unit	Chapter-4, Chapter- 3 Chapter-2 Chapter-7	4.2.4 3.6.7 2.6 2.11 & 2.12 2.10 7.6	4-4 3-19 2-13 2-16 2-14 7-9	Model Input: Stacks & Emission Characteristics. Treated Effluent Quality. Water Balance for Construction & Operation Phase. Water Balance Diagram (Figure 2.4) Solid Waste management & Hazardous Waste Management Systems. Effluent treatment Plant.

S.No.	ToR	Reference in the EIA Report			
		Chapter No.	**Section No.**	**Page No.**	**Title**
					Reduction in Overall Effluent (Table: 7.2)
9.	A map indicating location of the project and distance from severely polluted area.	The Project is located in MIDC Taloja Industrial Area, Navi Mumbai, which itself is severely polluted area as per Comprehensive Environmental Assessment of Industrial Clusters, CPCB, 2009. Therefore, no such map was prepared.			
10.	Project location and plant layout.	Chapter-3 Chapter-2	3.1.1 2.1	3-2 2-2	Figure 3.1 Location Map of Project site. Figure 2.1 Plant Layout
11.	Infrastructure facilities including power sources.	Chapter-2	2.14 2.15 2.18	2-26	Power Requirement Utilities Hazardous Materials Storage and Handling Facility
12.	Total cost of the project along with total capital cost and recurring cost/annum for environmental pollution control measures.	Chapter-8	8.5	8-20	EMP Budget
13.	Project site location along with site map of 10 km area and site details providing various industries, surface water bodies, forests etc.	Chapter-3	3.1.2 3.3.2	3-2 3-7	Site description & its environs (Figure 3.2) Hydrogeology (Figure 3.5)
14.	Present land use based on satellite imagery for the study area of 10 km radius.	Chapter-3	3.5	3-12,3-13	Land use land cover (Figure 3.7)
15.	Location of National Park/Wild life sanctuary/Reserve Forest within 10 km radius of the project.	Chapter-3	3.10.6	3-37	Eco sensitive areas

S.No.	ToR	Reference in the EIA Report			
		Chapter No.	**Section No.**	**Page No.**	**Title**
16.	Details of the total land and break-up of the land use for green belt and other uses.	Chapter-2	2.3	2-5	Salient features of the project (Table: 2.1)
17.	List of products along with the production capacities and list of solvents and its recovery plan.	Chapter-2	2.3.2	2-6	NPK Plant As no solvent will be used in the manufacturing process, solvent recovery plan is not proposed.
18.	Detailed list of raw material required and source, mode of storage and transportation.	Chapter-2	2.4 2.24	2-6 2-28	Raw Materials Used
19.	Manufacturing process details along with the chemical reactions and process flow chart.	Chapter-2	2.5	2-7	Basis of Design (Process Description)
20.	Action plan for the transportation of raw materials and products.	Chapter-2	2.24	2-28	Transportation of Hazardous Chemicals
21.	Ambient air quality monitoring at 6 locations within the study area of 10 km., aerial coverage from project site as per NAAQES notified on 16th September, 2009. Location of one AAQMS in downwind direction.	Chapter-3	3.8	3-24	Air Environment
22.	One season site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall and AAQ data (except monsoon) for PM_{10}, $PM_{2.5}$, SO_2 NO_x, CO, NH_3 including VOCs should be collected. The monitoring stations should take into	Chapter-3	3.7, 3.8	3-20, 3-24	Climate & Meteorology, Air Environment

S.No.	ToR	Reference in the EIA Report			
		Chapter No.	Section No.	Page No.	Title
	account the pre dominant wind direction, population zone and sensitive receptors including reserved forests. Data for surface and ground water and noise monitoring should also be included.				
23.	Air pollution control measures proposed for the effective control of gaseous emissions within permissible limits.	Chapter- 2	2.19	2-27	Air Pollution Control Systems
24.	Plant-wise air pollution control measures proposed for the control of emissions from all the sources particularly uncontrolled NO_x emission and method to control NO_x.	Chapter- 4 Chapter-8	4.2, 4.10, 8.3.2,	4-4, 8-6	Impacts on Air Environment, Impact Mitigation Measures, Air Pollution Management Plan.
25.	Details of water and air pollution and its mitigation plan.	Chapter- 8	8.2	8-1	Table 8.1 Proposed Environmental Mitigation Measures
26.	Action plan to control ambient air quality as per NAAQES Standards notified by the Ministry on 16th September, 2009.	Chapter- 4	4.10.1	4-16	Air Environment
27.	Determination of atmospheric inversion level at the project site and assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. Air quality modelling for proposed plant.	Chapter- 3 Chapter- 4	3.7.6 4.2.2	3-23 4-3	Atmospheric Inversion Level Impacts During Operation Phase
28.	Details of water requirement for existing and proposed expansion. Water balance chart	Chapter- 2	2.6	2-12	Water Balance for Construction and Operation Phases.

S.No.	ToR	Reference in the EIA Report			
		Chapter No.	**Section No.**	**Page No.**	**Title**
	including water intake, effluent generated, recycled and reused and discharged is to be provided.		2.6	2-13	No additional water required for the proposed project.
29.	Reduce fresh water requirement. Methods adopted/to be adopted for the water conservation should be included.	Chapter- 2 Chapter 7	2.6.2 7.6	2-13 7-9, 7-10	Operation Phase Reduction in Overall Effluent, Table: 7.2
30.	Source of water supply and 'Permission' for the drawl of proposed water from the Competent Authority.	Chapter- 2	2.6 --	2-12 --	Water Balance for Construction and Operation Phases. Permission for water withdrawal is annexed with the compliance status of existing plant.
31.	Design details of the ETP and STP as well as air pollution control equipments (Bag filters/ wet scrubber etc.).	Chapter- 2	2.9 2.10	2-13 2.14	Sewage Treatment Plant Effluent Treatment Plant
32.	Action plan for 'Zero' discharge of effluent as proposed should be included.	Chapter- 2 Chaptet-7	2.10 7.6	2-14 7-9	Effluent Treatment Plant. Reduction in Overall Effluent.
33.	Ground water monitoring minimum at 6 locations should be carried out. Geological features and Geo-hydrological status of the study area and ecological status (Terrestrial and Aquatic).	Chapter- 3	3.6 3.2.2 3.3 3.10	3-14 3-6 3-6 3-33	Water Environment Geology Hydrology & hydrogeology Biological Environment
34.	The details of solid and hazardous wastes generation, storage, utilization and disposal particularly related to the hazardous waste calorific value of hazardous waste and	Chapter-2 Chapter- 8	2.18 8.3.7	2-26 8-11	Hazardous Materials Storage and Handling Facility Hazardous Waste management Plan

S.No.	ToR	Reference in the EIA Report			
		Chapter No.	Section No.	Page No.	Title
	detailed characteristic of the hazardous waste. Action plan for the disposal of fly ash generated from boiler should be included.				
35.	Precautions to be taken during storage and transportation of hazardous chemicals should be clearly mentioned and incorporated.	Chapter-2	2.18; 2.24	2-26; 2-28	Hazardous Materials Storage and Handling Facility. Transportation of Hazardous Chemicals.
36.	Plan for the implementation of the recommendations made for the fertilizer plants in the CREP guidelines must be prepared and included.	Chapter-8	8.3.11	8-17	Corporate Responsibility for Environmental Protection (CREP); Table: 8.5 CREP for Fertilizer Sector Factories: Compliance Status for Present Operations.
37.	Details of captive landfill along with design details as per CPCB guidelines. Location of secured land fill/TSDF.	Chapter- 8	8.3.6 8.3.7	8-11 8-11	Solid Waste Management Plan Hazardous Waste management Plan No captive land filling site for DFPCL as it is a registered member of CHW-TSDF at MIDC, Taloja, for secure disposal of Hazardous waste. Membership no. MWML-HzW-TAL-915
38.	Authorization/Membership for the disposal of solid/hazardous waste in TSDF.	--	--	--	DFPCL is a registered member of CHW-TSDF at MIDC, Taloja, for secure disposal of Hazardous waste. Membership no. MWML-HzW-TAL-915
39.	An action plan to develop green belt in 33 % area	Chapter- 8	8.3.8	8-11 8-14	Green Belt Development Figure 8.4 Proposed Green Belt Development in the Expansion Unit.

S.No.	ToR	Reference in the EIA Report			
		Chapter No.	**Section No.**	**Page No.**	**Title**
40.	Action plan for rainwater harvesting measures at plant site should be included to harvest rainwater from the roof tops and storm water drains to recharge the ground water.	Chapter- 8	8.3.1 8.3.3	8-6 8-8	Rainwater Harvesting System Storm Water Management Plan
41.	Details of occupational health programme				
	i. To which chemicals, workers are exposed directly or indirectly.	Chapter- 6	6.3	6-2	Hazardous Classification Table 6.1: Potential Hazard Classification and Analysis of Chemicals to be Used in the Proposed Expansion Unit
	ii. Whether these chemicals are within Thresh Limit Values (TLV)/ Permissible Exposure Levels as per ACGIH recommendation.	--	--	--	--
	iii. What measures company has taken to keep these chemicals within PEL/TLV.	Chapter- 6	6.7	6-11	Safety Measures for Handling/Storage of Other Hazardous Chemicals
	iv. How the workers are evaluated concerning their exposure to chemicals during pre-placement and periodical medical monitoring.	Chapter- 6	2.13.4	2-22	Health; Pre-employment check-up; Pre-employment check-up for contract workmen; Periodical Medical Examinations; Company Employees:
	v. What are onsite and offsite emergency plan during chemical disaster.	Chapter- 2	2.21,2.22	2-28	On Site Emergency Plan Offsite Emergency Plan
	vi. Liver function tests (LFT) during pre-placement and periodical examination.	Chapter- 2	2.13.4	2-22	Health

S.No.	ToR	Reference in the EIA Report			
		Chapter No.	**Section No.**	**Page No.**	**Title**
	vii. Details of occupational health surveillance programme.	Chapter- 2	2.13	2-16	Occupational Health and Safety for Workers
42.	Socio-economic development activities should be in place.	Chapter- 3	3.11	3-37	Socio- Economic Environment
43.	Detailed Environment management Plan (EMP) with specific reference to details of air pollution control system, water & wastewater management, monitoring frequency, responsibility and time bound implementation plan for mitigation measure should be provided.	Chapter- 8 Chapter- 8	8.3.2 8.3.5 8.4	8-6 8-8 8-19	Air Pollution Management Plan Effluent Management Plan Environmental Monitoring Plan
44.	EMP should include the concept of waste-minimization, recycle / reuse / recover techniques, Energy conservation, and natural resource conservation.	Chapter- 8 Chapter-7	8.3.5 8.2 7.6	8-8 8-1 8-2 7-9	Effluent Management Plan. Proposed Environmental Mitigation Measures Table 8.1: Proposed Environmental Mitigation Measures Table 7.2: Existing & Proposed Effluent Discharge & Emission Reduction Details.
45.	**Corporate Environmental Responsibility**	Chapter- 7	7.4	7-1	Corporate Social Responsibility (CSR)
	a) Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.	Chapter- 7 **Annexure IV**	7.4	7-1	Corporate Social Responsibility (CSR) DFPCL have environmental policy approved by board Same is attached

S.No.	ToR	Reference in the EIA Report			
		Chapter No.	Section No.	Page No.	Title
					herewith.
	b) Does the Environmental Policy prescribe for standard operating process/procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA report.	--	--	--	Through the policy board has accepted all legal /statutory bindings related to environment / forest. It further says that DFPCL shall adopt to best practices & standards where ever such law or regulation may not be available.
	c) What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the EC conditions. Details of this system may be given.	Chapter- 8	8.3.10	8-16	EHS head is responsible for complying to rules, laws laid under various acts. Figure 8.5: Environmental Management Cell.
	d) Does the company have a system of reporting of non compliance / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism should be detailed in the EIA report.	--	--	--	Environmental compliance report is prepared by EHS head every day. Any non compliance in continuation is reported to the board.
46.	Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof.	N/A	N/A	N/A	No litigation pending.

S.No.	ToR	Reference in the EIA Report			
		Chapter No.	Section No.	Page No.	Title
47.	A tabular chart with index for point wise compliance of above TORs.	Chapter- 1	1.12	1-13	Compliance Report (Point wise Compliance to ToR Approved by MoEF in the EIA Study).

2

PROJECT DESCRIPTION

2 PROJECT DESCRIPTION

2.1 Project Overview

The Project is basically the expansion of fertiliser production (NPK) for making multiple grades of NPK within the existing Fertilizer complex of DFPCL at Raigad, Maharashtra. Deepak fertilizer is presently manufacturing single grade ANP fertiliser using prilling process. The proposed process is based on granulation technology which has following major benefits:

a) Deepak fertilizers will be able to manufacture multiple grades of NPK.
b) New technology will reduce air pollution.
c) New technology is zero effluent discharge process.
d) New technology will allow Deepak fertilizers to reduce its present effluent load by consuming reject from RO unit.
e) New plant will not require any additional fresh water.

DFPCL proposed that, once new plants are established, prilling plant shall be discontinued. Granulation technology is proven technology and all recent NPK plant worldwide are based on this technology.
This technology offers following distinct advantages:

a) Flexibility of turndown.
b) Flexibility in using different raw materials.
c) Better yield, thus reduced emissions.
d) Zero effluent discharge as all liquids are received into reactor section.
e) Can consume reject water from RO unit.

The manufacturing process involves chemical reactions of Ammonia, Sulphuric acid, Phosphoric acid and Potash for the production of NPK Fertilizer. The expansion project will not cause any change in the land use, land cover or topography as the facility is being built inside the existing facility only. The layout map of the proposed expansion unit is given in **Figure 2.1**.

The Project comprises of proven state of the art technology for NPK fertilizer unit. Existing off sites and utilities shall be augmented for the proposed units. The broad provision of plants and facilities to be made for expansion project together are given in **Table 2.1**.

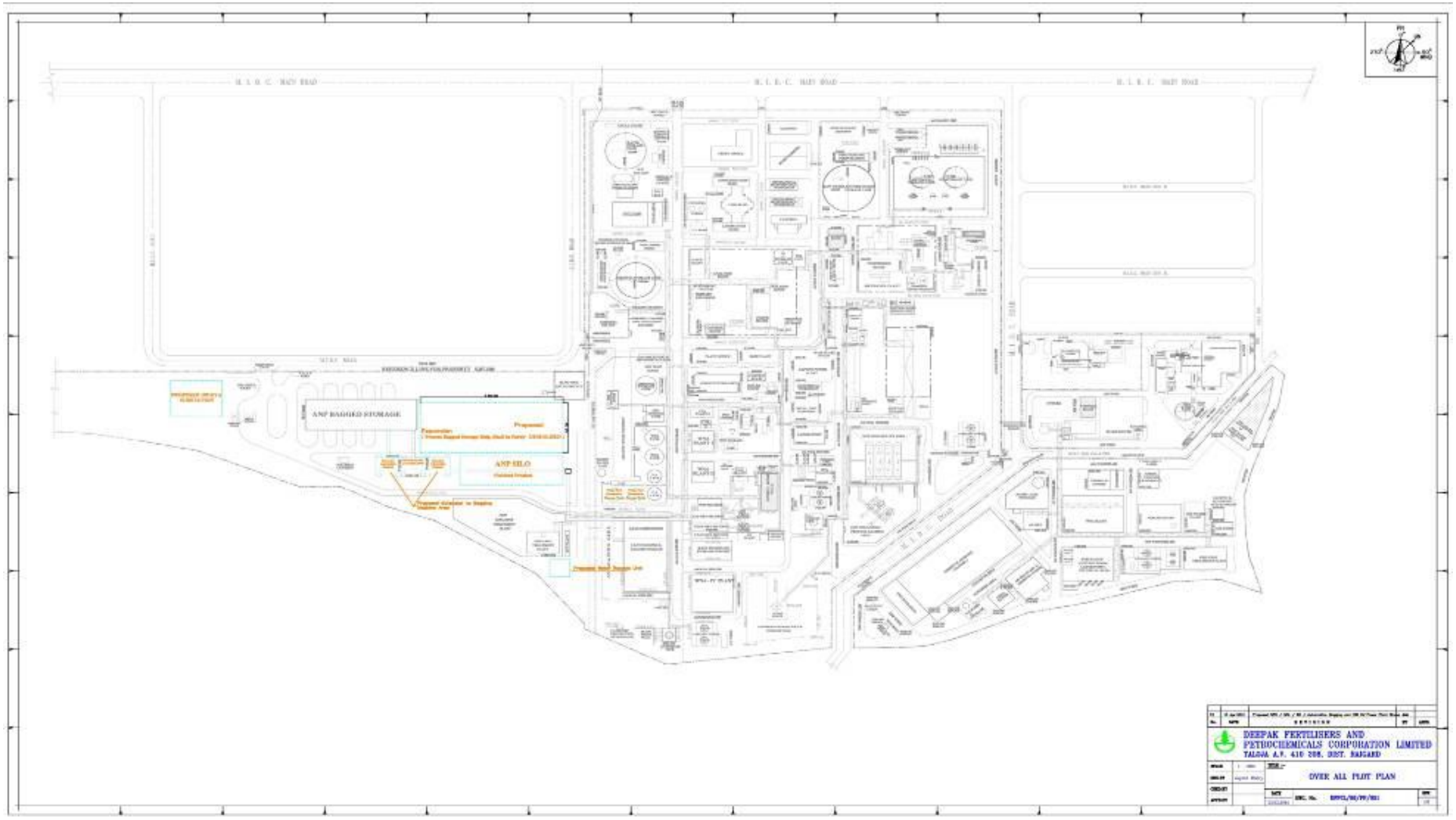


Figure 2.1: Plant Layout Map Demarcating Proposed Expansion Unit

2.2 Justification of Project Location

Deepak fertilizers have their manufacturing complex in MIDC, Chemical Zone at Taloja, Raigad. The expansion project is proposed within said complex as shown in layout map of Taloja Industrial Area (**Figure 2.2**).

This complex is well connected by road, and rail for transportation of raw material and finished products. DFPCL has all utilities available in the complex. DFPCL has its own ammonia and phosphoric acid storages at JNPT which is around 40 km from the plant location. In addition, present complex have storage tanks for Ammonia & Phosphoric acid. Deepak fertilizers also manufacture Ammonia within the same complex. Other facilities such as truck loaders, un-loaders are available within the complex.

In addition to above facts, the justification of the project location also lies in the following facts,

- Maharashtra is one of the major NPK market in the country wherein more than one million tons of complexes other than DAP are sold. In addition to the NPK, about 15 lakh MTs of DAP is also consumed by the Maharashtra farmers.
- Most of the NPK grades sold in Maharashtra are supplied by manufacturers who are located in other states.
- More importantly DFPCL would be manufacturing crop and soil specific nutrition and micro nutrition through fortification of these products enabling balanced application of fertilizer to improve farm productivity. To the Farmers it will be a source of convenience as they will be able to get crop specific solutions through a single source.

Therefore, in order to consolidate its position as an important supplier of phosphatic and nutrients based fertilisers, DFPCL propose expansion to 6,00,000 MTPA of Multiple Grade NPK Fertilizer facility to be developed inside the DFPCL Area. Moreover, the existing fertilizer plant is also having necessary facilities such as railway siding, well developed roads, barge and truck unloading facilities, facilities for rain water collection etc. which substantiate the proposed site location.

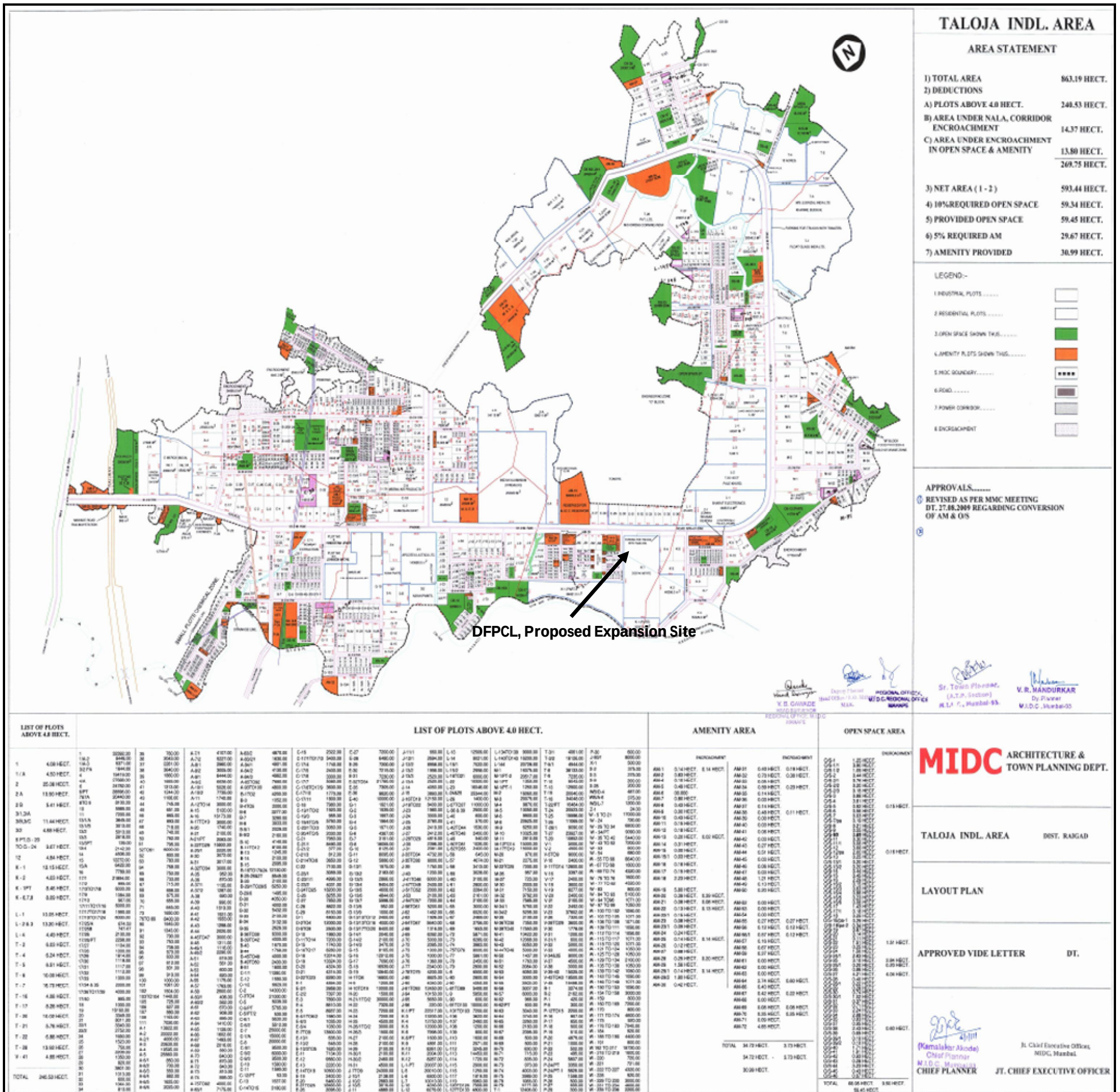


Figure 2.2 Layout Map of Taloja Industrial Area

2.3 Salient Features of the Project

2.3.1 Salient Features

The salient features of the project include the site location, type of project, capacity, nearby features and the eco-sensitive regions in and around the study region. Table 2.1 briefly describes the salient features of the Project.

Table 2.1: Salient Features of the Project

Items	Details
Project Name	Expansion of NPK Fertilizer Manufacturing Unit
Location	Taloja, Distt. Raigad, Maharashtra
Type of Project	Expansion
Total DFPCL Plant Area	96 Acres (Plant Area) 16 Acres (Green Cover)
Area allotted for expansion	10000 m^2 Plant shall be built on land presently occupied by godown.
Existing capacity (NP Plant)	3,24,900 MTPA
Proposed expansion capacity (NPK Plant)	6,00,000 MTPA
Manufacturing process	Granulation with a pipe reactor system
Air pollution control facility	Location: NP plant, Process: Multi stage scrubbing Capacity: Fumes scrubber : 5,80,000 m^3/hr airflow (Cooler and Drier Scrubber)
Sewage management facility	Capacity: 150 M^3/day
Effluent management facility	The process used for the production of complex fertilizer is a Zero Effluent Discharge Process. Hence, ETP is not required for the production of the complex fertilizer. Unit will be constructed to consume reject water from RO plant. Location: Behind present ETP. Process: RO System Capacity: 550 m^3/day
Solid waste management facility	No Solid waste will be generated from the process.
Hazardous waste management facility	No Hazardous waste will be generated from the process. Machine lube oil is expected which is already consented. However, no increase in consented quantity envisaged. Same is disposed to MPCB approved recyclers.

Items	Details
Landscaping/ green belt area	The total area of DFPCL has 16 Acres of green cover. A green belt is also proposed encircling the proposed plant expansion area.

2.3.2 NPK Plant

DFPCL proposed to install two identical streams of 1000 TPD NPK granulation plant. Proposed plant is to be designed to manufacture different grades of AN and DAP based NPK fertilizers with an option of producing fortified grades from the same units. Both units shall be capable to produce any grade of fertilizer at a time and therefore shall be designed for worst case scenario. The proposed plant shall be based on typical pipe reactor technology. All raw material feed like AN melt, ammonia, Phosphoric acid, MOP, Sulphuric Acid will be fed to pipe reactor. A typical block diagram is attached (**Figure 2.2**) for the unit configuration. The plant will be operational for 22 working hour's per day basis, with allowances of 2 hours/day for cleaning and adjustment. The plant since handles large amount of solid recirculation, 2 hours of allowance as stated above is practices as industry norms.

The modern high capacity plant has the advantage of economy of scale as well as lower energy consumption thereby resulting in lower production cost.

The plant shall be able to manufacture following grades of NPK fertilizer.

	N	P	K	S	Zn	B
NPK Grades (AN Based)	24	24	0	0	0	0
	15	15	15	0	0	0
DAP Based	10	26	26	0	0	0
	12	32	16			
Fortified grades	20	10	10	5	0.5	0.3
	15	15	15	5	0.5	-
	10	26	26	-	-	0.3
	12	32	16	-	-	0.3

2.4 Raw Materials Used

AN solution, Ammonia, Phosphoric acid and Sulphuric acid as liquid raw material are required for manufacturing of DAP /NPK granulated fertilizer. Potash & Filler shall be used as solid raw material. DFPCL is having the production facilities for manufacturing 300 TPD of Ammonia.

A typical composition/specification of all the raw material is listed as below:

Ammonia

State : Liquid
NH_3 Content : 99+/- 0.5% w/w min
H_2O Content : 0.5 % w/w max

Oil Content : 10 ppm max

Phosphoric Acid

P_2O_5 :	52-54% Wt
H_2SO_4 (as SO_4) :	0.5 to 2.5%
CaO :	0.05 to 0.25 % wt
Al_2O_3 :	0.3 to 1.5% wt
Fe_2O_3	0.2 to 1.5% wt
R_2O_3 (Al_2O_3+Fe_2O_3) :	3.0% Max
F :	0.3 to 0.7 % wt
MgO :	0.4 to 1.2 % wt
Cl :	250 ppm
Suspended Solids :	1.5 to 2.5% wt

Sulphuric Acid

H_2SO_4 Content : 98+/- 1.0% w/w

Potash

K_2O :	60% MIN
Moisture :	0.5% wt max
Size :	0.5-1 mm 90% min
Organic matters :	200 ppm Max

It should be free flowing, without anti-caking and lumps

Filler

Si_2O_2 :	70%
Moisture :	0.5% wt max
Size :	0.5-1 mm 90% min
Organic matters :	200 ppm Max
Bulk density :	1400-1600 Kg/m3
Angle of repose :	30-32^o

It should be free flowing, without anti-caking and lumps.

The following facilities are within existing facility for handling the raw materials required for NPK production:

- Ammonia storage tank – 18000 MT capacity & 3000 MT capacity.
- Ammonia unloading and loading facilities.
- Phosphoric acid storage tank – 3000 MT capacity – 2 Nos. Additional two tanks shall be made.
- Phosphoric acid unloading and loading facilities.
- Sulphuric acid storage tank – 600 MT – 1 No.

All raw materials shall be transported by road.

2.5 Basis of Design (Process Description)

The neutralization of liquid Ammonia and Phosphoric acid takes place in a Pipe Reactor. The required N/P ratio is reached in the Granulator by injection of ammonia into the solids bed, through an Ammoniation System.

2.5.1 Solid Circuit

All solid raw materials are loaded in powder form in respective bins. There will be a common raw material Rotary Diverter to feed the different solid raw material to their correspondent bin. Raw material Belt conveyor will be equipped with elevator and a magnetic separator, to remove any iron material in the raw material or recovered spillages before entering in the production area. Solid feedstock and recycle are brought together to the granulator, where the granulation will take place.

2.5.2 Granulation

Granulation is mainly accomplished by a series of chemical and physical reactions between the recycle, solid and liquid raw materials, concentrated AN solution and the Pipe reactor slurry. 96% AN solution is sprayed directly on granulator solid bed using a jacketed distributor pipe and spray nozzles.

The phosphoric acid required is partially neutralized with ammonia till reaching a molar N/P ratio of 1.8-1.85, depending on the grade and the granulation conditions.

The neutralization reaction mainly takes place in the Pipe reactor in such a way that the slurry of ammonium phosphate is poured directly onto the granulator's solids bed.

An Ammoniation System is designed to provide complete phosphoric acid neutralization. It consists on a number of independent rubber hoses supported from the granulator's main beam. This system avoids the formation of lumps, provides a homogeneous distribution of ammonia and reduces granulator power consumption. Rotary drum type Granulator is used for NPK manufacturing process.

2.5.3 Drying

The granulated product is directly discharged to the dryer drum by gravity, through a very steep chute. Dryer uses controlled amounts of air flows, blown from the atmosphere, and heated up with natural gas in the combustion chamber, to achieve the required reduction on granules moisture.

There will be two fans supplying air to the dryer; combustion fan (to provide the stoichiometry quantity of air for the combustion); and Quench air fan (to cool down the furnace brick lined area and to adjust the required air conditions prior to the dryer drum inlet).

Moisture of the product is decreased up to a value < 1% w/w% n the dryer. Dried granules are then conveyed and elevated to the top of the screening section.

2.5.4 Screening section

The plant utilizes two double deck vibrating Process Screens. All through put is passed over these screens. The Dryer elevator feeds the Screens Splitter which splits the dryer outlet material between Screens. By-pass Diverters are used for feeding homogenously both screening lines.

Screen splitter is designed with a motor actuated blade whose positions are controlled and adjusted with the corresponding positions of detector and actuator.

Directly installed at the outlet branches of the Screens Splitter are two Screen Diverters, with electrical motor actuator, They are used for by-passing the corresponding screen and process crusher for maintenance and cleaning or when a partial (or total) emptying of the unit is required in a relatively short period of time.

While emptying the unit, Reclaim Diverter is positioned in such a way that product falls to Final Product Elevator which in turns send non desired product towards the off-spec area. Desired quality material is sent to of Final Product Storage. Off spec product is gradually re-introduced to the process by means of pay-loader, through the spillages recovery system.

The screening section is designed in such a way that in case of failure of one of the screening/crushing lines, it is still possible to continue with the normal operation of the plant using the other parallel line.

Screen feeders are provided to optimize the distribution of the product all along the screen width. In the vibrating screens, oversized fines and on-size products are separated. The oversize material will be sent to the crushers, chain mill type, and then to recycle. On-size product falls on the recycle regulator belt conveyor, which regulate the amount of on-size product to be sent to the final treatment section. The rest of on-size product, which will normally be in excess to the required quantity, is sent back to the recycle belt conveyor, by overflowing from the recycle regulating hopper. The recycle conveyor will collect:

- The dust coming from all cyclones
- The crushed product from the pulverizers
- Fines coming from screens
- The part of the on-size product in excess to the required unit production.

2.5.5 Cooling section (using a rotary cooler)

On size product from the Recycle Regulator Conveyor is fed by gravity to the Cooler Drum. Cooler is counter current rotary type and the cooling air comes from Air Cooler Impulsion Fan. The cooling air is chilled and dehumidified. The closed loop ammonia vaporization system is used for chilling of the air.

The Rotary Cooler Fines Screw Conveyor , a small screw conveyor installed at the product feed end of rotary cooler is used to convey the fines , granules and gross particulates of dust entrained by the counter-current air leaving the cooler which are collected in the cooler feed end hopper.

Rotary Cooler discharges cooled product, which goes directly to final product elevator which lift it to the single desk Polishing Screen. Here, less than 1 mm diameter material is separated and returned back to recycle, whereas product between 1-4 mm diameters falls by gravity to the Coater drum D2-D-103. Coating oil is added to the Coater Drum for caking control.

Polishing screen is equipped with a vibrating feeder .This improve the screening efficiency to evenly distribute the feed across its whole width.

2.5.6 Product Coating

Coating is particularly necessary in AN containing formulation, due to the hygroscopic nature of the raw material as it can easily promote caking, mostly when variations of air temperature

and moisture occur. Coating agent is preferably constituted by an coating wax specific for such a purpose. The coating oil is fed to the coater drum by using metering pumps. After coating, the product is weighed and sent to storage.

2.5.7 Liquid Circuit

AN concentrated solution (96-98%) is fed directly to granulator using a jacketed distribution header and its is sprayed on the solid bed with spray nozzles. Liquid ammonia at nearly ambient temperature is simultaneously fed to the Pipe Reactor and the Granulator Ammoniation System, both of them fitted inside the granulator drum. The amount of liquid ammonia is measured through mass flow meters, Coriolis type.

Fresh phosphoric acid is fed to the granulator pre-scrubber tank, to the scrubber tank and to the pipe reactor tank. Tanks are provided with agitators to assure the required liquids homogeneity. Defoamer may be added to these equipments if needed.

Sulphuric acid is fed to the granulator pre-scrubber tank and sometimes to the scrubber tank. Also a small amount of sulphuric acid is fed to the tail-gas scrubber to adjust the pH of the scrubbing liquid (process water) in that point.

The scrubber tank also receives the liquids from dryer, granulator and de-dusting and cooler scrubbers and the water make-up from tail-gas scrubber. Scrubbing liquid is advanced to the granulator fumes pre-scrubber. After scrubbing granulator fumes, washing liquid is advanced to the PR Feed Tank. All transfer flows are controlled by LIC.

Phosphoric and sulphuric acids are added to the different scrubbing sections to adjust washing liquid concentration and N/P ratio, flows being controlled by magnetic flowmeters. There is also provision for process water make up to both tanks; although in normal operation the process water will be only added through the tail gas scrubber. Liquid spillages around the plant are collected in a sump tank and pumped back to the process via the pipe reactor, the scrubber and the pre-scrubber tanks. Liquid emissions outside the plant are not envisaged.

The Pipe Reactor receives the required scrubbing phosphoric liquid from its corresponding tank by variable speed pump. The slurry produced by the reaction with liquid ammonia is distributed over granulator's solids bed. A steam flushing system is provided on the Pipe Reactor for occasional cleaning.

Ammonia is injected deep into the solid's bed till reaching the final required N/P ratio. Reaction heat helps to evaporate a large portion of the water in the slurry, thus reducing the heat requirements of the dryer.

The plant has a series of gas scrubber connected to the different equipments for a double purpose: to retain as much as possible all recoverable products, and to minimize emissions (especially ammonia, fertilizer dust and fluorine) to the atmosphere. The scrubbing liquid will be diluted phosphoric / sulphuric acids or water, depending on the scrubber. The scrubbing system has a first scrubbing step composed of a Venturi-Type fume prescriber for the granulator. The pre-scrubbing liquid is the result of mixing fresh phosphoric acid and sulphuric acid with scrubbing liquid coming from scrubber tank. From the granulator pre-

scrubber, the liquid is sent to the pipe reactor tank, where the concentration of P_2O_5 required for feeding the Pipe Reactor is adjusted with additional fresh concentrated phosphoric acid. The pre-scrubbing step objective is to retain most of the ammonia and dust leaving from the granulator. Occasional additions of sulphuric acid can be done to the scrubber tank.

The gases coming out of the pre-scrubber will be sent to the ventury type scrubber, where they are using as scrubbing liquid fresh phosphoric acid diluted with the slightly polluted water coming from tail gas scrubber. The objective of this scrubber is to complete the recovery of ammonia and dust. From the same common tank the scrubbing liquid is also re-circulated to the venture dryer scrubber, where the dust which has been not retained by the dryer cyclones is recovered; and the venture cooler and de-dusting scrubber where a part of the gases coming out from the cooler cyclones are jointly washed with the de-dusting gases coming from cyclones.

All exhaust gases from the above scrubber shall be sent to the final washing step: the Tail Gas Scrubber, which shall include a multi-spraying system in the horizontal feeding arm and a packed section in the vertical tower. Gases are washed with water, to avoid the fluorine emissions created during phosphoric acid washing, as well as to recover dust and NH_3.

The first washing consists of a duct multi-spraying system and uses the water advanced from the second one. A pH controlling system, using sulphuric acid as acidic media, assures the best pH to achieve both ammonia and fluorine recovery. The second step includes a packed section, to efficiently complete the dust, ammonia and fluorine removal. Scrubbing liquid is basically composed of water, which is sprayed on top of the packing. Scrubbed liquor shall be re circulated to the process.

Gases, after washing, are finally released to the atmosphere through a common stack. The last section of TGS is equipped with a demister to avoid droplet entrainment. The liquid from the tail gas will contain water, a small quantity of ammonia, fertilizer dust and fluorine retained during the scrubbing. This liquid will be recovered into the scrubber tank; where with the addition of phosphoric acid will constitute the scrubbing liquid. The flow chart for NPK manufacturing process is shown in **Figure 2.3**.

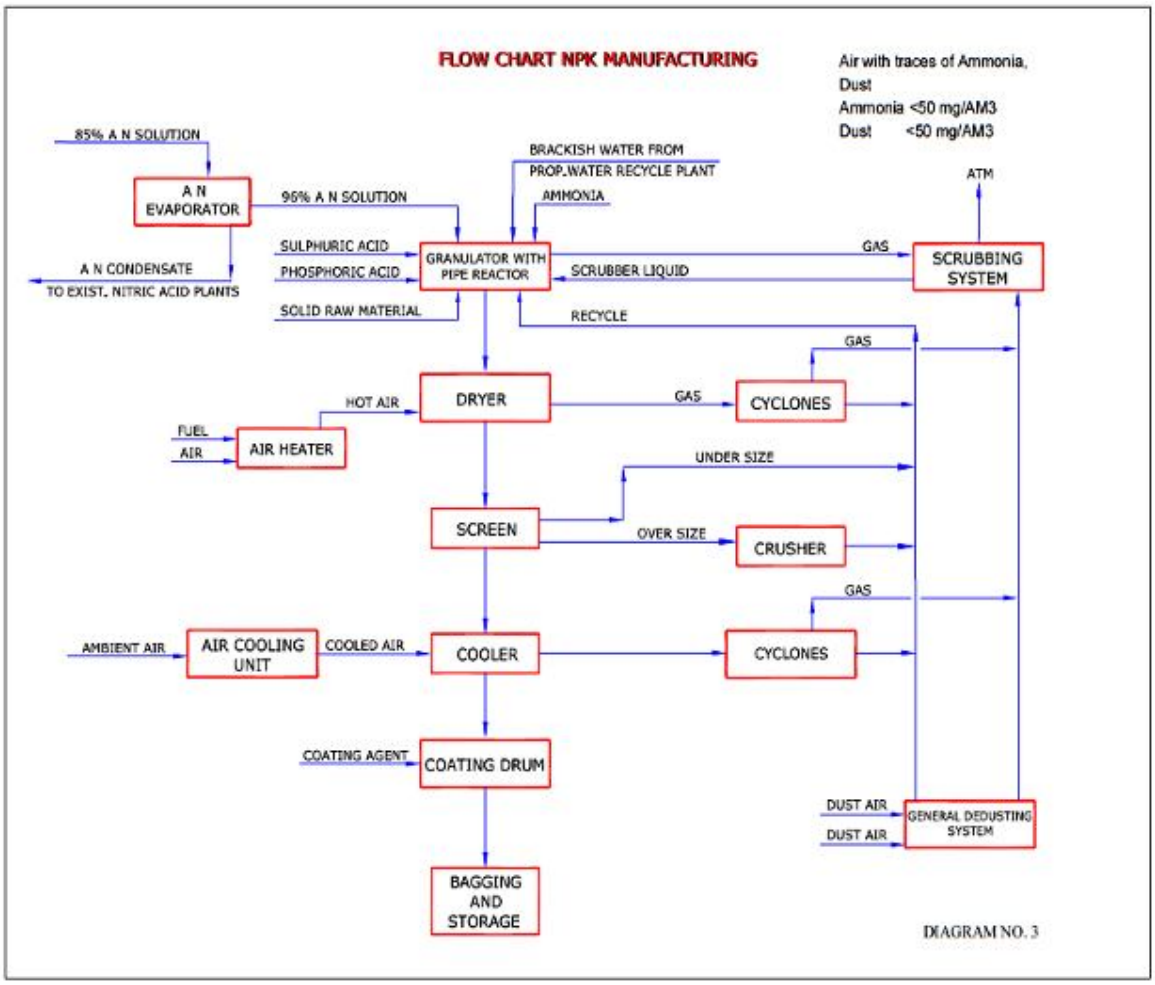


Figure 2.3: Flow Chart for NPK Manufacturing Process

2.6 Water Balance for Construction and Operation Phases

2.6.1 Construction Phase

During the construction phase, water requirement is about 20 kLD. Water requirement will be temporary and widely variable in nature and is expected to last for about 24 months and will be met from present water source i.e. from MIDC. **Table 2.2** gives information about the water requirement in the construction phase.

Table 2.2: Details about Water Requirement during Construction Phase

S.No.	Component	Water Required (kLD)
1.	Construction activities	20
2.	Drinking	1
3.	Sanitation	20
4.	Green belt development	Requirement will be met from STP water
TOTAL		41

About 11 kLD of wastewater will be generated during construction phase, which will be collected in a septic tank and will be treated in the existing effluent treatment facility within DFPCL premises.

2.6.2 Operation Phase

The stages where water is required in major quantities during the operation phase are manufacturing process (chemical reactions) and scrubber make up due to loss through the stack both from reactor vent and drier outlet. The total raw water requirement is 500m^3/day which will be met through present water source i.e. from MIDC. **Table 2.3** shows the usage of water for various purposes.

Table 2.3: Water Consumption for Various Activities during Operation Phase

S.No.	Component	Water Required (kLD)
1	Process	150
2	Drinking & Sanitation	20
3	Cooling tower mark up	380
TOTAL		**550**

Only 20 kLD of wastewater (sewage) is expected to be generated during the operation phase, which will be collected in septic tank and will be subsequently treated in the existing effluent treatment facility.

As the manufacturing process is Zero Effluent Discharge process at its battery limit, no effluent is expected to be discharged during the operation phase. As part of this project, DFPCL shall install water recycle unit (RO system) to treat present effluent. Reject from this unit shall be used in the process. No additional fresh water requirement is envisaged for the complex due to this project. The water balance diagram is shown in **Figure 2.4**.

2.7 Storm Water Drainage System

DFPCL Taloja plant area already has a storm water drainage system. It is made up of partially covered drains with brick masonry work. There are total six storm water drainage outlets. The four outlets located in the northern side of the plant discharges into DFPCL Compound outside plant area.

2.8 Rainwater Harvesting System

DFPCL at Taloja has about 3.86 Lakh Sq.m of land in its possession. Since water table is very high in the area, no rain water harvesting system is implemented yet. DFPCL propose to collect rainwater carried from roof for proposed building.

2.9 Sewage Treatment Plant

The sewage treatment plant (capacity 150 kL/day) is working for treating only the domestic effluent. Treated water is used for gardening purpose.

2.10 Effluent Treatment Plant

In the DFPCL plant, effluent is generated from the Ammonia, IPA, Nitric acid plant, CT blowdown etc. DFPCL has effluent treatment plant of capacity 5000 m^3/day. Present effluent generation is approx. 3800 m^3/day. Treated effluent is discharged to CETP, Taloja as per MPCB and CETP norms. As part of project, DFPCL shall install RO unit of capacity 550 m^3/day. This is expected to create 450 m^3/day good quality water 100 m^3/day reject. This water shall be used to fulfil water requirement of the proposed plant. Thus, DFPCL will reduce its effluent discharge by approx. 450 m^3/day after expansion project is commissioned.

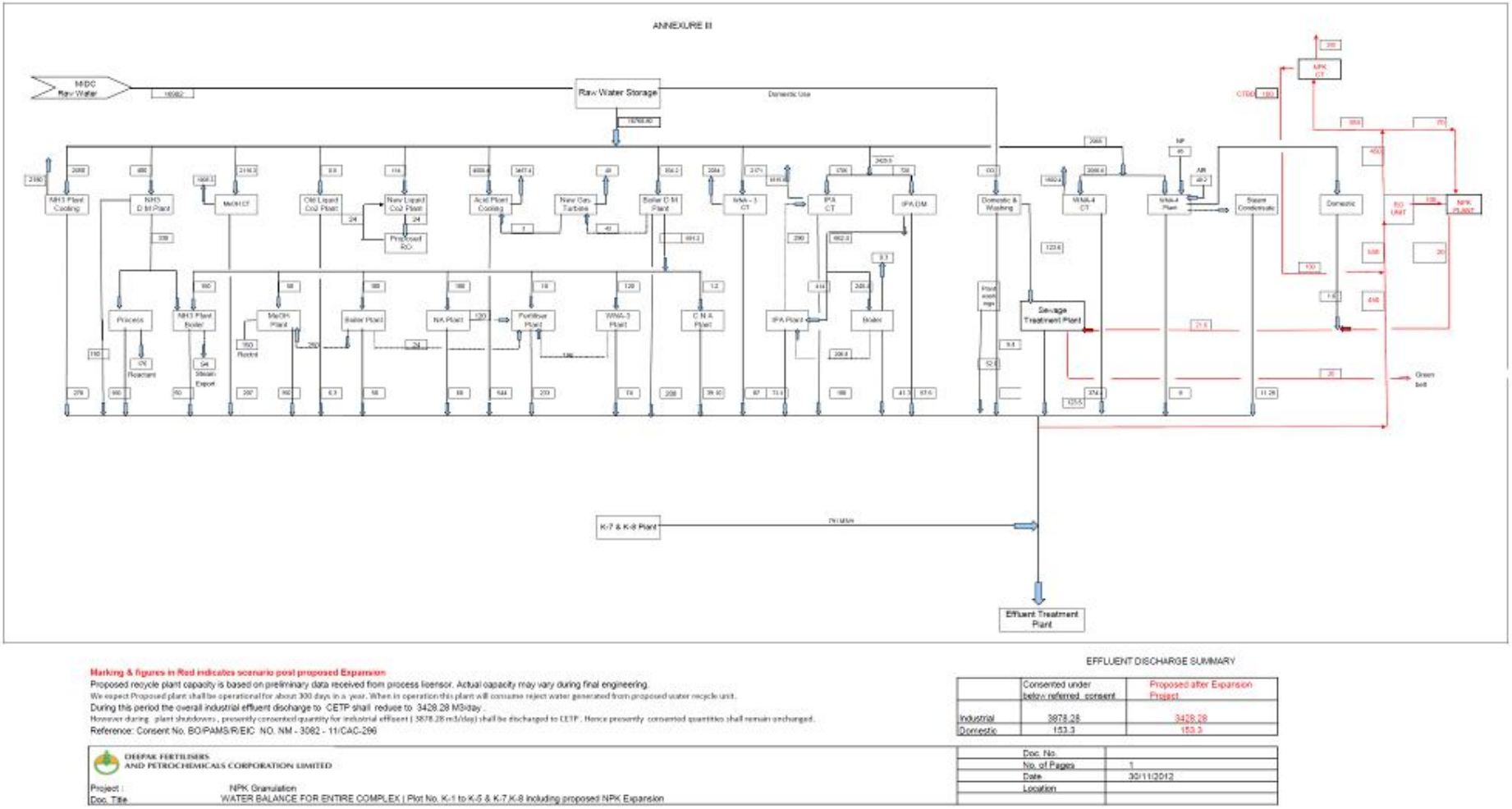
The proposed unit shall be designed for zero liquid effluent discharge. However 1-2 m^3/hr additional effluent will be generated from boiler blow down, domestic effluent etc. However, all effluent of the complex shall be treated through RO system. Part of the reject of RO shall be recycled to NPK unit and the balance shall be sent to multiple effect evaporators for zero effluent from the complex. Treated effluent from RO shall be used in the process. Thus proposed project will result in conservation of natural resources and green environment.

2.11 Solid Waste Management

Solid Waste generated in the manufacturing & other administrative area in the complex is segregated as organic & inorganic waste. Organic waste is converted in fertiliser.

Other solid wastes are disposed of to authorised waste collection contractor or re-users.

Proposed NPK process shall not generate any new type of solid waste.



Marking & figures in Red indicates scenario post proposed Expansion

Proposed recycle plant capacity is based on preliminary data received from process licensor. Actual capacity may vary during final engineering.
We expect Proposed plant shall be operational for about 300 days in a year. When in operation this plant will consume reject water generated from proposed water recycle unit.
During this period the overall industrial effluent discharge to CETP shall reduce to 3428.28 M3/day.
However during plant shutdowns, presently consented quantity for industrial effluent (3878.28 m3/day) shall be discharged to CETP. Hence presently consented quantities shall remain unchanged.
Reference: Consent No. BO/PAMS/R/EIC NO. NM - 3082 - 11/CAC-296

EFFLUENT DISCHARGE SUMMARY

	Consented under below referred consent	Proposed after Expansion Project
Industrial	3878.28	3428.28
Domestic	153.3	153.3

DEEPAK FERTILISERS AND PETROCHEMICALS CORPORATION LIMITED

Project : NPK Granulation
Doc. Title WATER BALANCE FOR ENTIRE COMPLEX (Plot No. K-1 to K-5 & K-7,K-8 including proposed NPK Expansion

Doc. No.	
No. of Pages	1
Date	30/11/2012
Location	

Figure 2.4: Water Balance Diagram.

2.12 Hazardous Waste Management System

The ETP sludge generated will be disposed in the secured land fill available at DFPCL premise.

The hazardous waste Management System at DFPCL is divided in to three major activities, viz. Collection, Segregation and disposal. The hazardous waste generated at DFPCL is mainly spent Catalysts, spent oil, oil soaked cotton waste, oil filters, batteries, chemical or oil drums & electrical waste.

LEGAL REQUIREMENT: DFPCL has identified all the obligations under the legal requirement of "Hazardous Waste (Management Handling and Trans-boundary movement) Rules-2008". These are evaluated on six monthly basis for compliance. Environmental department is responsible for the disposal of hazardous waste to authorized recycler. Disposal period is strictly maintained within 90 days from date of generation.

COLLECTION OF HAZARDOUS WASTE: Segregation of the hazardous waste is done based on the categories given in the Hazardous Rule 2008. Preprinted labels are then placed on the container. It is ensured that the compatibility of the materials is maintained between two hazardous materials.

DISPOSAL OF HAZARDOUS WASTE: Hazardous waste is disposed as per the documented operational controlled procedure (OCP). For respective categories of hazardous waste separate procedure is developed and in accordance with the procedure the hazardous waste is disposed. These are as follows:

Doc Control No.	Title
SYS/OCP/11	Disposal of oil or chemical soaked cotton waste
SYS/OCP/13	General procedure for handling and disposal of hazardous waste
SYS/OCP/17	Disposal of spent oil, empty oil drums and chemical caboys
SYS/OCP/62	Comprehensive analysis of hazardous waste

Personal Protective Equipment (PPE):- PPE such as hand gloves, safety goggles and safety shoes are used while handling the hazardous waste.

Proposed NPK process will not generate any new type hazardous waste.

2.13 Occupational Health and Safety for Workers

The existing system of Occupational Health and Safety is capable of catering to the needs, arising from the proposed expansion.

The DFPCL at Taloja has a Health and Safety Policy.

2.13.1 Safety Training

1. OBJECTIVES

Manufacturing of Fertilisers and Petrochemicals involves handling, processing and storage of a number of hazardous chemicals. DFPCL recognizes that the Company has moral, economic, social and legal obligations to provide and maintain safe working conditions in all its work areas and protect environment. The Company, therefore, adopts and promulgates the Policy set out below for the purpose of creating and maintaining a safe and healthy working environment.

2. POLICY

2.1 The Company considers Safety, Health and Environment as one its prime objectives. The Management is of the firm opinion that all incidences like near miss, minor and major injuries, fire occurrences and release / spillages of chemicals are preventable.

2.2 All the manufacturing plants and supporting services shall adopt techniques for manufacturing, handling, storing and disposing of all substances safely and without creating unacceptable risk to equipment, human life or the environment. All activities relating to construction and maintenance including contract services shall also ensure safe practices.

2.3 All the manufacturing plants and supporting services shall adopt techniques for manufacturing, handling, storing and disposing of all substances safety and without creating unacceptable risk to equipment, human life or the environment. All activities relating to construction and maintenance including contract services shall also ensure safe practices.

2.4 The Company shall continue to follow all statutory regulations related to occupational safety, health and environment. It shall adopt its own Safety, Health and Environment standards where such laws or regulations may not be available to prevent accidents.

2.5 The Company shall continue to impart training in Safety, Occupational Health and Environment to all its employees both in-house and in outside specialized institutes.

2.6 The Company shall continue to give due consideration to integrate Safety, Health and Environment in all decisions including those dealing with purchase of Plant, Equipment, machinery and Material as well as selection and placement of personnel.

3. SITE ORGANISATION

3.1 The Company has a SHE organization to co-ordinate, monitor, promote and enhance Safety, Occupational Health and Pollution prevention and control activities.

3.2 The SHE Department is manned professionally qualified personnel and the number of Officers required conforms to statutory requirement.

3.3 It is and shall remain the responsibility of the SHE Department to –

- prepare rules and procedures related to SHE
- monitor compliance of the said rules and procedures through inspections and audits,
- conduct investigation and analysis of incidences,
- organize SHE promotional activities and educate & train the employees,

- carry out all related activities with a view to create and maintain safe and healthy working environment,
- Conduct various safety audit studies
- carry out Pre-employment and Periodical Medical Examination,
- Maintain industrial hygiene at work area.
- Render effective emergency medical treatment,
- Preserve medical records in Occupational Health Centre as required under Statutory Provisions.

4. INVOLVEMENT OF WORKERS

1. It is and shall remain the endeavour of the Company to elicit the fullest co-operation of the employees through their representatives to effectively implement this Policy.

2. Each Division of the Company shall have a Safety Committee and 50% of the members of the Committee shall be workers.

3. The workers shall be motivated to participate in the safety contests organised in-house as well as by outside Organizations such as National Safety Council, Taloja Manufacturers' Association, etc.

5. SAFETY TRAINING

We, the members of Galaxy believe that, training is one of the best methods that can be used to influence human behaviour for the purpose of developing sound and safe work habits.

Areas of training –

1. Basic Safety – About company, safety rules, guidelines, hygiene, habits etc.

2. Safety at works – Housekeeping, benefits of HK, 5S, safety checks etc.

3. Chemical safety – Classification, Hazards, properties, MSDS, different limits

4. Personal Protective Equipments – Choosing appropriate PPE during work

5. Safety Equipments- Breathing sets, eye washers, etc.

6. Fire Safety – Fire, fire triangle, extinguishing, extinguishers, rules etc.

7. Electrical Safety – General electrical safety

8. Static Electricity, Hazard & Safety – Generation, Precautions, prevention.

9. Work permit system – Different work permits in detail.

10. First aids – Physiology, different injuries & treatment.

11. Emergency Plan – Onsite emergency, off site emergency. Mock drills

12. Case Studies – Past incidences in form of case studies.

13. Behavioural based safety – inculcating behaviour for safe work strategy.

6. SAFETY INSPECTIONS

DFPCL believes in "prevention" of all types of incidences. This is achieved through periodical inspection of the plants. Also periodical internal & external safety audits are conducted.

Work Station monitoring: best housekeeping practices are followed. Workers, Visitors, staff is provided with personal protective equipment.

Accident reporting & Investigation System in DFPCL

All incidences (injuries, environmental & fire) are reported. It includes near miss incidences also. After reporting of incidence, every incidence is investigated deeply to find out the proper root cause. Appropriate correction action is implemented and recurrence of the incidence is eliminated / reduced. After investigation, report is sent to all the concerned department and people to implement the recommendations. Any reportable incidence is reported to concerned regulatory authority immediate / within stipulated time.

Definition – The event that causes unplanned occurrence involving injury to person, damage / loss of property or equipment, damage to environment or any incidents which has potential of resulting into said occurrences.

Scope – these procedures SAF-SOP-01 is addressing for reporting, investigating and analysis of incidents to determine their causes, implement corrective actions and document lessons learnt to prevent reoccurrence.

Applicability – This procedure is applicable to DFPCL, Taloja plant, JNPT storage terminal and transportation of natural gas through pipeline from ONGC URAN to Taloja.

Nh3, Nox, Vox, SPM are monitored regularly and online surveillance. It is ensured that Nh3, Nox, Vox, SPM are maintained below threshold limit.

Responsibility – Employees should promptly report any incidents that occur including fire. Explosion, vehicle accidents and incident resulting into air, water & soil pollution, accidental damage to property of the company, dangerous occurrences and release / spillage of hazardous chemicals.

Incidents are classified as follows:

Near miss – It means any unplanned, sudden event that could have caused injury to man, materials (plant) or environment or could have involved a loss of containment possibly giving rise to adverse effect but not resulted in such accident.

First Aid – If any injury to person (DFPCL Employee, contractor or visitor) occurred while on duty which requires one time treatment in our OHC is considered as First aid injury case.

Minor Injury– Minor injury to a person occurred while on duty which requires medical treatment in our OHC and follow up visit for the purpose of treatment.

Reportable Accident – Injury to person which requires treatment in our OHC and makes the person disable for doing the duty for next 48 hours and is reportable to the DISH authorities as per the Maharashtra factory act.

Fatal – Death of person due to an accident

Minor Fire – Any incident where unintended smoke or minor fire was noticed and damage restricted to about Rs. 10000/-

Major Fire – Any incident which has resulted into accidental burn of companies property resulting into loss damage above Rs 10000

Minor Environmental Accidents – Any unplanned incidents which have resulted into release / spillage of chemicals resulting into air / water / soil pollution but the consequences were limited to DFPCL Taloja boundary.

Major Environmental Accidents – Any environmental accidents resulted into air/water/soil pollution and its effects were observed beyond DFPCL Taloja boundary.

Dangerous Occurrence– Bursting of vessel, collapse or fall of crane and structure, explosion are the examples of dangerous occurrences.

Vehicle Accidents – Any incident involving vehicles of DFPCL, contractor or visitors which includes motorbike, cars, jeeps, tankers, forklifts, cranes, fire vehicles, dumpers, trailers etc. have causes injury to person or damage to property

Responsibility for Reporting and Recording – Whatsoever observe any of the above mentioned incidents should promptly to the area shift in charge. Vehicle accidents should also be reported to security office.

The shift in charge are also responsible for initiating the report of above mentioned cases in forms after taking immediate actions for medical treatment and to prevent further damage. He will forward written report within 24 hrs to HOD and HOD will forward report with comments to Safety Dept. Formats for rising reports are available in soft as well as hard copy with all shift in charges.

Investigation of the Incidents

Near Miss – All the miss incidences will be investigated by area shift in charge (SIC) and report will be send to GM (EHS & QS) after immediate action. The report is sent in the format and their recommendations are given in recommendation.

First Aid Cases and Minor Injury – First aid cases and minor injury will be investigated by SIC and Safety officer jointly in the format and its report is sent to Plant HOD and AVP (EHS & QS) within seven days with root cause analysis and recommendation to avoid reoccurrence.

Minor Fire and Minor Environmental Incidents – This type of incidents are investigated by plant in charge and safety officer jointly. In the case of minor fire, fire officer is involved in investigation. The report is then sent to Plant HOD and AVP (EHS & QS) within four days with root cause analysis and recommendation to avoid reoccurrence.

Reportable accident, Major fire, Major environmental incident, Dangerous occurrence, and fatal accidents – This type of incidents are investigated by constituting team which is recommended by Ex VP(O) and AVP EHS & QS. The report is then sent to Plant HOD and AVP (EHS &QS), Ex VP (O) and DISH within 7 days or within time frame with root cause analysis and recommendation to avoid reoccurrence.

Analysis – GM (EHS &QS) will be responsible for carrying out analysis of all incidents periodically and submit the findings to the Central safety committee for discussion and deciding future plan of action for improvement.

2.13.2 Safety Manual

In DFPCL, Safety manual has been prepared with view to set forth the guidelines with respect to safety in our factory. All efforts have been made to cover safety practices to be followed in our day to day operation. However, each one of us should integrate safety in his work so that each one cares for himself, his equipment co-workers and environment. Manufacturing of fertilisers and petrochemicals involves handling, processing and storage of hazardous chemicals. So as to provide and maintain safe working condition in all its work area and protect environment following safety procedures and safety policy are incorporated in safety manuals.

1) General safety rules
2) Minimum safety measures to be followed by contractors in factory premises
3) Vehicle and pedestrian safety
4) Safety barricades
5) Office safety
6) Safety work permit procedures
7) Hazards of confined spaces
8) Procedure for confined space entry
9) Welding procedure
10) Gas cutting procedure
11) Digging, trenching and excavation procedure
12) Work at height procedure
13) Cranes and lifting devices
14) Use of hand tools and power tools
15) Grinding wheel safe practices
16) Handling of compress gas cylinders

17) Safety in material handling

18) Electrical system safety

19) Laboratory safe practices

20) Safe use of Hoses

21) Use and maintenance of personnel protective equipment

22) Procedure for accidents reporting and investigation

23) MSDS of all final products, and raw materials.

2.13.3 Safety Committee

As per Maharashtra factory act, the factory which carries on 'hazardous process' as defined under section 2 (cb) of the Act and employs more than 50 workers, there shall be safety committee.

In DFPCL we have three safety committees for three different groups to easy functioning of the committee as factory having large number of employees working in various plants. There are equal participation of committee members from worker and management category.Each committee is headed by individual plant HOD as chairman and concern area safety officer is the secretary of the same safety committee.The tenure of safety committee meeting is for two year and committee representative form worker sides are elected by worker.

The committee meeting is held once in three months under chairmanship of plant HOD.

Safety committee is assisting and co-operating with the management in achieving the aims and objectives outlined in the 'Health and Safety Policy' of the occupier. It is dealing with all matters concerning health, safety and environment and to arrive at practicable solutions to problems encountered and creating safety awareness amongst all workers.

Safety Committee looking into any complaint made on the likelihood of an imminent danger to the safety and health of the workers and suggests corrective measures and reviewing the implementation of the recommendations made by it.

The minutes of meeting are prepared and circulated to Factory manager, AVP EHS & QS, and all committee members. The record of safety committee meeting is kept in standard format as ready reference whenever it is required.

2.13.4 Health

Health Records of Employees: As per Section 41 (C) c of Factories Act 1948 under specific responsibility of the Occupier in relation to hazardous process, every Occupier of a factory involving any hazardous process shall "maintain accurate and up to date Health records, or as the case may be Medical records of the workers in the factory who are exposed to any Chemical, Toxic or any other harmful substances which are manufactured, stored, handled or transported and such records shall be accessible to the workers subject to the conditions as may be prescribed.

Provide for medical examinations of every worker –

a) Before such worker is assigned to a job involving the handling of or working with a hazardous substance and

b) While continuing in such job and after he has ceased to work in such job at intervals not exceeding twelve months in such manner as may be prescribed.

DFPCL has very broad health policy. Details of practices and facility at DFPCL are as below –

DFPCL have occupational health center in their premises just adjacent to security.

We have six rooms in OHC:

1. Nursing station

2. Two detention / treatment wards with two beds each – total four beds

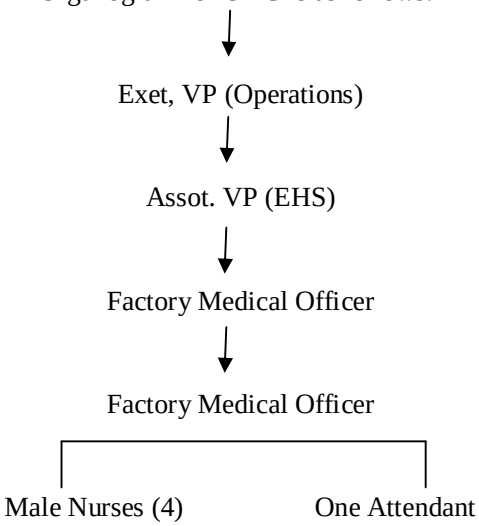
3. Two cabins for medical officers

4. One decontamination room.

With the following infrastructure:

Appropriate illumination with 24 hours tap water supply. AC for one ward, where patient can be treated or can be kept under observation. Drinking water, cooler with purifier.

Organogram for OHC is as follows:-



The following facilities / equipments are available in OHC:

1. Decontamination room

2.Eye wash with normal saline

3.Difoterine for chemical burns

4.Water gel for any type of burns with water gel blankets to cover whole body

5.Cleaning & dressing of wounds

6.Autoclave for sterilization

7.Ice Pads for First Aid in blunt trauma

8.Infra red light to treat musculoskeletal sprains

9.Crepe Bandages to treat sprains

10.Arm sling and cervical collar with support

11.Tetanus and Pain killer injections

12.IV Fluids and oral rehydration solutions

13.Steroid and other life saving injections

14.Oral antibiotics and pain killer tablets

15.B P Apparatus with stethoscopes

16.ECH Machine

17.Automated External Defibrillator

18.Oxygen Cylinders – 4 for use and 3 standby

19.Audiometry Booth

20.Auroscope

21.Refrigerator

22.Anti Sanke Venom

23.Steam inhaler

24.Steam inhaler

25.Four Beds for detention and treating patients

26.Well Equipped Ambulance with Oxygen Cylinder

27.Fingertip Pulseoximeter.

Systems:

1. <u>Pre-employment check-up</u>:

When a candidate is selected for employment (management / non-management) – HR, directs the candidate to OHC for medical fitness before offer letter is given. We are OHC conduct his / her clinical check-up and send for blood, urine, LFT examination along with X Ray chest and if required ECG and other tests depending on findings in clinical examination. Fitness or unfitness is informed to HR after we get all the reports.

Audiometry & Vision tests are also part of pre-employment test.

2. <u>Pre-employment check-up for contract workmen</u>:

Contract employees are sent to us usually by user department. We conduct physical examination along with height, weight and vision including colour vision. Fitness or unfitness is informed to user department and a copy is given to safety.

3. <u>Periodical Medical Examinations; Company Employees</u>:

PME for company employees is conducted once in six months – once by a certifying surgeon and another by a reputed diagnostic center. After medical examination, when we get the reports from the diagnostic centres, employees are called for counseling and thereafter for follow-up after 3 to 6 months with abnormal reports; to know the post counseling status. After follow-up, health analysis is done to see how many problems had during medical checkups and how many have shown improvement? And how many are fallouts?

4. Periodical Medical Examinations; Contract Employees:

PME for contract employees is conducted once in a year by a certifying surgeon and counseling is done after we get the reports.

4.Sickness:

If any person is sick, he reports to OHC on duty and after treatment he is sent back to department or detained in OHC for some time before he goes back to duty or sent home or nearby Hospital depending on condition of the patient in Ambulance if required.

5. Injury:

If any employee suffers from occupational injury he reports to OHC on his own and after treatment resumes duty immediately but if injury is major his supervisor or co-worker informs OHC and there by Ambulance is sent to bring the casualty from the place of injury. Depending on the severity and investigations required the casuality is treated, detained in OHC or hospitalized.

6. Medicine Inventory:

Monthly medicine stock is prepared on the last day of every month and order is placed at our regular vendor. Bills and stock statement of last month along with bills are submitted to purchase and accounts department for clearance.

7. Special Sick Leave:

Whenever a management employee is sick and is unable to report to duty on Medical grounds, he submits sickness certificate with fitness certificate alongwith other supporting documents like, investigations if any, discharge card if admitted and prescription/s by the treating Doctor, depending on the illness SSL is recommended to sanction.

SSL is also recommended in case of occupational injury where rest at home or hospitalization is required.

8. Health Tips:

Daily Health Tips are circulated through emails on various health related topics to improve health awareness among all employees.

9. Health awareness Seminars:

Health awareness seminars are arranged by inviting a renowned faculty from outside reputed Hospital to deliver a session of a particular speciality. 6 such sessions are arranged in a year to cover different topics of general concern of all.

10. Executive Health Checkup:

Executive health checkup of management employees is conducted periodically for 50 years and above in a speciality center this is an extensive medical check up which includes various

tests including PSA, 2D Echo and Stress Test. After detail medical examination diet is advised if required and changes in life style and further tests or procedure / surgery etc depending on the findings.

2.14 Power Requirement

DFPCL has its own 17.9 MW gas based power generation within the complex. Additional 9 MW requirement is to be taken from the Maharashtra State Elect. Distribution Co. Ltd. The proposed expansion project will require additional 5 MW of power which shall be taken from MSEDCL. As part of project, DFPCL shall upgrade their system to 100 KVA from 22 KVA as directed by MSETCL. MSETCL has already approved additional load.

2.15 Utilities

All required utilities of the project are available within the complex. One Cooling tower of capacity 700 m^3/hr. shall be added.

2.16 Employment

No additional manpower is envisaged.

2.17 Land Details

DFPCL has 96 acres of land in their possession. The DC norms for development of plant and floor space index shall be met. Required approval from competent authority shall be obtained.

2.18 Hazardous Materials Storage and Handling Facility

Sulphuric acid, phosphoric acid ammonia and potash are the hazardous materials which will be used for the production of the complex fertilizer. The details about the storage and handling facilities for these hazardous materials are given below:

1) Sulphuric Acid - Storage Tanks of total Capacity of about 800 MT

Sulphuric acid is outsourced and is stored in storage tanks. Acid will be pumped to the new plant from these storage tanks. In the event of a major failure of the acid tank sulphuric acid spill out are contained within the dyke wall provided around the storage tanks. In addition to that recovery facility is also provided.

2) Phosphoric Acid - Storage Tanks of total Capacity of about 3000 MT of P_2O_5

Phosphoric acid is outsourced. Acid is transported through tankers and is unloaded to storage tanks using unloading pumps. From these storages acid will be pumped to the new plant using another set of loading pumps. Here also storage tanks are protected with dyke wall for containment of spillages. Two numbers of additional tanks with capacity of 1500 MT each shall be made with same type.

In the event of a major failure of both the acid tanks, enormous quantities of acids will spill out and will be contained within the area since dyke wall is provided around the storage tanks. In addition to that recovery facility is also provided.

3) Ammonia- Atmospheric pressure storage tank of capacity 21000 MT

DFPCL makes Ammonia from gas. Additional Ammonia is transported through tanks and is unloaded to the storage tank using unloading compressors. The storage tank is kept at –33 deg C. and atmospheric pressure. Ammonia will be pumped to the new plant using transfer pumps.

In case of any ammonia leak, it will be isolated by closing the manual isolation valves. To do this, the person should wear the necessary safety appliances such as breathing apparatus, PVC suit etc. and approach the isolation valves by going at right angle to wind direction. Water curtain shall also be used to approach the leak area and to contain the ammonia leak.

2.19 Air Pollution Control Systems

The following measures have been taken up by DFPCL to control Air Pollution occurring due to various processes.

- For the proper implementation of Pollution Control Systems with respect to air, a capital investment of about Rs.2000 Lakh has been incorporated for installing various equipments of pollution control. Apart from this, a recurring expenditure of approx. Rs 50 Lakh is being incurred for operating and maintaining the pollution control plants.

2.19.1 Air Scrubbing System

Proposed process will have well designed scrubbers.

- The scrubbing system consists of a pre-neutralizer / granulator fume scrubber, drier scrubber and cooler scrubber.
- All the scrubbers are venturi-cyclonic type and the drier and cooler scrubbers have built-in venturi cones, whereas the fume scrubber has the venturi cone mounted externally.
- Fresh phosphoric acid is taken in the fume scrubber sump tank and the overflow from this tank flows to the scrubber seal tank of dryer and cooler scrubbers.
- In the seal tank of dryer and cooler scrubbers, process water is also introduced.
- Dust laden air from the dryer, cooler and equipment vent pass through the cyclones where a major portion of the dust is separated before being scrubbed in the dryer and cooler scrubbers respectively.
- Fumes from the pre-neutralizer and granulator are scrubbed in the fume scrubber. Each scrubber is provided with a fan for creating the required draft.
- The scrubbed gases from the dryer and cooler scrubbers are let out to the atmosphere after passing through knockout chambers with spray water arrangement where entrained phosphoric acid droplets are removed when the gases pass through a wetted packed section.
- The liquid effluent drains by gravity from the knockout chamber to the sump tank /scrubber seal tank for recycling in manufacturing process.

Thus no liquid effluent shall be discharged to the effluent treatment plant.

2.20 Fire Fighting System

DFPCL complex have Fire fighting system designed on guidelines laid by TAC. DFPCL have own fire tender with trained manpower.

MIDC Taloja fire station is located next to DFPCL Complex.

During proposed expansion required modification shall be done in present fire fighting system.

2.21 On Site Emergency Plan

DFPCL has well defined onsite emergency plan for the complex which covers all plant & storages, unloading & loading facilities.

Requirement laid by the plan are met.

Practices defined under the plan are regularly followed and monitored.

2.22 Offsite Emergency Plan

Offsite disaster (Industries) Management plan for Raigad district is available. It covers Taloja MIDC & Chemical movements in the district.

DFPCL is active member of district crisis group and regularly participates in actions as required.

2.23 Mutual Aid response Group

With initiative from DFPCL and other members, Mutual aid response group is formed for Taloja MIDC consisting of Safety & Fire officers of various companies.

Every 15 days this group meets to discuss actions required to meet various situations in case of emergency.

Arrea covers nearby villages also.

Required drills are conducted by this group regularly.

2.24 Transportation of Hazardous Chemicals

DFPCL has laid system for transportation of hazardous chemicals. Some of the features of this system are as below –

1) All drivers are trained before joining and every 6 months they undergo training.

2) Route for transportation of Chemical is standardised which is reviewed regularly.

3) All tankers are inspected once a year.

4) Transport information card with all necessary instructions is provided to every tanker.

5) In emergency control room, 24 hours. dedicated telephone line is provided to attend to any call.

3

DESCRIPTION OF THE ENVIRONMENT

3 BASELINE ENVIRONMENTAL STATUS

3.1 General Setting of Site and Study Area

3.1.1 Study Area

Taloja is located in the Konkan region of Raigad district in Maharashtra State, on a West-facing spur of the Western Ghats of Sahyadri range. Taloja Industrial Area is one of the most rapidly developing industrial belts of Mumbai. The Kasardi River flows along the Taloja Industrial Area having non-perennial nature and drain out into the Arabian Sea. The major town/cities of Raigad district includes Mangaon, Roha, Panvel, Pen, Khopoli, Kharghar, Taloja, Khalapur, Uran, Patalgang, Rasayani, Nagothana, Poladpur, Alibag, Karjat and Mahad. The largest city both in area and in population is Panvel.

The study area for this EIA study encompasses area falling within 10 km radius from the proposed project site. The existing/ baseline environmental set-up of the study area with respect to the air, water, soil, noise and biological parameters shall be discussed in this chapter. The location map showing the study area is given in **Figure 3.1.**

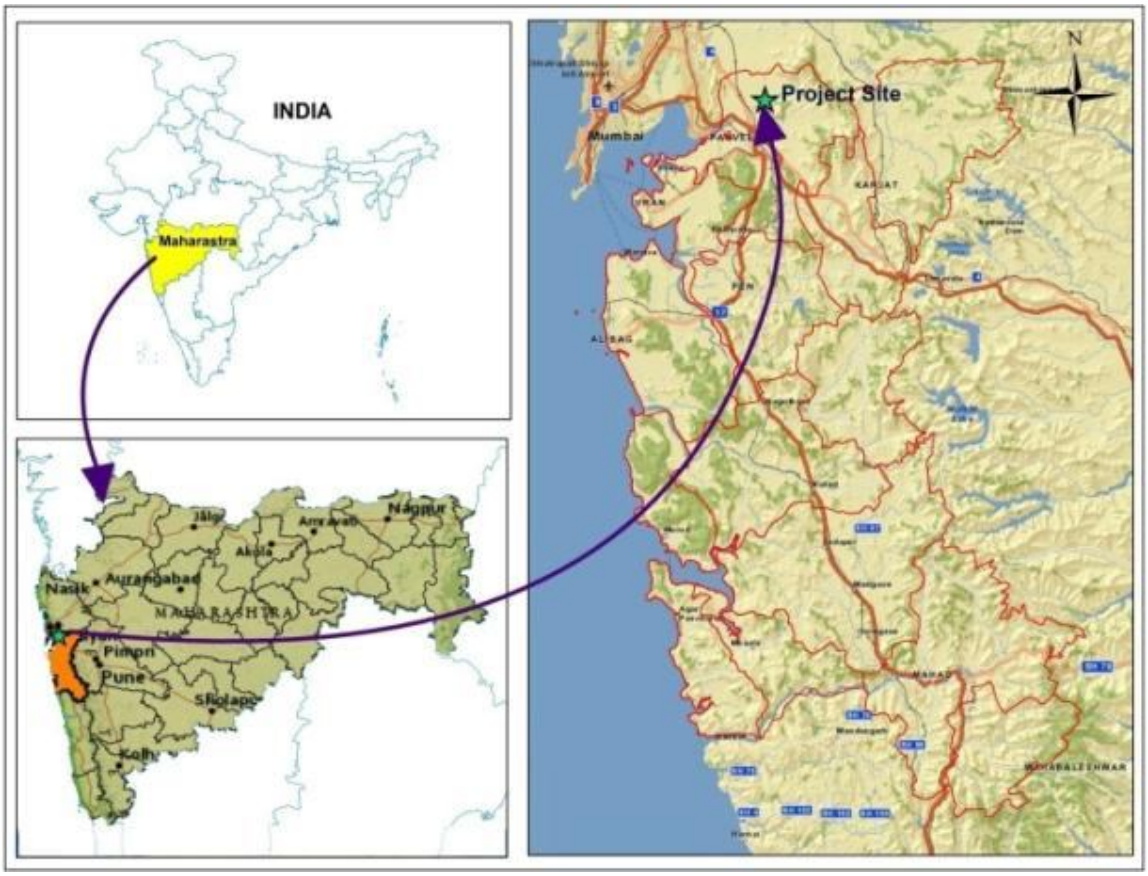


Figure 3.1: Location Map of Project Site

3.1.2 Site Description and its Environs

The area for proposed expansion is within the existing plant premises. The site is well connected by road and is approximately 10 km (North) from Panvel city. The study area of 10 km radius mostly consists of Industrial & Commercial land apart from very small agricultural land and the project site is within the notified MIDC Industrial Area at Taloja. There are various industries near by the project site such as Hindalco Industries Ltd., Tata Steelium, Bharat Electronics Ltd., Flamingo Pharmaceuticals Ltd., Apcotex Ltd., United Braveries Ltd. Kellog, Floatglass Industries, Bharat Shell Ltd., VVF Ltd etc.

MIDC (Maharashtra Industrial Development Corporation) has constructed a water supply scheme to supply 32 MLD of water to Taloja Industrial Area from Barvi Dam grid, owned by MIDC. CIDCO has developed a residential and commercial area known as Navi Mumbai, 2 km from Taloja Industrial Area. A CETP (Common Effluent Treatment Plant) of 18 MLD capacity have been undertaken and completed by MIDC in order to make the area eco-friendly. This scheme is being operated as a joint venture between MIDC and Taloja Manufacturer Association and takes care of effluent collection, treatment and disposal. MIDC has constructed a Fire Station to handle chemical, petrochemical, textile fires etc. **Figure 3.2** shows the study area map and **Table 3.1** briefly shows the description of the site along with the nearby features.

Figure 3.2: Study Area Map (10 km buffer)

Table 3.1: Brief Description of the Project Site

Items	**Details**
Project	Expansion of NPK Fertilizer Manufacturing Unit, DFPCL Complex.
Location	Plot K-1 to K-5, MIDC Industrial Area, Taloja, District Raigad, Maharashtra.
DFPCL Plant Area Break-up	3,85,584 m^2 (Total Plot Area) 40,626 m^2 (Explosive & Process Area) 86,805 m^2 (Plinth Area) 62,461 m^2 (Roads & Drains) 65,562 m^2 (Green Belt)
Area allotted for expansion	10,000 m^2 (This land is part of plinth area of present godown which shall be removed to make new plant.)
Capacity	3,24,000 MTPA (Existing) 6,00,000 MTPA (Proposed)

Items	Details
Nearby features	**Industries**- Hindalco Industries Ltd., Tata Steelium, Bharat Electronics Ltd., Flamingo Pharmaceuticals Ltd., Apcotex Ltd., United Braveries Ltd. etc. Kellog, Float Glass, Bharat Shell, VVF Industries. **Highways**- NH-4 (3.2 km) **Railways-** Navade Railway Station (3.5 km approx.)
Project cost	Rs 360 Crores.

3.2 Topography and Geology

3.2.1 Topography

The topographic set up of the Raigad district is very uneven and rugged. The coastline is characterized by alternative bluffs and curved bays having narrow hinterlands. The central region of the district has many plateau and hills rising from the valleys. The Eastern part of the district is much rugged merging with the Sahyadri, which are running North-South direction. The eastern horizon is marked by Sahyadri hills. In the western direction with a steep slope dropping from 869 m at Raigad to 3 m above M.S.L. at Shrivardhan. The terrain map of the study area is shown in **Figure 3.3.** and Digital Elevation Map of the study area is shown in **Figure 3.4.** The terrain features have adverse influence on the sewerage and drainage system of the area and the effects of an inadequate drainage system become visible and real with flooding and water logging of low-lying areas during the rainy season.

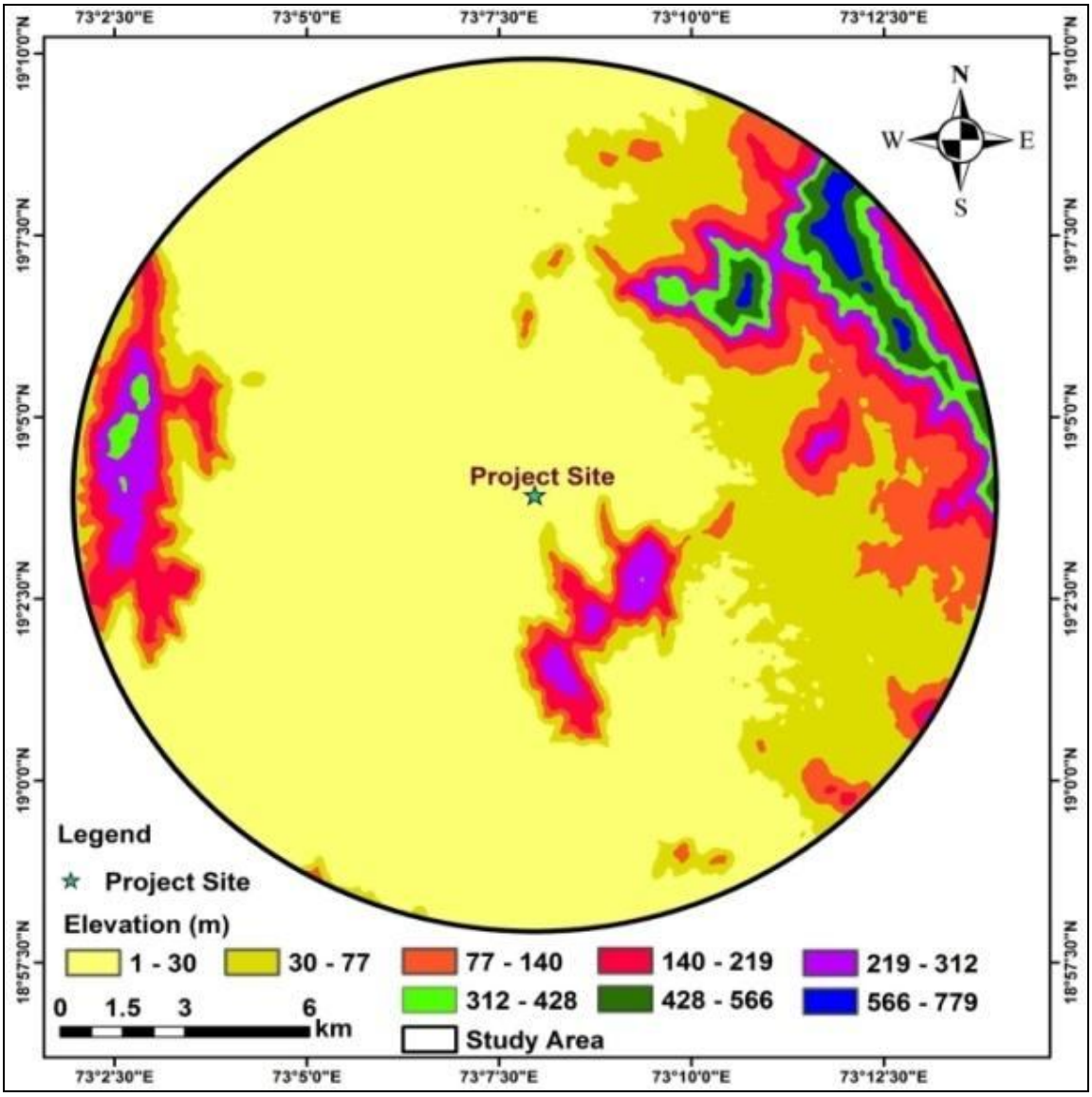


Figure 3.3: Terrain Map of the Study Area

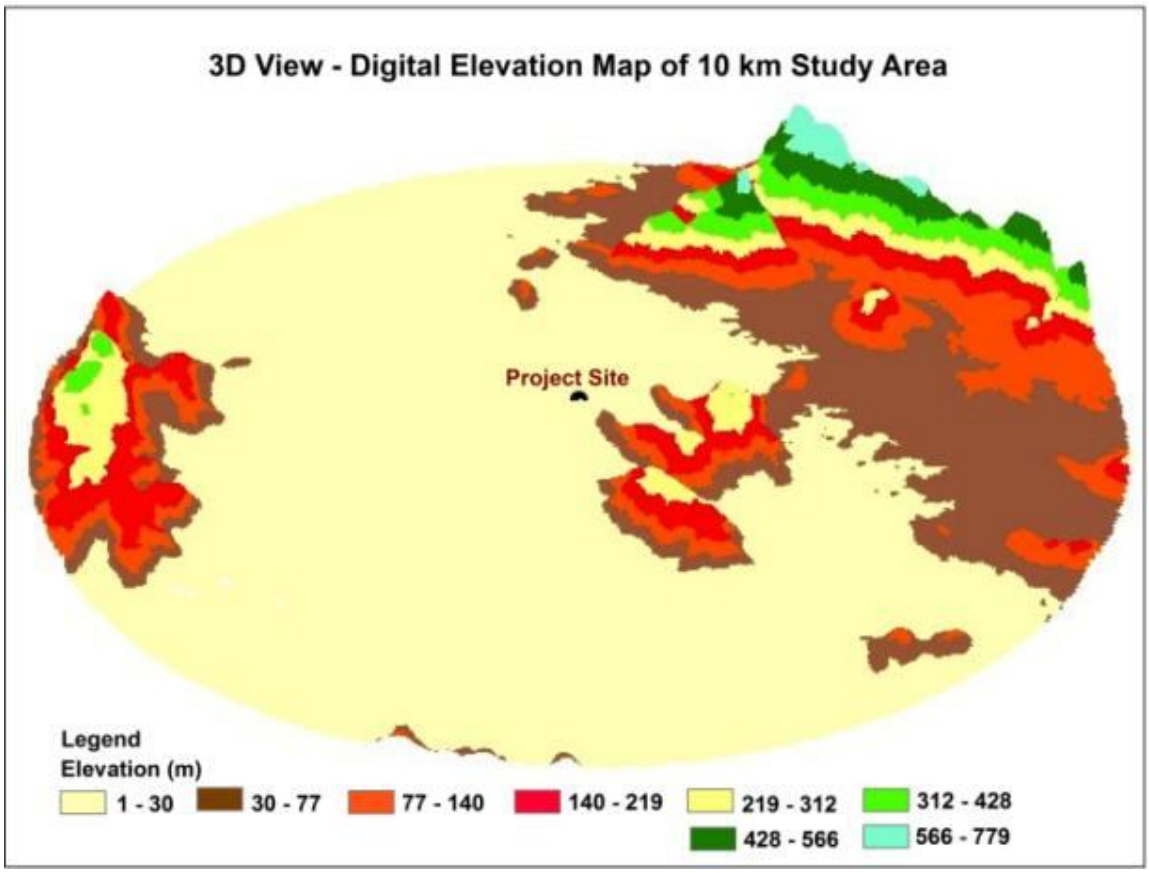


Figure 3.4: 3-D Digital Elevation Model of the Study Area

3.2.2 Geology

The entire district is covered by basaltic lava flows known as "Deccan Traps". These Deccan Traps are capped by laterites. The Recent, Sub-Recent and Pleistocene laterites are observed within the study area.

3.3 Hydrology and Hydrogeology

3.3.1 Hydrology

The drainage system of the district may be divided in to three groups as follows:

Northern region	: Drained by river Panvel, Ulhas, Patalganga and Amba.
Central region	: Drained by Kundalika and Mandad
South region	: Savitri and its tributaries

The peculiarities of the drainage system of the district are that all rivers are Westerly following**.** A small river (Kasardi River), which is non-perennial in nature, flow along the Taloja Industrial Area and finally drains into the Arabian Sea. It is neither used for drinking purpose nor as irrigation source.

3.3.2 Hydrogeology

The requirement of water for irrigation and the domestic purposes, are fulfilled by the groundwater. The groundwater occurs in weathered mantle, fractures and joints in deccan trap. The depth of wells ranges between 3.50 to 8.50 m bgl. The surface water level in winter ranges between 1 to 3.50 m and in summer ranges between 4 to 8.00 m. Majority of the wells goes dry in the summer season due to poor productive aquifer. The yield of the wells tapping in the trap is poor to moderate. Wells are mainly used for seasonal crops. The depth of the wells ranges from 3.50 to 7.00 m bgl. The major drainages within study area are shown in **Figure 3.5.**

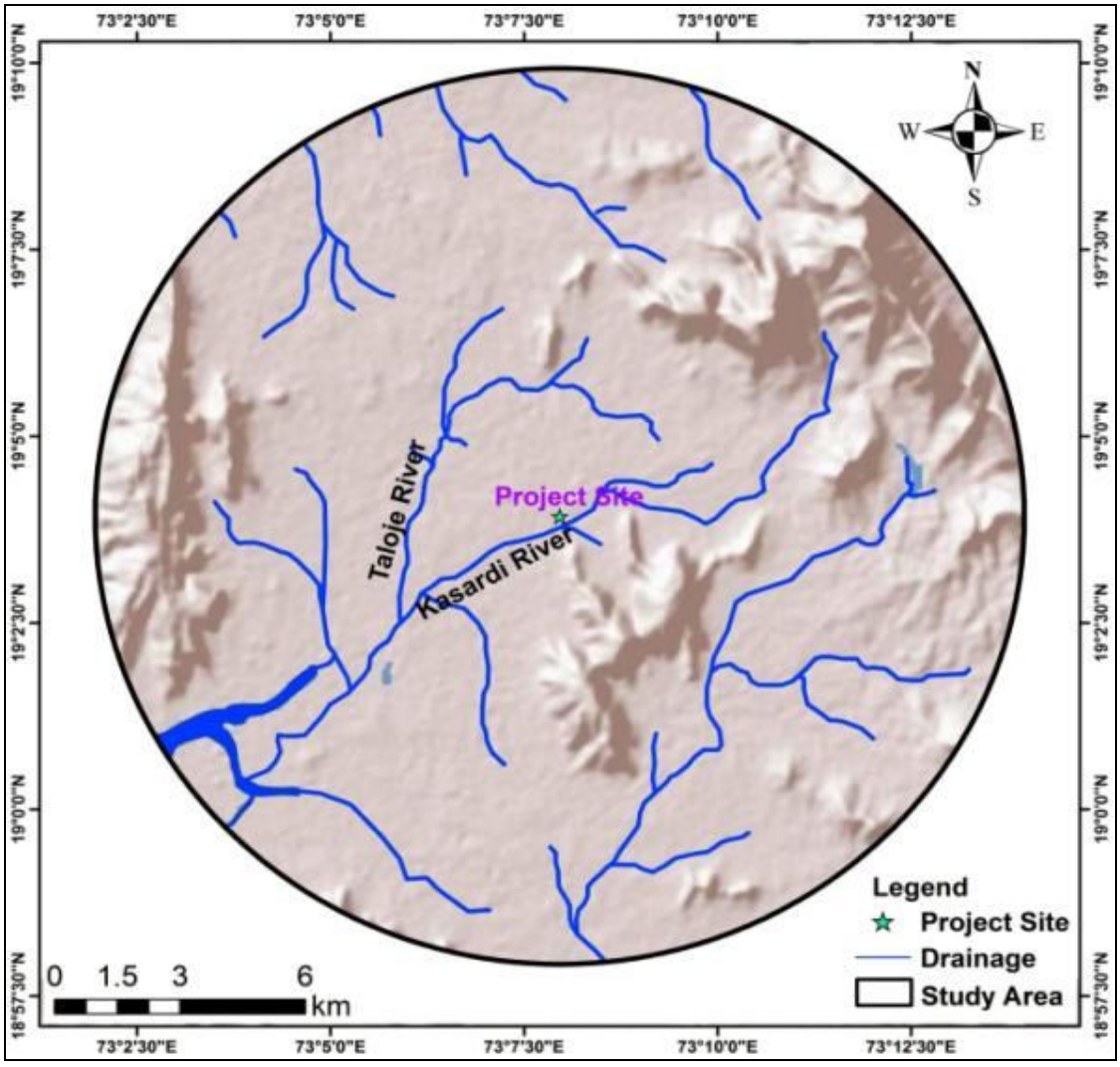


Figure 3.5 : Drainage Map of the Study Area

3.4 Soil Quality Monitoring

Soil quality reflects how well a soil performs the functions of maintaining biodiversity and productivity, partitioning water and solute flow, filtering and buffering, nutrient cycling, and providing support for plants and other structures. Soil management has a major impact on soil quality. Representative soil samples were collected from the study area to assess the quality of soil. For studying the soil types and the soil characteristics, different sampling locations were selected to assess the existing soil condition representating various land use condition and geological features.

3.4.1 Methodology for Soil Monitoring

A number of parameters were determined, which are indicative of physical, chemical and fertility characteristics. Sampling and analysis was conducted as per established standard methods and procedures prescribed in IS 2720 and ASTM. Soil samples were collected by ramming a hand auger into the soil upto a depth of 90 cm. At each of the sampling location, soil samples were collected from three different depth viz. 30 cm, 60 cm and 90 cm below the surface and homogenized. The homogenized samples were then packed in a polythene plastic bag and sealed. The sealed samples were sent to the Laboratory for analysis. The physical, chemical and heavy metal concentrations were determined for all the samples.

3.4.2 Soil Monitoring Locations

The Soil Monitoring was conducted for studying the various parameters at six different locations within the study area, namely two within the plant area and four outside the plant area. The locations of the Soil Quality Monitoring are summarized in **Table 3.2.** The sampling locations are chosen based on the proximity of the location to the project site. **Figure 3.6** shows the soil sampling locations in the impact area map. **Photo Plates 3.1** to **3.4** shows the soil sample collections at different locations.

Table 3.2: Soil Sampling Locations

S.No.	Sampling Locations	Code	Distance	Direction
1	Existing Plant Area	SS-1	4.3	NW
2	Proposed Expansion Area	SS-2		
3	Pale Bhudrug	SS-3	1.24	SSW
4	Valap Gaon	SS-4	0.28	NE
5	Taloje Majkur	SS-5	1.76	SSW
6	New Panvel (W)	SS-6	5.96	SSW

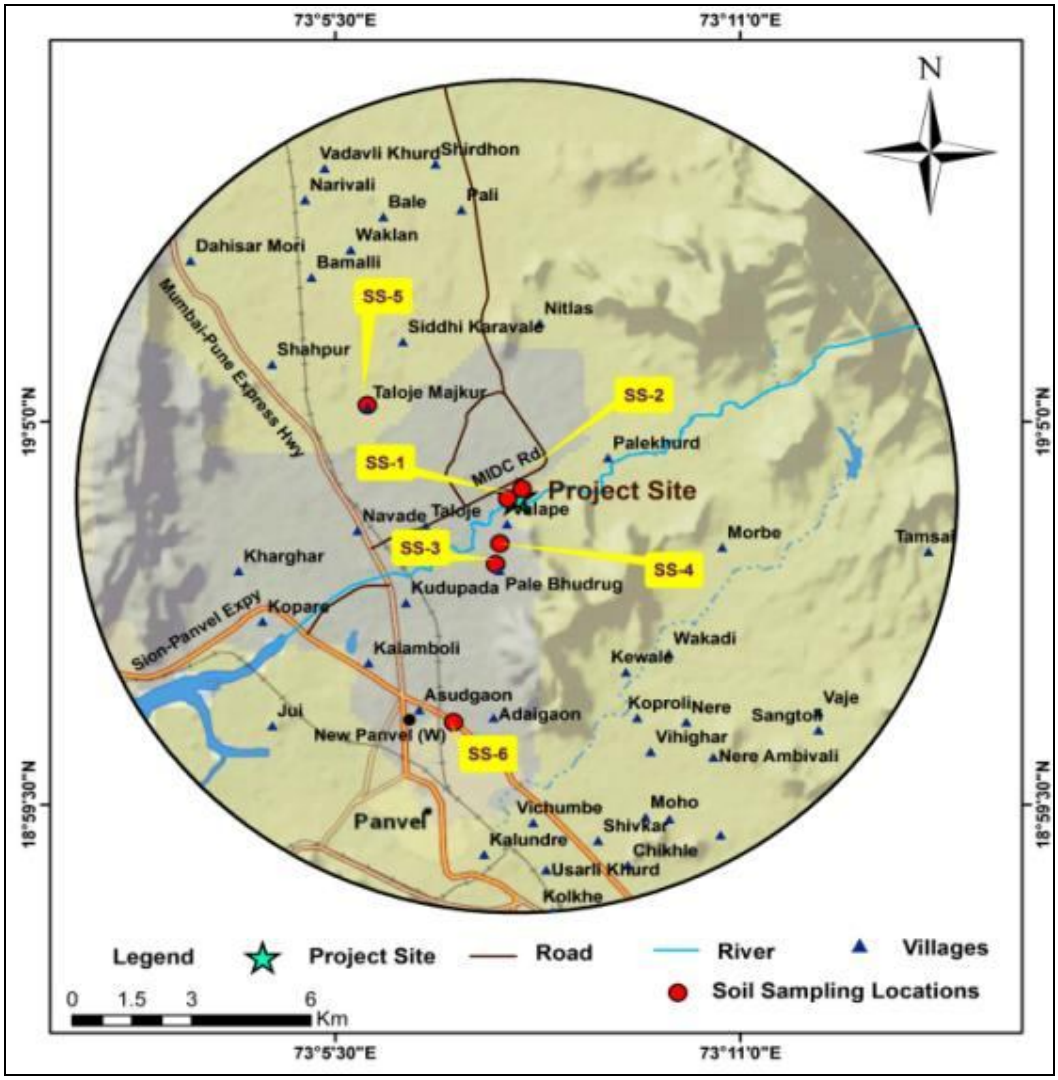


Figure 3.6: Soil Monitoring Locations in the Study Area

Photo Plate 3.1: Soil Sample collection at Valap Village

Photo Plate 3.2: Soil Sample Collection at Existing Site

Photo Plate 3.3: Soil Sample Collection at Proposed Site

Photo Plate 3.4: Soil Sample collection at Majkur Village

3.4.3 Soil Characteristics in the Study Area

The soil samples were analyzed for various parameters and the results are given in **Table 3.3**.

Table 3.3: Soil Characteristics in the Study Area

S.No.	Parameters	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
1.	pH	6.9	7.4	6.9	7.1	7	6.8
2.	Electrical conductivity mS/cm or dS/m	1.09	1.49	0.73	0.65	1.63	0.95
3.	Cation Exchange Capacity, mEq/100 gm	2.14	2.87	1.65	1.14	6.41	2.26
4.	Texture	Sandy loam	Clay loam	Loam	Sandy loam	Clay	Sandy clay loam
5.	Sodium, (mg/g)	70.5	115	52	20	836	124
6.	Calcium (mg/g)	157	214	135	98	257	165

S.No.	Parameters	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
7.	Magnesium(mg/g)	120	145	87	65	154	98
8.	Potassium (mg/g)	25	41	12	11	87	35
9.	Sodium Adsorption Ratio	8.2	9.2	6.2	5.6	24.5	11.5
10.	Permeability (cm/sec)	$2.2x10^{-4}$	$1.2 x10^{-4}$	$0.8 x10^{-4}$	$1.4 x10^{-4}$	$2.1 x10^{-4}$	$1.9 x10^{-4}$
11.	Water holding capacity %	50.1	36.8	33.3	51	40	48.5
12.	Porosity %	54	43	51	45	39	42

Observations:

The area in particular is covered by silty clay soils with a few patches of sandy clays. Due to presence of clay in the soil, the permeability is low to moderate. The analytical results of the soil samples collected during the study period are summarized below. The pH of the soil samples was in the range of 6.8 to 7.4, which show that the soil is near neutral in nature. The available Sodium, Calcium and Potassium, varied from 20 to 836 mg/g, 98 to 257 mg/g and 11 to 87 mg/g respectively, which signify that the soil has significant nutrient value. The Sodium Adsorption Ratio (SAR) ranges between 5.6 and 24.5 for all the soil samples.

3.5 Land Use and Land Cover

The project site is located at 360m south from MIDC road in left bank of Kasardi River. The land use land cover map for the study area was prepared by processing LANDSAT TM satellite imagery with 30 × 30 m resolution, March 2013. The land use land cover map is shown in **Figure 3.7.** The land use classification is tabulated in **Table 3.4.**

The Study Area is covered by 38.5% of built-up in which industries are in majority. Next to built-up area, agricultural land and shrub land which covers 20.1% and 7.5% of area respectively. The study area consist of 8.2% water bodies and it includes major rivers like Kasardi River and Taloje river and it drains out to Arabian Sea. Overall 14.4 % of barren land is present in the study area; it also includes bare exposed rock in mountainous area. The elevated hilly area consists of 11.3% of Forest.

Table 3.4: Classification of Land Use and Land Cover

Class Name	Area (in km^2)	Area (in percent)
Built up	120.9	38.5
Agricultural land	63.1	20.1
Shrub land	23.6	7.5
Barren land	45.3	14.4
Water Body	25.7	8.2
Forest	35.5	11.3
Total	314.1	100

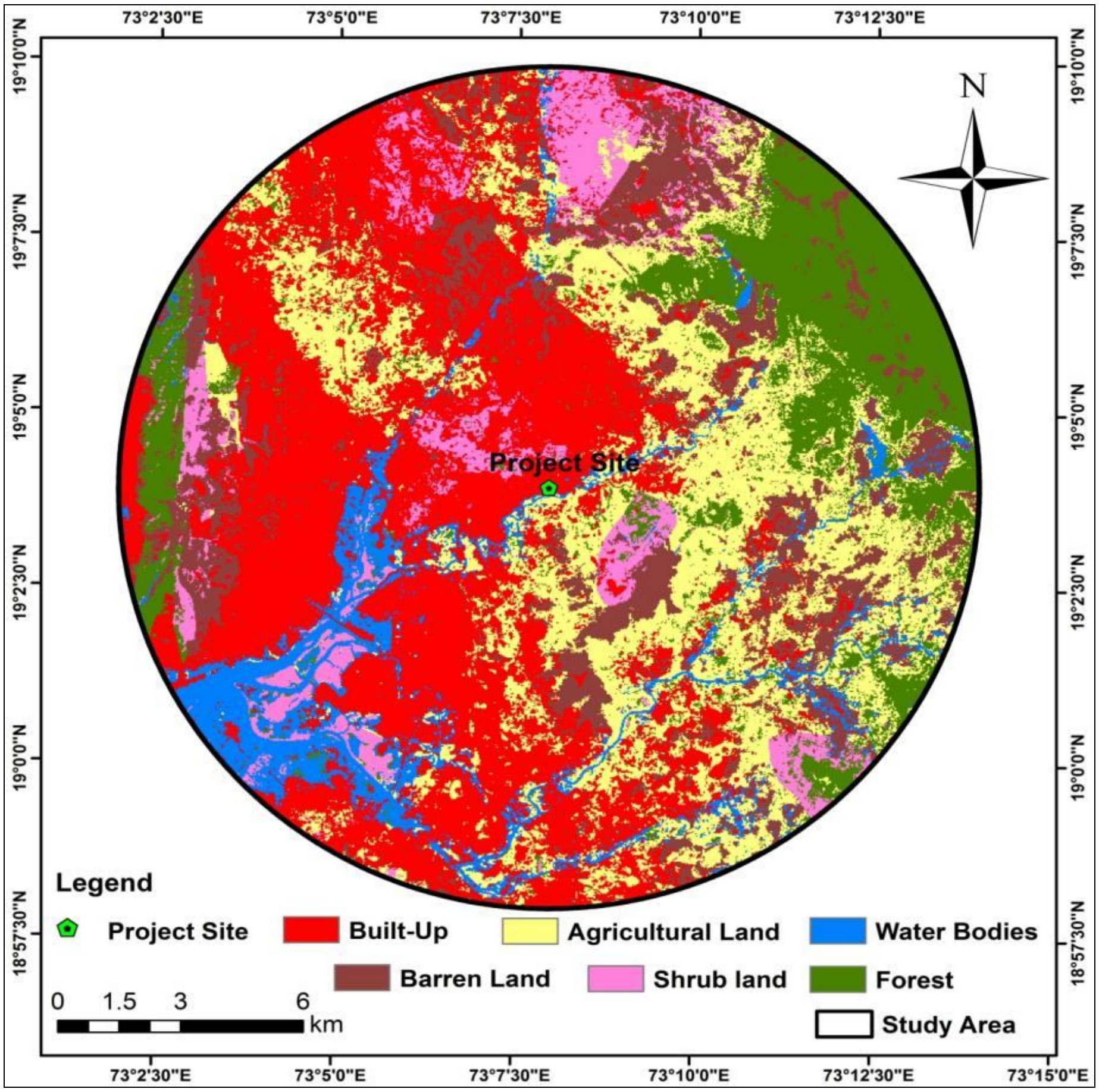


Figure 3.7: LULC Map of the Study Area

3.6 Water Environment

The water resources, both surface and groundwater plays an important role in the development of an area. Likewise, the water resources of the area have been studied to establish the status of water quality in the area. **Figure 3.8** shows the ground water and surface water monitoring locations.

Assessment of baseline data on water quality includes:

- Identification of surface water sources
- Identification of ground water sources
- Collection of water samples

Analyzing water samples for physic-chemical and biological parameters.

3.6.1 Surface Water

River Kasardi is present within the study area and it flows along the Taloja industrial area. The river discharges their silt into the Arabian Sea. Several irrigation and drainage canals flow through study area, which are used for irrigating the agriculture fields. Three surface water samples were collected from different places within the study area.

3.6.2 Ground Water

Ground water is an important source of water for the villages in the study area. The villagers for cooking, washing and other purpose utilize it. The ground water is seldom used for drinking purpose owing to its saline nature. However, there are a few villages in the study area, which consume ground water for drinking purpose. Generally, every village has hand pumps and few open wells to draw water for domestic use. The villages receive water from the Panchayat supply and in case of non-availability of water; tankers are sent by the corporation to fulfill the water demand. Ground water samples were collected from six locations. Reconnaissance survey was undertaken and monitoring locations were finalized based on the location of the water bodies, usage of the water and areas that can represent baseline conditions.

Photo Plates 3.5 to **3.8** shows the surface water and ground water sample collections at different locations.

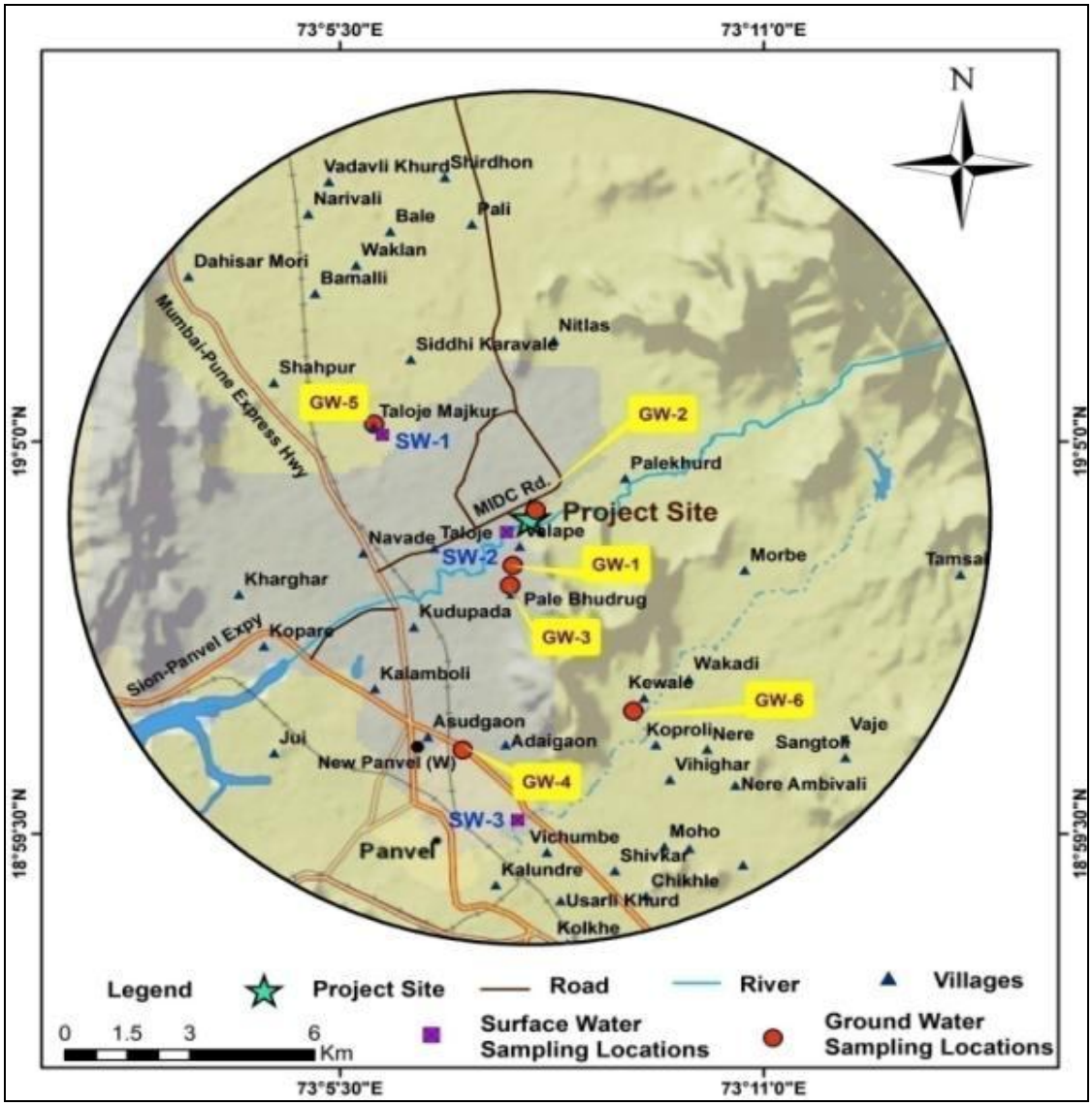


Figure 3.8 Ground water & Surface water-monitoring locations

Photo Plate 3.5: Surface Water Sample Collection from Kasardi river

Photo Plate 3.6: Surface Water Sample Collection from drain at Valap Village

Photo Plate 3.7: Ground Water Sample Collection from borewell at Valap Village

Photo Plate 3.8: Ground Water Sample Collection from drain at New Panvel (W)

3.6.3 Raw water & Waste Water from ETP

The effluent quality was analyzed by collecting samples of wastewater from ETP plant. Three samples were collected i.e. one for untreated waste water, one for treated waste water and one for the raw water which is utilized for the process. **Photo Plates 3.9** to **3.10** shows the wastewater sample collections at different locations.

Photo Plate 3.9: Treated Waste Water Sample Collection from ETP

Photo Plate 3.10: Untreated Waste Water Sample Collection from ETP

3.6.4 Methodology for Water Quality Monitoring

To assess the water quality of the study area, three different classes of water was sampled and assessed, they are: Surface Water, Ground Water and Water from the Effluent treatment plants, located within the plant premises.

Water samples were collected once from all these locations during the one season study period. The samples were analyzed for relevant physico-chemical parameters for drawing up the baseline data. Sampling locations for water samples are detailed in **Table 3.5**

All the basic precautions and care was taken during the sampling to avoid contamination. Analysis of the samples was carried out as per established standard methods and procedures prescribed by the CPCB, e.g. relevant IS Codes (IS: 2488 (Part-1 to 5) "Methods for Sampling and Testing of Industrial Effluents"), IS: 10500-1993 drinking water standards and "Standard Methods for Examination of Water and Wastewater" published by APHA.

Table 3.5: Sampling Locations for Surface water, Ground water and Waste Water

Station No	Name of the sampling	Distance	Direction
Surface Water Samples			
SW-1	Kasardi River	4.02	NW
SW-2	Valap Gaon	0.62	SW
SW-3	New Panvel	7.73	S
Ground Water Samples			
GW-1	Pale Bhudrug	1.24	SSW
GW-2	Valap Gaon	0.28	NE
GW-3	Taloje Majkur	1.76	SSW
GW-4	New Panvel	5.96	SSW
GW-5	Existing Plant	4.3	NW
GW-6	Temboda Village	5.35	SSE
Waste Water samples			
WW-1	Untreated Waste Water		
WW-2	Treated Waste Water		
WW-3	Raw Water		

3.6.5 Surface Water Quality Monitoring Results

The Physico-chemical analysis of the collected surface water conducted and the results for various parameters are listed in **Table 3.6**. The pH range varies from 7.0 to 7.2 The TDS for al, the samples ranges between 123 to 150 mg/l for all the samples, fluoride content for the samples is below the prescribed standard and ranges between 0.21 to 0.44 mg/l and all other parameters are well within the limits.

Table 3.6: Physico-Chemical Analytical Results of Surface Water

Parameter	Units	SW-1	SW-2	SW-3	IS:2296-1982 Class C norms
Color	Hazen	4	5	4	300
pH	-	7.2	7.1	7.0	6.5-8.5
Total Dissolved solids	mg/l	150	123	134	1500
Dissolved Oxygen	mg/l	7.2	6.6	5.2	4
Alkalinity as $CaCO_3$	mg/l	88	62	80	
Chlorides as Cl^-	mg/l	17	12	15	600
Hardness as $CaCO_3$	mg/l	70	61	62	-
Calcium as Ca	mg/l	15	18	19	-
Magnesium as Mg	mg/l	9	5	4	-
Sulphates as SO_4	mg/l	9	10	9	400
Nitrate as NO_3	mg/l	2.6	1.9	2.4	50
Fluoride as F	mg/l	0.44	0.42	0.21	1.5
Iron as Fe	mg/l	0.33	0.29	0.44	50
Lead as Pb	mg/l	0.002	0.003	0.001	0.1
Mercury as Hg	mg/l	0.001	0.001	0.002	-
Arsenic as As	mg/l	0.001	0.001	0.003	0.2
Chromium as Cr	mg/l	0.001	0.001	0.001	0.05
Total Coliform	MPN/100 ml	1800	1500	1150	5000
Faecal Coliform	MPN/100 ml	105	55	80	-

3.6.6 Ground Water Quality Monitoring Results

The physico-chemical analyses of ground water were conducted and the analytical results for various parameters are tabulated in **Table 3.7**. The pH range varies from 6.5 to 7.7 and Dissolved Solids value varies from 253 to 360 mg/l. Fluoride content is in the range of 0.41 to 0.88 mg/l hardness of the samples are also well below the limit of 300-600 mg/l. All the other parameters were found to be within the Drinking Water Quality Standard IS: 10500-1991

Table 3.7: Physico-chemical Analysis of Ground Water Quality

Parameter	Units	GW1	GW2	GW3	GW4	GW5	GW6	IS: 10500-1991 Norms
Color	Hazen	5	5	4	4	4	5	5-25
pH	-	7.7	7.4	7.5	6.5	7.2	7.3	6.5-8.5
Chlorides as Cl^-	mg/l	53	79	66	62	78	75	250-1000
Hardness as $CaCO_3$	mg/l	133	179	140	125	166	164	300-600
Elec. Conductivity	µMhou/cm	423	570	520	515	535	545	-
Calcium as Ca	mg/l	24	40	30	25	36	31	75-200
Magnesium as Mg	mg/l	18	25	20	15	20	20	30-100
Sulphates as SO_4	mg/l	3	25	24	39	42	41	200-400
Dissolved solids	mg/l	253	360	320	322	335	345	500-2000
Alkalinity as $CaCO_3$	mg/l	98	109	98	88	85	90	200-600
Nitrate as NO_3	mg/l	10	45	40	44	45	39	45-100
Sodium as Na	mg/l	17	30	32	35	30	25	-
Potassium as K	mg/l	22	29	33	39	40	41	-
Fluoride as F	mg/l	0.41	0.67	0.72	0.88	0.59	0.55	1.0-1.5
Iron as Fe	mg/l	0.20	0.19	0.21	0.11	0.21	0.25	0.3-1.0

3.6.7 Effluent Treatment Plant Monitoring Results

The physico-chemical analytical results of the effluent water for various parameters are given in **Table 3.8.** The pH of the wastewater varies between 2.51 to 5.37 showing an acidic nature of wastewater. TDS and all other parameters are reported to be well within the permissible limits.

Table 3.8: Physico-Chemical Analysis of Effluent Treatment Plant Discharge Quality

S.No.	Parameters	WW-1	WW-2	WW-3	Permissible Limits
1	pH	5.37	2.51	2.60	5.5 – 9.0
2	Color (Hazen)	<5.0	<5.0	<5.0	5-25
3	TDS(mg/l)	828	821.6.	948.0	1500
4	TSS (mg/l)	32.0	12.0	18.0	100
5	Oil & Grease	<1.0	<1.0	<1.0	10
6	Nitrate(mg/l)	52.71	42.16	19.33	10
7	Ammonical nitrogen (mg/l)	3.64	<1.0	<1.0	50
8	Total kjehldal nitrogen (mg/l)	6.30	<1.0	<1.0	100
9	Sulphate(mg/l)	295.43	280.86	118.57	-
10	Fluoride(mg/l)	1.3	0.86	0.83	2.0

S.No.	Parameters	WW-1	WW-2	WW-3	Permissible Limits
11	Phenolic compounds	<0.01	<0.01	<0.01	1.0
12	Mercury(mg/l)	<0.01	<0.01	<0.01	0.01
13	Conductivity (µS/cm)	1380	360.0	1580.0	-
14	Cyanide (mg/l)	<0.01	<0.01	<0.01	0.2
15	Phosphate total (mg/l)	1.34	1.68	0.98	5.0
16	Arsenic (mg/l)	<0.01	<0.01	<0.01	0.5
17	Total chromium (mg/l)	0.12	<0.1	<0.1	2.0

3.7 Climate and Meteorology

3.7.1 Climate of Taloja

The climate of Taloja is typical of that on the west coast of India, with plentiful and regular seasonable rainfall, oppressive weather in the hot months and high humidifies throughout the year. The summer season from March to May is followed by the south-west monsoon season from June to September. October and November form the post-monsoon or the retreating monsoon season. The period from January to March is the cold season. The weather of Raigad is influenced by the proximity to seaside. **Table 3.9** gives a brief of the mean monthly temperature and rainfall conditions at Taloja, in Raigad.

Table 3.9: Meteorological data of Study Area

S. No.	Months	Year	Mean Temperature (°C)	Max. Temperature (°C)	Min. Temperature (°C)	Precipitation (mm)
1	January	2013	24	31	17	1.3
2	February	2013	25	32	18	6.4
3	March	2013	27	33	21	6.2

Source: www.worldweatheronline.com

The different seasons are described briefly below:

Summer Season: The summer season in Taloja spans from the months of March-May. The temperatures during this period are high and the maximum temperature ranges around 35-40ºC. Frequent showers also hit Taloja during this season.

Monsoon Season: The Monsoons in Taloja spans from the months of June-September. During this time, the city experiences heavy thunder and lightning accompanied with heavy downpour. The average rainfall during this period is about 527.3 mm and the primary reason for monsoons is due to south-west winds. The city also experiences some rainfall in the months of October-December, known as the retreating monsoons and north-west winds are responsible for rains at this time of the year.

Winter Season: The winters in Taloja spans from the months of December –February and is generally cool and dry. There is no rainfall at this time of the year and the temperature remains in the range of 10 ºC - 32 ºC.

3.7.2 Relative Humidity

The relative Humidity remains high throughout the year as the area is close to the sea. The air is humid throughout the year. Relative humidity is on an average over 80 % during the south-west monsoon season. In the rest of the year, the relative humidity is between 65 per cent and 75 per cent.

3.7.3 Cloud Cover

During the south-west monsoon season, skies are heavily clouded to overcast. In May and October, the clouding is moderate. Clear or very lightly clouded skies are common in the rest of the year.

3.7.4 Cyclone

No recent records of the cyclones could be witnessed in the area. The last major cyclone recorded was Cyclone Phyan in 2009, claimed four lives and massive damage to property in the coastal districts of Raigad, Ratnagiri, Thane and Palghar.

3.7.5 Micro-Meteorology

Air quality baseline data is a critical factor, which influences the meteorological study as it governs the ambient air quality**.** The hourly meteorological data of Taloja town, which is approx. 2.5 km far from project site is used for interpretation of the baseline information as well as input for air quality simulation models.

The wind rose diagram and wind class frequency distribution for the study area is shown in **Figure 3.9** and **Figure: 3.10** The analysis of the average wind pattern shows predominant winds blowing from SW and SE. The calm wind (wind speed < 0.5 m/s) conditions prevailed for 2.23 % of the total time.

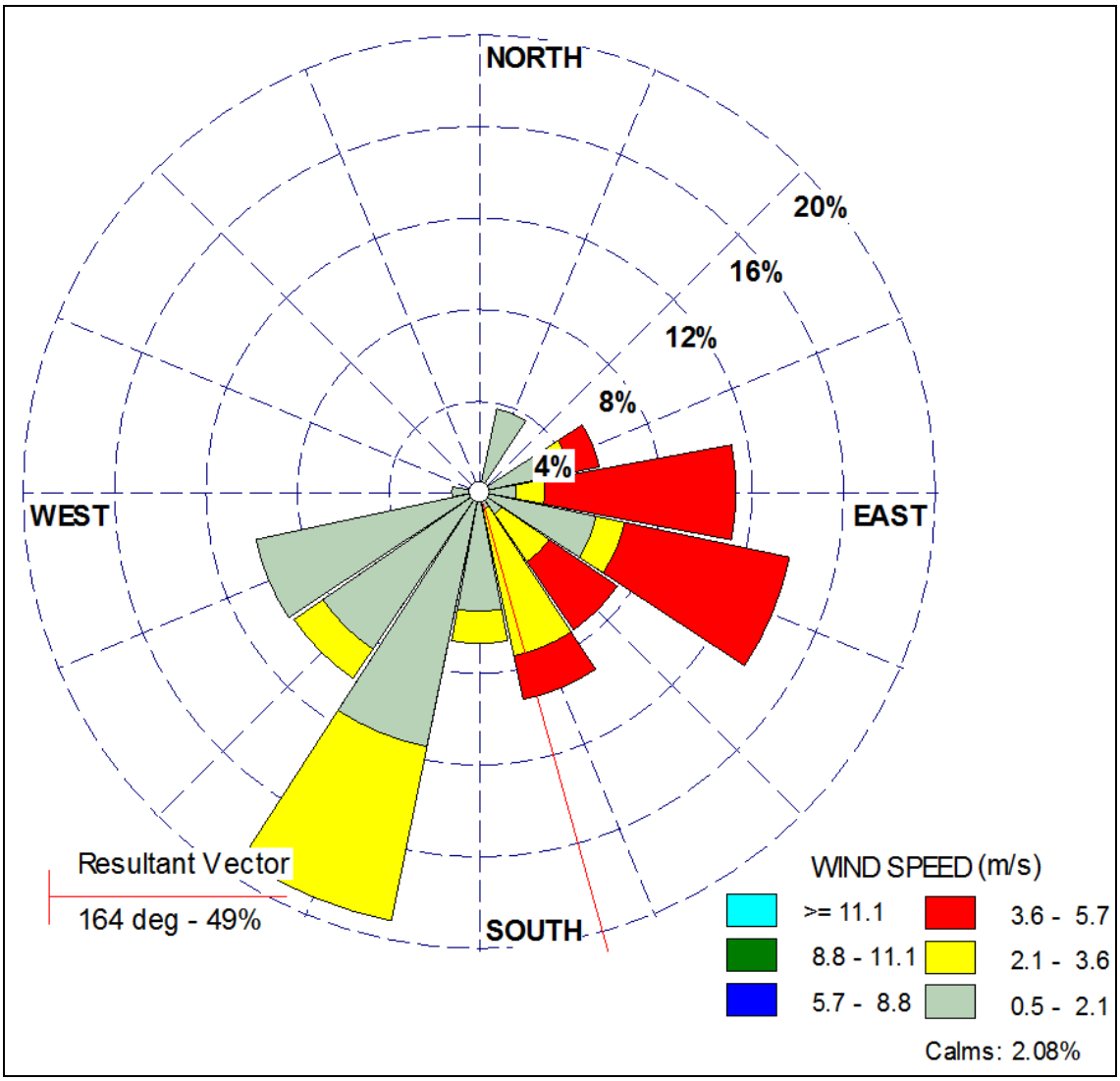


Figure 3.9: Windrose for Taloja (Winter Season – January to March 2013)

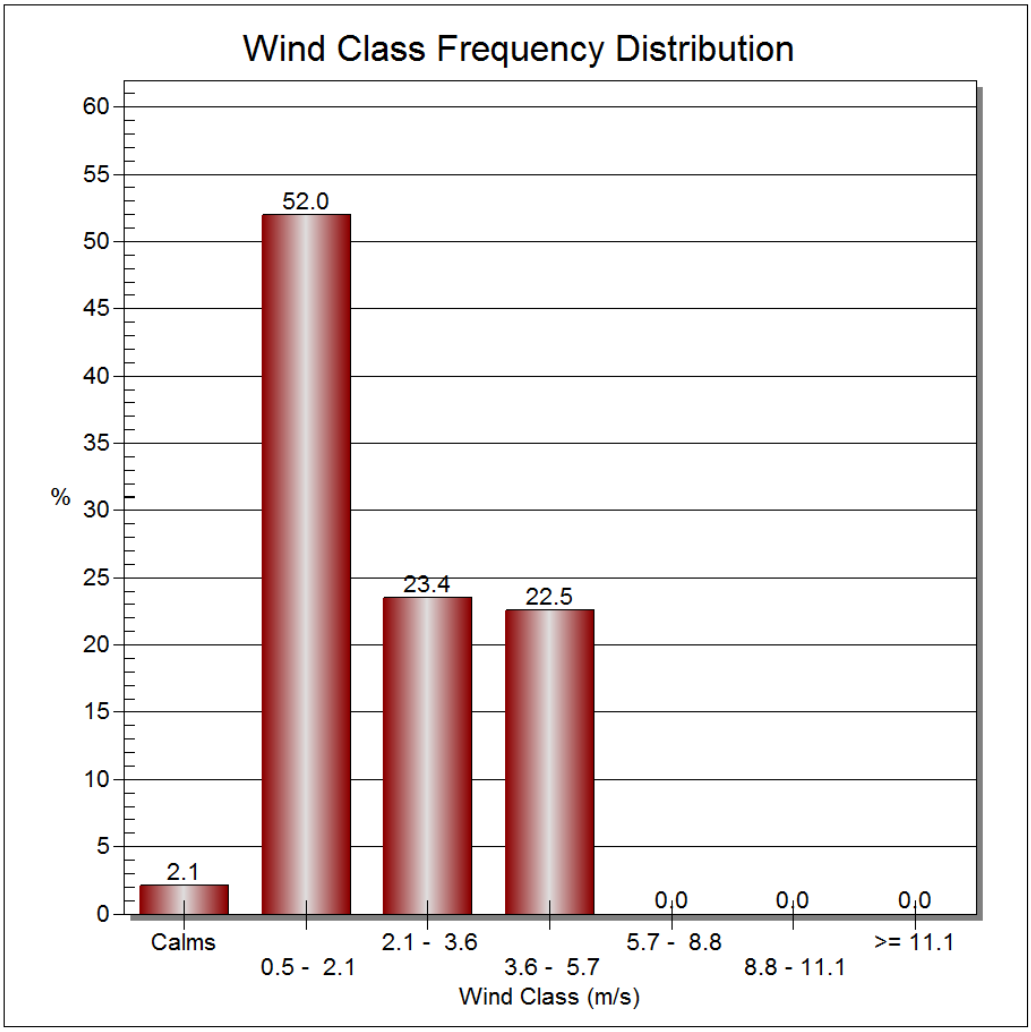


Figure: 3.10 Wind Class frequency Distribution of the Study Area.

3.7.6 Atmospheric Inversion Level

As the distance increases from the Earth's surface, the temperature of air decreases. At certain height above the Earth's surface, this phenomenon inverse and beyond this height a positive correlation is established between temperature and distance from Earth's surface. This point is called the Atmospheric Inversion Level or Mixing Height. At the inversion level, both vertical and horizontal diffusion of air is inhibited and pollutants are trapped in the atmosphere nearer to the Earth's surface. The lower the inversion level, higher will be the pollutant concentration in the ambient air at the Earth's surface.

The maximum inversion level for the proposed project site during winter season is in the range of 1350 m – 1500 m (IMD, 2008).

3.8 Air Environment

3.8.1 Ambient Air Quality Monitoring

The ambient air quality in the 10 Km radius study area with the proposed plant as the epicenter will form the baseline information over which the predicted impacts can be superimposed to find out the net impacts on the air quality in the project impact area. The design of the network of ambient air quality monitoring stations in the study area was done based on the following criteria.

- Meteorological conditions on a synoptic scale
- Topography on the study area
- Representation of the regional background levels
- Representation of the plant site
- Influence of the existing sources
- Major human settlements in the study area

Six sampling stations were chosen for monitoring of ambient air quality within the study area. These were within 10 km from proposed expansion site. Two of the locations were located in the predominant downwind direction (South-West) and two locations are at upwind direction (North-West) as per the Windrose (**Figure 3.9**). The remaining two locations are within the plant, one at the proposed expansion area and one at existing area. The locations of the monitoring stations were selected to accord an overall idea of the ambient air quality scenario in the study area. Logistic considerations such as accessibility, security, and availability of reliable power supply etc. were also taken into consideration while finalizing the locations of such stations. The locations of the Ambient Air Quality Monitoring Stations in the study area are given in **Table 3.10** and **Figure 3.11**. **Photo Plates 3.11** to **3.14** shows the air quality monitoring at different locations.

Table 3.10: Ambient Air Quality Monitoring Stations

S. No.	Code	Location Name/ Description	Distance from Site (km)	Direction from Site	Latitude	Longitude
1.	AQ-1	Existing Plant	0.5	NE	19°04'11.3"N	73°08'04.1"E
2.	AQ-2	Expansion Site	0.1	N	19°03'57.6"N	73°07'58.8"E
3.	AQ-3	Pale Bhudrug	2.0	SW	19°02'59.2"N	73°07'42.5"E
4.	AQ-4	Valap Gaon	1.0	SW	19°03'15.8"N	73°07'44.6"E
5.	AQ-5	Taloje Majkur	4.3	NW	19°05'14.9"N	73°05'56.6"E
6.	AQ-6	New Panvel (W)	6.5	NW	19°00'41.3"N	73°07'05.7"E

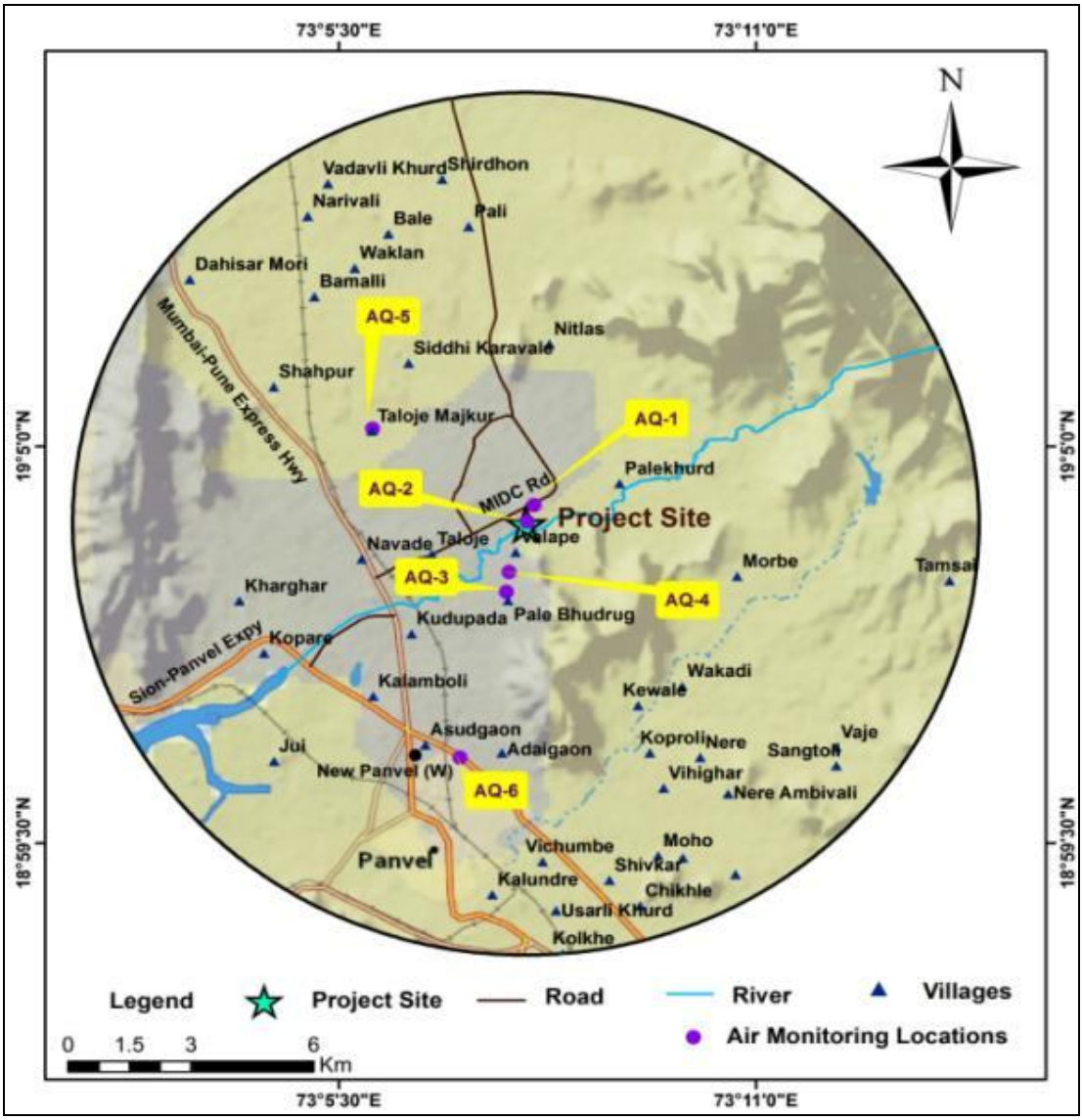


Figure 3.11: Ambient Air Quality Monitoring Locations

Photo Plate 3.11: Installation of Air monitoring sampler near CPCB Monitoring Station-1

Photo Plate 3.12: RDS sampler reading noted at Palebudrug Village

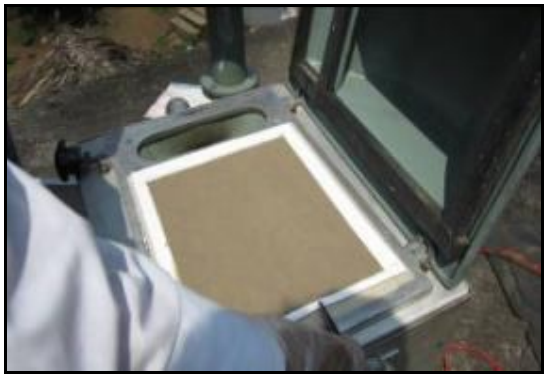


Photo Plate 3.13: Filter paper for monitoring the PM_{10} at Valap village

Photo Plate 3.14: Collection of PM10 filter paper sample at Taloja Majkur Village

3.8.2 Parameters, Frequency and Monitoring Methodology

Monitoring was conducted in respect of the following parameters:

- Particulate Matter (PM_{10} and $PM_{2.5}$)
- Sulphur Dioxide (SO_2)
- Oxides of Nitrogen (NO_x)
- Carbon Monoxide (CO)
- VOC
- NH_3

Ambient air quality monitoring was conducted from January 2013 to April 2013 at a frequency of twice a week at each station adopting a 24-hours schedule for parameters such as Particulate matter, SO_2 and NO_x and for parameters CO, VOC and NH_3, monitoring was carried out once at each station. The equipment was placed at open space, free from trees and vegetation, which otherwise acts as a sink of pollutants resulting in lower levels in monitoring results. At locations close to highways, the equipment was placed at least 100 m away from such highways/roads to avoid influence of traffic exhaust emissions.

3.8.3 Ambient Air Quality Monitoring Results

The ambient air quality monitoring results is given in **Tables 3.11 to 3.15**.

a) Particulate Matter (PM_{10} and $PM_{2.5}$)

The 24-hourly average PM_{10} level varied between 39.05 µg/m^3 to 48.25 µg/m^3 . The level of PM_{10} in all the areas was well within the NAAQS standards. **Table 3.11** gives details of the mean values of the 24-hourly average PM_{10} levels.

Table 3.11: Summary of PM_{10} Levels Monitored in the Study Area

Code	Location Name/ Description	24-hourly Average PM_{10} (µg/m^3)			
		Min.	Max.	Mean	Limit
AQ-1	Existing Plant	45.75	50.75	48.25	100

AQ-2	Expansion Site	43.00	47.16	45.08	100
AQ-3	Pale Bhudrug	38.00	44.2	41.1	100
AQ-4	Valap Gaon	40.6	45.8	43.2	100
AQ-5	Taloje Majkur	36.6	44.1	40.5	100
AQ-6	New Panvel (W)	36.6	41.5	39.05	100

The 24-hourly average $PM_{2.5}$ level varied between 7.81 µg/m^3 to 9.65 µg/m^3. Similar to that of PM_{10}, the levels of $PM_{2.5}$ for all the sampling locations was within the permissible limits. **Table 3.12** gives details of the mean values of the 24-hourly average $PM_{2.5}$ levels.

Table 3.12: Summary of $PM_{2.5}$ Levels Monitored in the Study Area

Code	Location Name/ Description	24-hourly Average $PM_{2.5}$ (µg/m^3)			
		Min.	Max.	Mean	Limit
AQ-1	Existing Plant	7.00	12.30	9.65	60
AQ-2	Expansion Site	5.71	12.31	9.01	60
AQ-3	Pale Bhudrug	6.82	9.62	8.22	60
AQ-4	Valap Gaon	2.14	11.14	8.64	60
AQ-5	Taloje Majkur	5.44	10.43	8.1	60
AQ-6	New Panvel (W)	4.11	11.51	7.81	60

b) Sulphur dioxide (SO_2)

The mean of 24-hourly average values of SO_2 over the study area was varying between 3.1 µg/m^3 to 4.15 µg/m^3. The SO_2 levels at all the locations were much below the permissible limit of 80 µg/m^3 stipulated for residential, rural & other areas. **Table 3.13** below gives the details of SO_2 levels at each location.

Table 3.13: Summary of SO_2 Levels Monitored in the Study Area

Code	Location Name/ Description	24-hourly Average SO_2 (µg/m^3)			
		Min.	Max.	Mean	Limit
AQ-1	Existing Plant	2.25	6.05	4.15	80
AQ-2	Expansion Site	2.75	4.95	3.85	80
AQ-3	Pale Bhudrug	2.67	5.13	3.9	80
AQ-4	Valap Gaon	2.18	4.22	3.2	80
AQ-5	Taloje Majkur	2.16	4.04	3.1	80
AQ-6	New Panvel (W)	3.55	4.65	4.1	80

c) Oxides of Nitrogen (NOx)

The mean of 24-hourly NO_x level over the entire study area was varying between 18.85 µg/m^3 to 22.85 µg/m^3. The 24-hourly average values of NO_x at all the locations were within the prescribed limit of 80 µg/m^3 stipulated for residential, rural and other areas. The details of the NO_x levels at each location are given in **Table 3.14** below.

Table 3.14: Summary of NO_x Levels Monitored in the Study Area

Code	Location Name/ Description	24-hourly Average NO_x (µg/m^3)			
		Min.	Max.	Mean	Limit
AQ-1	Existing Plant	16.4	29.3	22.85	80
AQ-2	Expansion Site	16.71	27.49	22.1	80
AQ-3	Pale Bhudrug	15.55	24.95	20.25	80
AQ-4	Valap Gaon	13.41	29.19	21.3	80
AQ-5	Taloje Majkur	15.53	22.67	19.1	80
AQ-6	New Panvel (W)	13.90	23.80	18.85	80

d) HC, VOC, CO and NH_3

Air samples for Carbon Monoxide, Volatile Organic Carbon and Ammonia were collected from six different sites within the study area. The values of all the three pollutants were found to be within the NAAQS Limits. The analysis results are shown in **Table 3.15** below.

Table 3.15: Summary of HC, VOC, CO, and NH_3 Levels Monitored in the Study Area

Code	Location Name/ Description	Parameters				Limits	
		HC (ppm)	VOC (ppm)	CO (mg/m^3)	NH_3 (µg/m^3)	CO (mg/m^3)	NH_3 (µg/m^3)
AQ-1	Existing Plant	1.8	<1.0	2.24	50.55	4	400
AQ-2	Expansion Site	1.5	<1.0	1.97	48.2	4	400
AQ-3	Pale Bhudrug	<1.0	<1.0	2.10	39.6	4	400
AQ-4	Valap Gaon	<1.0	<1.0	2.25	42.35	4	400
AQ-5	Taloje Majkur	<1.0	<1.0	2.09	35.5	4	400
AQ-6	New Panvel (W)	1.2	<1.0	2.50	34.25	4	400

3.9 Noise Environment

Major sources of noise in the study area:

- Noise made by normal human activities;
- Noise made by vehicles, carts, etc.;
- Noise made by occasional movement of machineries, operation of pumps, etc; and
- Natural noise, consisting of sounds made by birds, animals and insects.

The purpose of noise monitoring at different locations is to obtain baseline noise levels for future reference.

3.9.1 Ambient Noise Monitoring

Ambient noise monitoring was conducted to assess the background noise levels in the study area**.** Six locations within the study were selected for the measurement of ambient noise levels. Noise monitoring was carried out on a 24-hour basis to assess the baseline noise-levels and to evaluate the impact, if any. The monitoring locations selected for the study are given in **Table 3.16** and shown in **Figure 3.12.** The national ambient air quality standards are given in **Table 3.17**. The monitoring results are given in **Table 3.18**, followed with the graphical representation in **Figure 3.13** and **3.14.**

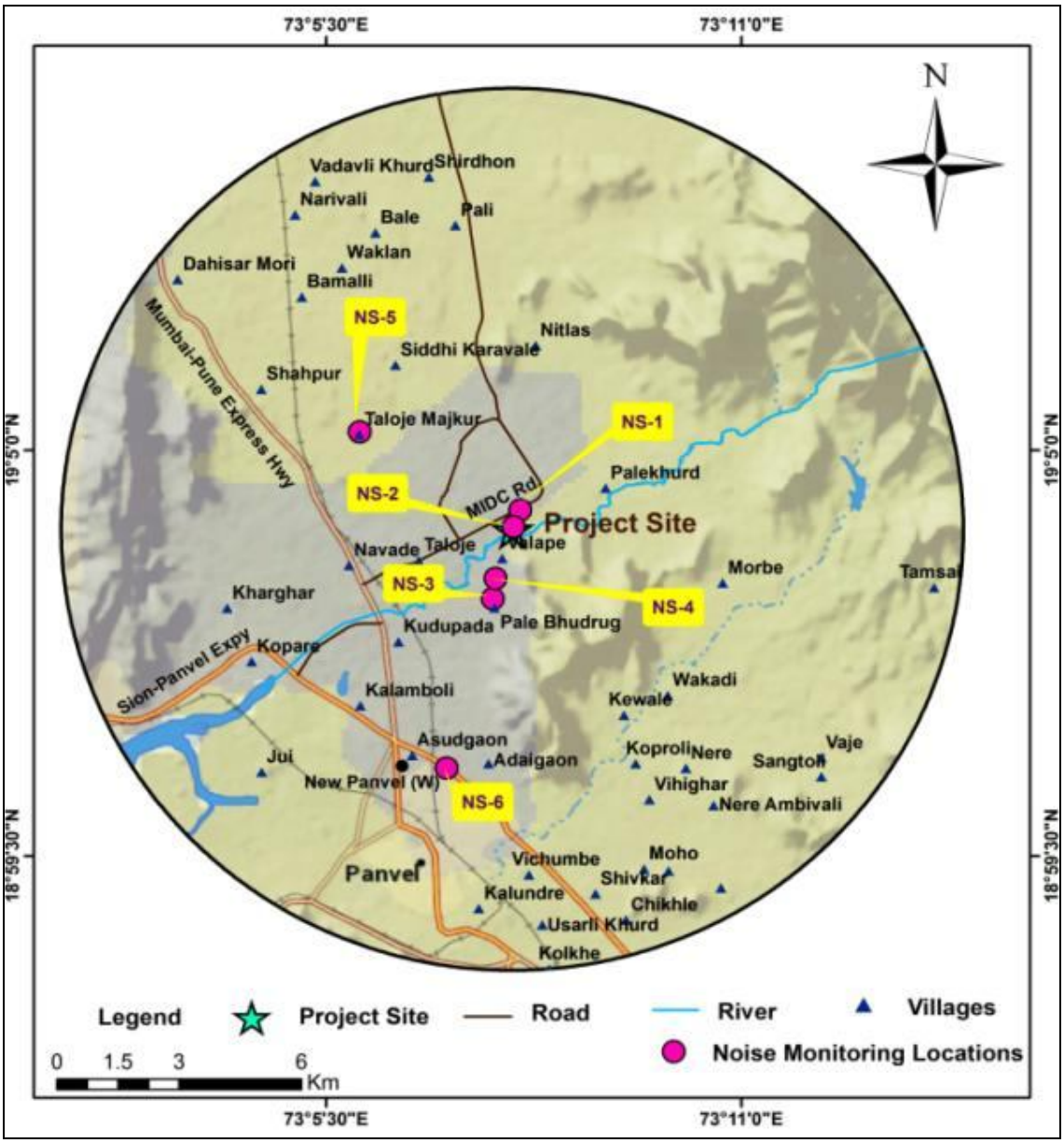


Figure 3.12 Noise Monitoring Locations

Table 3.16: Location of the Noise Monitoring Stations

Code	Location Name/ Description	Location w.r.t Project Site	
		Direction	Distance
N1	Existing Plant	NE	0.5
N2	Expansion Site	N	0.1
N3	Pale Bhudrug	SW	2.0
N4	Valap Gaon	SW	1.0
N5	Taloje Majkur	NW	4.3
N6	New Panvel (W)	NW	6.5

3.9.2 Methodology

Ambient noise level or sound pressure levels (SPL) were measured by a portable sound level meter having built in facilities to read noise level directly in dB (A). A-weighted equivalent continuous sound pressure level (L_{eq}) values were computed from the values of A-weighted SPL measured with the help of noise meter. Noise Measurement was carried as per IS: 4954 standards as given by Central Pollution Control Board (CPCB). At each location, noise monitoring was conducted continuously over a period of twenty-four hours to obtain L_{eq} values at uniform time intervals of one hour.

Day time L_{eq} has been computed from the hourly L_{eq} values between 6.00 a.m. and 10.00 p.m. and night time L_{eq} from the hourly L_{eq} values between 10.00 p.m. and 6.00 a.m. using the

$$L_{eq\ day} = 10 \log \frac{1}{16} \sum_{i=1}^{16} 10^{\frac{L_i}{10}} \qquad L_{eq\ night} = 10 \log \frac{1}{8} \sum_{i=1}^{8} 10^{\frac{L_i}{10}}$$

following formula:

Where, Li = Leq value of the ith hourly time interval
Area category: I-Industrial, C-Commercial, R-Residential, S-Silence zone
Day time: 6.00 a.m. to 10.00 p.m. Night time: 10.00 p.m. to 6.00 a.m.
Permissible Ambient noise standards in dB (A):

Table 3.17: Ambient Air Quality Standards in respect of Noise

Area Code	Category of Area/Zone	Limits in dB (A) Leq	
		Day Time	Night Time
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silence	50	40

Table 3.18: Summary of Ambient Noise Levels Monitored in the Study Area

Code	Location Name/ Description	Area Category	Day		Night	
			Leq	Limit	Leq	Limit
N1	Existing Plant	Industrial	70.04	75	58.23	70
N2	Expansion Site	Industrial	67.77	75	58.94	70
N3	Pale Bhudrug	Residential	50.32	55	41.33	45
N4	Valap Gaon	Residential	50.52	55	43.24	45
N5	Taloje Majkur	Residential	51.49	55	39.75	45
N6	New Panvel (W)	Residential	52.56	55	43.46	45

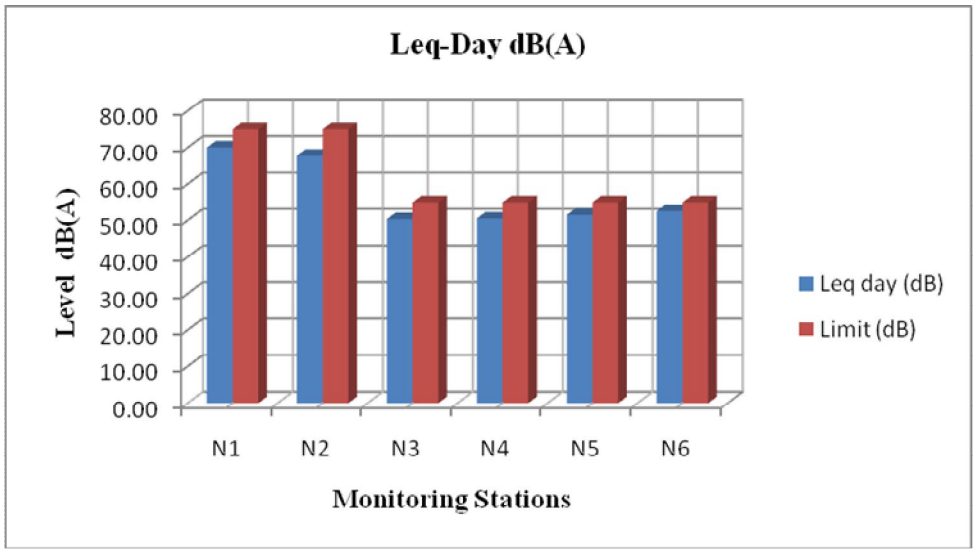


Figure 3.13 Ambient Noise Levels monitored in the Study Area (Day time)

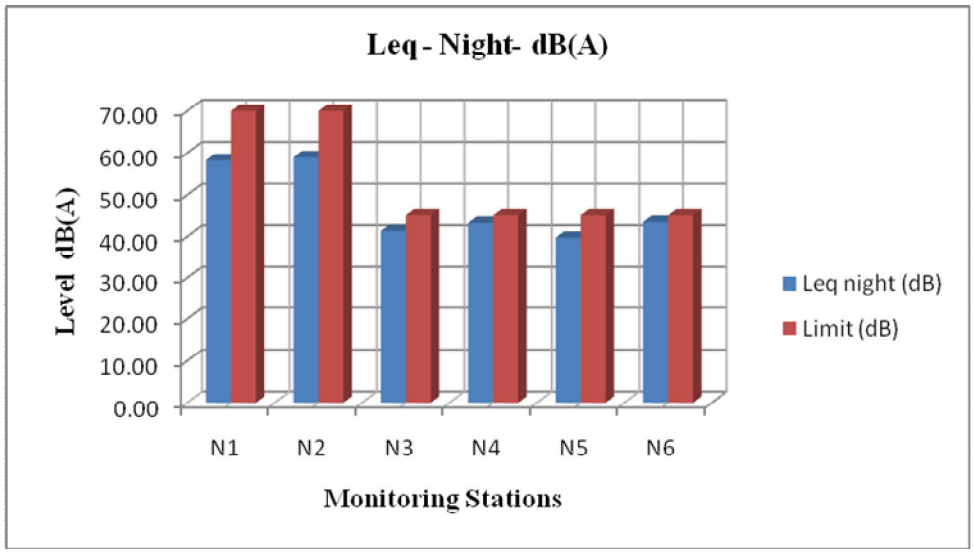


Figure 3.14 Ambient Noise Levels Monitored in the Study Area (Night time)

The minimum and maximum sound levels were recorded on a hand held sound level meter for five minutes during day time. The sound level meter was held 1.2 to 1.5 m above ground level and at least 3m away from sound reflecting sources like trees in the surrounding environment.

3.9.3 Observations and Regional scenario and effects

Assessment of noise level was carried out at various places to evaluate the ambient noise level in the industrial & residential area as well as possible impact due to project activities. The values of noise level, which are recorded lies between 50.32-70.04 dB (A) at day time and 39.75-58.94 (A) at night time. The noise level in the daytime as well as in night time were found to be within the permissible limit although the noise levels at N1, N2 are slightly high in the day & night time because of the industrial activities taking place in the area. The day

equivalent and right equivalent values observed for all the locations are within the noise standards specified by CPCB.

The testing and analysis of air, water, soil samples and noise data was carried out by QCI-NABL accredited laboratory, EKO Pro Engineers Pvt. Ltd. located at Ghaziabad, Uttar Pradesh.

3.10 Biological Environment

3.10.1 General Setting

Ecological communications presents the highest level of commitment to the environment, to personal and community ecology and to a sustainable way of life for us and for the next generation.

Environment consists of all living and non-living factors which balance the weather conditions and may be disturbed by some mechanical activities. Due to introduction of such activities, the surrounding water, air and habitats may disappear or some new species may appear.

By conducting ecological studies, we may be able to understand the pattern of change in weather condition, appearance or disappearance of flora and fauna, changes in vegetation pattern in respect of their quantity & quality.

The future industrial activities may be so planned in such a way that the existing ecosystem may not get disturbed beyond sustainable limits. Hence, ecological studies form a part of environmental monitoring studies required for Environmental Management Plan.

The study area falls near to the South West coast of India. The topography of the area is nearly coastal. The project site falls within MIDC Industrial Area. About 60% of the total area is under vegetation and around 28% of the area is the built up area. Water bodies also cover a significant portion of about 9%. Quadrate survey at different location was carried out to evaluate the floral diversity in the region.

3.10.2 Flora

There is no eco-sensitive area, forest, or wild life sanctuaries within the 10 km study area. A floral enlistment of trees, shrubs and herbs with their scientific names, local names are tabulated in **Table 3.19**. In addition, floral species observed through quadrate sampling during field visits have been depicted under the **Photo Plate 3.15**.

Table 3.19: Comprehensive List of Plant Species

S. No.	Scientific Name	Local Name
Tree		
1.	*Azadirachta indica*	Neem
2.	*Neolamarckia cadamba*	Kadam
3.	*Cocos nucifera*	Narial
4.	*Santalum album*	Chandan
5.	*Terminalia arjuna*	Arjun

S. No.	Scientific Name	Local Name
6.	*Polyalthia pendula*	Ashoka
7.	*Tectona grandis*	Sagun
8.	*Terminalia catappa*	Badam
9.	*Ficus religiosa*	Peepal
10.	*Mangifera indica*	Aam
11.	*Syzygium cumini*	Jamun
12.	*Tectona grandis*	Sagun
13.	*Artocarpus heterophyllus*	Jackfruit
14.	*Acacia arabica*	Babul
15.	*Zizyphus jujuba*	Ber
16.	*Psidium sp.*	Guava
17.	*Acacia arabica*	Bakul
18.	*Aegle marmelos*	Bel
19.	*Acasia catechu*	Khair
Shrubs		
1.	*Sida cordifolia*	Bala
2	*Macaranga peltata*	Macaranga
3.	*Strobilanthus callosus*	Karvi
Herbs		
1	*Adhatoda vasica*	Basak, adusa
2	*Aloe vera*	Aloe
3	*Cynodon dactylon*	Dub
4	*Jatropha gossypifolia*	Ratanjaun
5	*Lantana camara*	Lantana
6	*Ocimum sp.*	Bantulsi
7	*Mimosa pudica*	Chuimui
8	*Ricimus communis*	Castor bean
9.	*Euphorbia hirta*	Dudhi

Source: *1. District Forest Division, Panvel (Raigad) 2.Local Enquiry and field investigation.*

***Artocarpus heterophyllus* (Near Panvel Area)**

***Cocos nucifera* (Near lake view inside the)**

Photo Plate 3.15: Vegetation Cover in the Study Area

3.10.3 Threatened and Endangered Plant Species

No endangered or threatened species are present in the study area.

3.10.4 Economical Important Plant species

A survey was carried out to identify the wild plants used by the local peoples for different purposes. The data was mainly collected by taking views of the local people and the ethno botanical data was recorded in the specially formatted questionnaires. Around 16 different plants listed from these areas are used for various purposes. The ethno-botanical utility of various trees, shrubs, herbs, and grass species observed and reported in the study area and its surroundings are given in **Table 3.20.**

Table 3.20: List of Economically Important Plant Species Present in the Study Area

S. No.	Scientific Name	Vernacular Name	Uses
1	Adhatoda vasica	Basak	Medicine
2	Azadirecta indica	Neem	Medicine
3	Citrus sp.	Nimbu	Food
4	Jatropha curcas	Bharenda	Fodder
5	Mangifera indica	Aam	Food
6	Ocimum sanctum	Tulsi	Medicine
7	Phyllanthus emblica	Amla	Medicine, Food
8	Syzygium cumini	Jamun	Food
9	Tectona grandis	Sagun	Timber
10	Terminalia catappa	Badam	Food
11.	*Syzygium cumini*	Jamun	Food
12.	*Artocarpus heterophyllus*	Jackfruit	Food
13.	*Psidium sp.*	Guava	Food
14.	*Zizyphus jujuba*	Ber	Food

S. No.	Scientific Name	Vernacular Name	Uses
15.	*Aegle marmelos*	Bel	Food
16.	*Cocos nucifera*	Narial	Food

(Source: Local Enquiry and Ethno Botanical field investigation)

3.10.5 Fauna

The area supports varied habitats viz. open space, agricultural fields, and human settlements. The information of the fauna, which are present in and around the study area, is gathered from various sources like interrogating the locals, as well as by detailed survey of these areas by EIA study team. During the field survey naturally occurring species, which were observed were recorded A list of mammals, birds,and reptiles with their scientific names prepared from various secondary sources as well as direct and indirect evidences by EIA team is presented in **Table 3.21**.

Table 3.21: List of Fauna in Study Area

S.No.	Common name	Vernacular name	Scientific name	Status/WPA Schedule No.
Mammals				
1	Common Hare	Khargush	*Lupus migricollis*	Least Concerned
2	Common House Rat	Chuha	*Rattus rattus brunneusculus*	Endangered, V (1991)
3	Indian Fox	-	*Vulpes bengalensis*	Endangered, II (1991)
4	Langur	Hanuman	*Presbytis entellus entellus*	Endangered, II (1991)
5	Monkey	Bander	*Macacus mulatta mulatta*	Endangered, II (1991)
Reptiles				
1	Python	Ajgar	*Python molurus*	Near Threatened
2	Cobra	Cobra	*Naja naja*	Not Evaluated
3	Wall Lizard	-	*Podarcis sp.*	Least concern
4	Indian Chameleon	Girgiti	*Chamaeleo zeylanicus*	Least Concern
Avifauna				
1	Crow	Kauwa	*Corvus brachyrhynchos*	Least concern
2	Common Myna	Mayna	*Acridotheres tristis*	Least Concern
3	Rock Pigeon	Kabutar	*Columba livia*	Least concern
4	Eagle	-	*Aquila hastata*	Vulnerable
5	House Sparrow	-	*Passer domesticus*	Least Concern

S.No.	Common name	Vernacular name	Scientific name	Status/WPA Schedule No.
6	Baya Weaver	Baya	*Ploceus philippinus*	Least Concern
9	Owl	Ullow	*Otus sp.*	Least Concern

Source: *1.District Forest Division, Panvel (Raigad); 2.Local Enquiry and field investigation*

3.10.6 Eco sensitive areas

There is no Eco sensitive Zone like Biosphere Reserve, National Park, Wildlife Sanctuary is present within 10 km of the study area or it's near vicinity.

3.11 Socio-Economic Environment

The study area falls within block Panvel of the Raigad district. The Panvel block has 90 Gram Panchyats, 174 Villages with 441 habitations having rural population of 3.56 lakhs. The major villages, which fall within 10 km of study area near project site, are tabulated in **Table 3.22** and the habitation map of the study area is shown in **Figure 3.15.**

Table 3.22: Villages within Study Area

District	**Raigad**
Block	**Panvel**
Villages	Pale Bhudrug
	Valap
	Taloje Majkur
	Morbe
	Devichapada
	Dhamini
	Nitalas

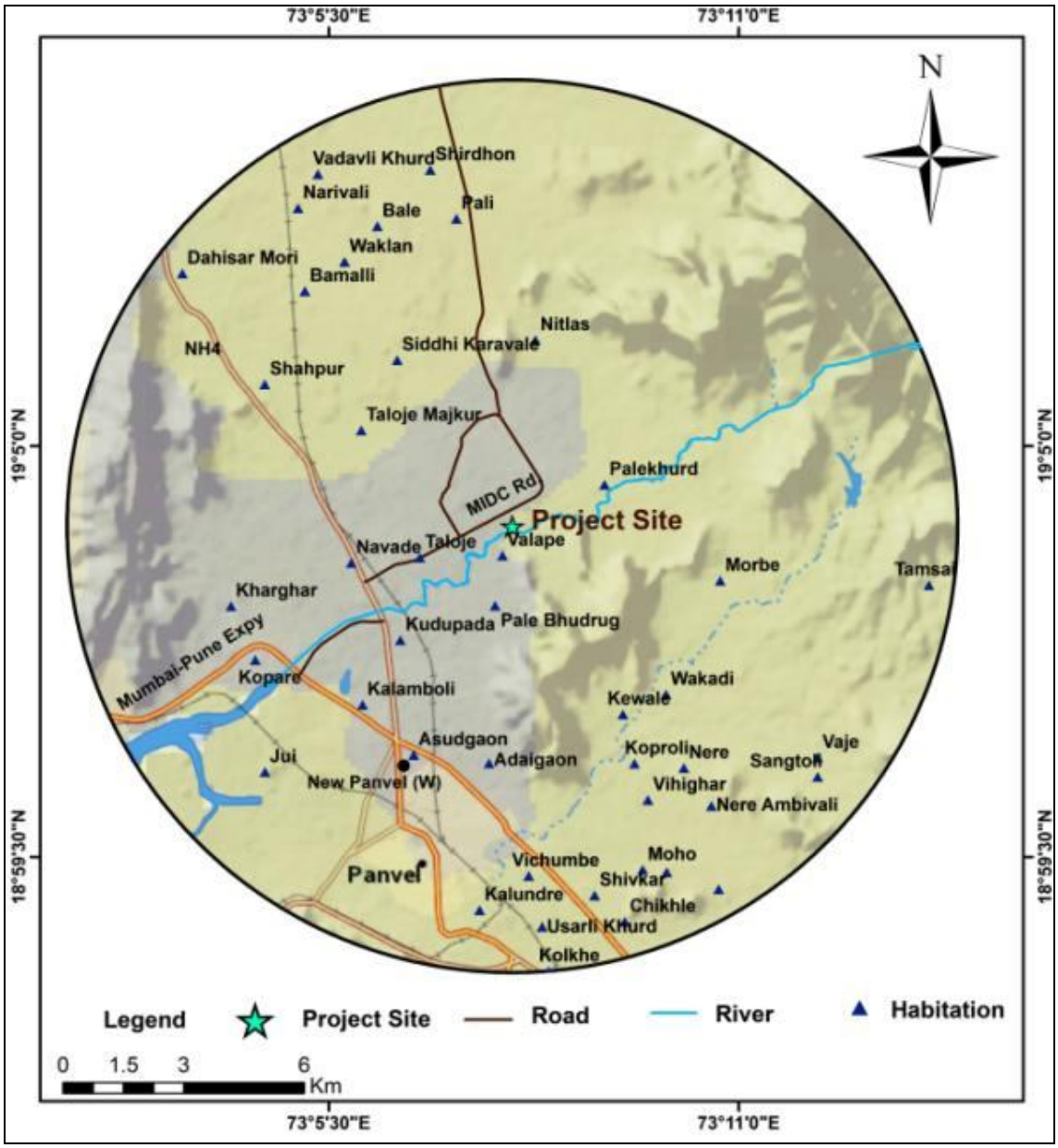


Figure 3.15 Habitation Map of the Study Area

3.11.1 Demographic Profile

The demographic profile of the villages within the study area (as per 2011 census) is shown below in **Table 3.23.**

Table 3.23 Demographic profile of the Villages in Study Area

S.No.	Villages	Population				No. of Cattles
		Total	SC	ST	General	
1.	Pale Bhudrug	1679	12	169	1498	284

2.	Valap	1668	40	114	1514	121
3.	Taloje Majkur	1978	0	81	1897	288
4.	Morbe	1263	0	174	1089	390
5.	Devichapada	3129	75	4	3050	485
6.	Dhamini	578	0	562	16	95
7.	Nitalas	1787	10	53	1724	277

Source: http://www.censusindia.gov.in/Census_Data_2001

There are large numbers of Hindu families in these villages. Compared to the number of Hindu families, the numbers of Christian and Muslim families are less. These villages have rich cultural traditions.

3.11.2 Occupation

The study area is having conducive geographical factors, which helps in growth and development of industries in the area. The MIDC Industrial Area at Taloja has around 981 industries where a large number of populations from nearby villages are engaged. Some others have their own small businesses (shop owners).

Apart from that, agricultural practices is also done but at lower scale. People are engaged in growing crops and plantations for commercial purposes. The major cash crops of the area are paddy, mango and vegetables. Some people also work as laborers in the agricultural fields.

3.11.3 Infrastructural Facilities

3.11.3.1 Connectivity and Communication

Most of the villages have good connectivity and communication facilities. The villages nearby the Taloja Industrial Area are well connected with each other. There are state highway (SH-47), national highway (NH 17) and Mumbai-Pune Expressway, which passes along the study area thereby providing good connectivity to a very wide network of the national and state highways.

Panvel railway station is the nearest main railway station at approx. 10 km from the project site, which is well connected to the study area. Apart from railways and roadways, there are rivers flowing through the area that provides good inland navigational facilities.

Most of the villages in these tehsils have both mobile and landline telecom connections. They have post offices and many cooperative as well as regional level banks. All the villages have television/radio sets and are aware of national and international news/events.

3.11.3.2 Hospitals and Schools

The villages of the Panvel block do not have good medical facilities. Primary health centers exist in few of the villages along with some private doctors, so the villagers have to go to Panvel for any major disease. Therefore, medical facilities need to be developed in these villages. Although primary educational facilities are there in all the villages there is also a need for the development of higher level of educational institutes.

3.11.3.3Places of Religious/Archaeological and other Importance

There are no important religious/archaeological places within the 10 km of study area apart from few small temples in the villages as observed during the field survey.

4

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 INTRODUCTION

Any developmental activity in its wake will bring about some impacts associated with its origin, which can be broadly classified as reversible, irreversible, long and short-term impacts. In this chapter, an endeavor has been made to identify various Environmental Impacts associated with the plant operation and other activities wherein, there may be a chance of pollution.

Based on the possible worst case emissions and waste generation from the proposed project and taking into consideration the baseline Environmental status at the proposed project site, the environmental factors that are likely to be affected (Impacts) are assessed. Both instrumental (positive) and detrimental (negative) impacts are accounted for this purpose. The prediction of impacts helps in the preparation of a sound Environmental Management Plan which has to be executed during the on-going activities for the proposed project to minimize the adverse impacts on the environmental quality.

The mathematical models were used to quantitatively describe the cause-effect relationships between the sources of pollution and different components of environment. In case if the mathematical models are not available or it is not possible to identify/validate a model for particular situation, predictions would be made through available scientific knowledge.

Methodology:

The potential impacts on the environment from the proposed project are identified based on the nature of the various activities associated not only with the project implementation and operation, but also on the current status of the environmental quality at the project site.

Potential Impacts

All the potentially significant environmental impacts from the project are grouped as below.

Air Environment

- Impacts on ambient air quality
- Impacts on ambient odor
- Impacts on ambient noise

Water Environment

- Impacts on surface & ground water quality
- Impacts on aquatic life

Land Environment

- Impact on land use
- Impacts on soil fertility
- Impacts on agriculture
- Impacts on forests and wildlife

Socio Economics

- Impacts on demand-supply
- Impacts on natural resources
- Impacts on industry
- Impacts on infrastructure
- Impacts on employment

Indirect Impacts

- Impacts on public health and safety
- Impacts on cultural resources
- Impacts on ecology and biodiversity
- Impacts on aesthetics

This section presents the likely impacts identified and recommends mitigation measures based on the analysis of the information collected from the following:

- Project information provided by DFPCL (described in Section 2);
- Site visits and Environmental monitoring (Existing environmental condition is depicted in Section 3);
- ACE's past experience in similar projects; and
- Standard international environmental protection and management practices in Fertilizer sector.

Actual and foreseeable events, including operational events and typical events are discussed in this section. Processes that may create risks to the natural environment are considered first and are analysed in terms of key potential environmental impacts, which are covered in this chapter. Information is also provided on proven existing management techniques for minimising the impact due to project activities.

The anticipated qualitative potential impacts related to the proposed project activities and risk interaction based on the environmental sensitivities/ resources available in the project area and surroundings has been provided in interactive matrices in this chapter.

The impact analysis performed is intended to cover the impacts of construction and operational activities associated with the proposed expansion of NPK fertilizer plant.

Based on the proposed project activities and the baseline information provided in Chapter 3**,** the activities have potential to impact the following environmental resources in **Table: 4.1** below:

Table 4.1: Identification of Potential Impacts: Activities Impacts/Risks Interaction

		Environmental Sensitivities								
		Physical				Biological		Socio-economic		
Impacts/ Risks / Activities	Air Quality	Noise	Surface Water Quality	Ground Water Quality	Land	Flora	Fauna	Living Conditions of Local People	Occupational Exposure & General Safety	Economy
Site preparation and construction by demolishing existing AN bagged storage area	◆	◆	◆		◆			◆	◆	◆
Installation and operation of process plant and bagging machines	◆	◆	◆		◆			◆	◆	◆
Transportation of personnel and material	◆	◆						◆		◆
Atmospheric emissions	◆					◆	◆	◆	◆	
Noise levels		◆						◆	◆	
Wastewater generation			◆		◆					
Solid/Demolishion waste generation	◆				◆				◆	
Socio-economic								◆		◆

Note: **denotes likely adverse impact,** **denotes positive impact**

Based upon the above interaction matrices following potential impacts have been identified:

A. Physical

- Air Quality
- Noise
- Water Quality
- Soil Quality

B. Biological

- Flora and Fauna

C. Socio-economic

- Living conditions of Local People
- Occupational Exposure & General Safety
- Economy

4.1.1 Prediction of Impacts

Prediction of impacts is the most important component in the environmental impact assessment studies. Several scientific techniques and methodologies are available to predict impacts of developmental activities on physic, ecological and socio-economic environments. Such predictions are superimposed over the baseline status of environmental quality to derive the ultimate scenario of environmental conditions. The prediction of impacts helps to prepare the environmental management plan required to be executed during the on-going activities for the project to minimize the adverse impacts on environmental quality.

The mathematical models are the best tools to quantitiavely describe the cause-effect relationships between sources of pollution and different components of environment. In case, mathematical models are not available or it is not possible to identify / validate a model for a particular situation, predictions could be made through available scientific knowledge and jusgements.

4.2 Impacts on Air Environment

4.2.1 Impacts during Construction Phase

During the construction phase, dust (particulate matter) is expected to be the main pollutant to be emitted from the demolishion of AN bagged storage area, haul roads, stockpiles and material handling. In this case, pollution emission sources shall be distributed throughout the project site and will fall under the category of area source. The land acquired is fairly flat, so extensive site formation work is not expected during this phase.

In the absence of information regarding the quantity and type of construction equipment to be deployed at any particular time, total suspended particulate matter emission factor for construction activities as per AP-42, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Fifth Edition, USEPA 1995, was taken to calculate the approximate concentration of suspended particulate matter to be emitted during construction phase. The standard emission factor for heavy construction activity is 2.6 mg/ha/month of activity (Section 13.2.3.3, AP-42, USEPA, 1995). The area allotted for plant construction is about 7,700 m^2 (0.77 ha), and the theoretical particulate matter emission during the construction phase is about 2.002 mg/month.

Vehicular emission of SO_2, NO_2, CO and CO_2 will add onto the air pollution. Movement of vehicles on unpaved roads will also add onto the dust emission. Operation of DG sets will also generate air pollutants like SO_2, NO_2, CO and CO_2.

In order to circumvent this, the road surfaces near the proposed project site will be sprinkled with water to reduce dust generation. Ambient air levels of SO_2 and NOx are likewise expected to increase due to operation of construction equipment's such as generators, bulldozers, pay loaders, trucks etc. However, this will be temporary in nature only during construction period.

4.2.2 Impacts during Operation Phase

Particulate and fugitive emissions might arise from raw material stock piling, process activities like mixing of rock phosphate and sulphuric acid, grinding, DG set and vehicular movement.

During the operation phase, there are five major categories of sources of air pollutants, they are:

- Emissions from manufacturing processes
    - Fugitive emission in the form of dust
    - Emission of particulate matter
- Fugitive emissions from material handling.
- Emissions (SO_2, NO_2, CO, CO_2 and dust) from vehicular movement.
- Emissions (SO_2, NO_2, CO and CO_2) from Diesel Gen. Set (Emergency power, 500 KVA)
- Emissions (SO_2, NO_x, CO and NH_3) from Ammonia prilling reformer.

Detailed Air Dispersion Modeling has been carried out using **AERMOD View** model for predicting the Ground Level Concentration (GLC) of air pollutants namely $PM_{2.5}$, PM_{10}, SO_2, NO_x and NH_3 contributed during the operation of proposed NPK fertilizer plant.

4.2.3 The Model

Air Dispersion Modeling for prediction of maximum increment in Ground Level Concentration (GLC) of different air pollutants in the surrounding area due to the emission from stacks present in proposed expansion of NPK fertilizer plant during operation stage has been carried out by using the **AERMOD View** model developed by the US EPA. This model is used extensively to assess pollution concentration and deposition from a wide variety of sources and is also recommended by CPCB. It is a steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain. Given source characteristics, emissions, meteorology and averaging time, the model predicts maximum GLCs of various pollutants.

4.2.4 Model Input

Stack and Emission Characteristics:

The major source of emissions is from the stacks during the operation of the proposed NPK fertilizer project. As a result, the stack emissions from the proposed NPK fertilizer plant would be constituted of mainly sulphur dioxide (SO_2), oxides of nitrogen (NO_x), particulate matters (PM_{10}), particulate matter ($PM_{2.5}$) and ammonia (NH_3). The stack and emission characteristics pertaining to the stacks present in the proposed NPK fertilizer plant are reported in **Table 4.2**. The modeling has been carried out as per the guidelines of the CPCB. The 24-hourly maximum GLCs have been computed for comparison with the standards.

Table 4.2: Stack & Emission Characteristics

S.No.	Stack Details	Release Height (m)	Emission Rate (g/s)					Gas Exit Temp. (K)	Stack Diameter (m)	Gas Exit Velocity (m/s)
			SO_2	NO_x	PM_{10}	$PM_{2.5}$	NH_3			

1.	Stack A	55	-	-	2.88	0.72	3.6	323	2	15
2.	Stack B	55	-	-	2.88	0.72	3.6	333	2.25	15
3.	DG Set	7	0.20	1.2	0.24	0.10	-	373	0.80	4.9

Meteorological Parameters:

On-site hourly meteorological data monitored during the months January - March, 2013 in respect of temperature, wind speed, wind direction, humidity and cloud cover has been used as input for air dispersion modeling. Hourly mixing heights used for modeling have been calculated and taken from the **AERMOD View** model itself.

4.2.5 Modeling Procedure

The modeling has been carried out as per the guidelines of the CPCB. Five relevant pollutants namely sulphur dioxide (SO_2) oxides of nitrogen (NO_x), particulate matter (PM_{10}), particulate matter ($PM_{2.5}$) and ammonia (NH_3) have been considered for modeling. Square pattern of receptor locations up to a maximum distance of 10 km with respect to 16 radial directions (N to NNW) from the centre of the location of the stacks have been considered. The 24-hourly maximum incremental GLCs have been computed for comparison with the standards.

4.2.6 Modeling Results

The predicted 24-hourly maximum incremental Ground Level Concentration **(**GLC) along with isopleths plot of concentration for NO_x, SO_2, PM_{10}, $PM_{2.5}$ and NH_3 in the study area are reported below in **Table 4.3 - 4.7** and **Fig. 4.1 – 4.5.**

Table 4.3: Predicted 24-hourly Maximum GLC of NO_x (µg/m^3)

S.No.	Receptor Location		Mean 24-hourly Background Level (µg/m^3)	Predicted 24-hourly Max Incremental GLC (µg/m^3)	Total Projected Level (µg/m^3)	Standard (µg/m^3) (for Industrial, Residential & Rural Area)
1	AQ-1	Existing Plant	22.85	14.317	**37.167**	80
2	AQ-2	Proposed Expansion Site	22.1	14.317	**36.417**	80
3	AQ-3	Pale Bhudrug	20.25	7.161	**27.411**	80
4	AQ-4	Valap Gaon	21.3	7.161	**28.461**	80
5	AQ-5	Taloje Majkur	19.1	0.004	**19.104**	80
6	AQ-6	New Panvel (W)	18.85	0.004	**18.854**	80

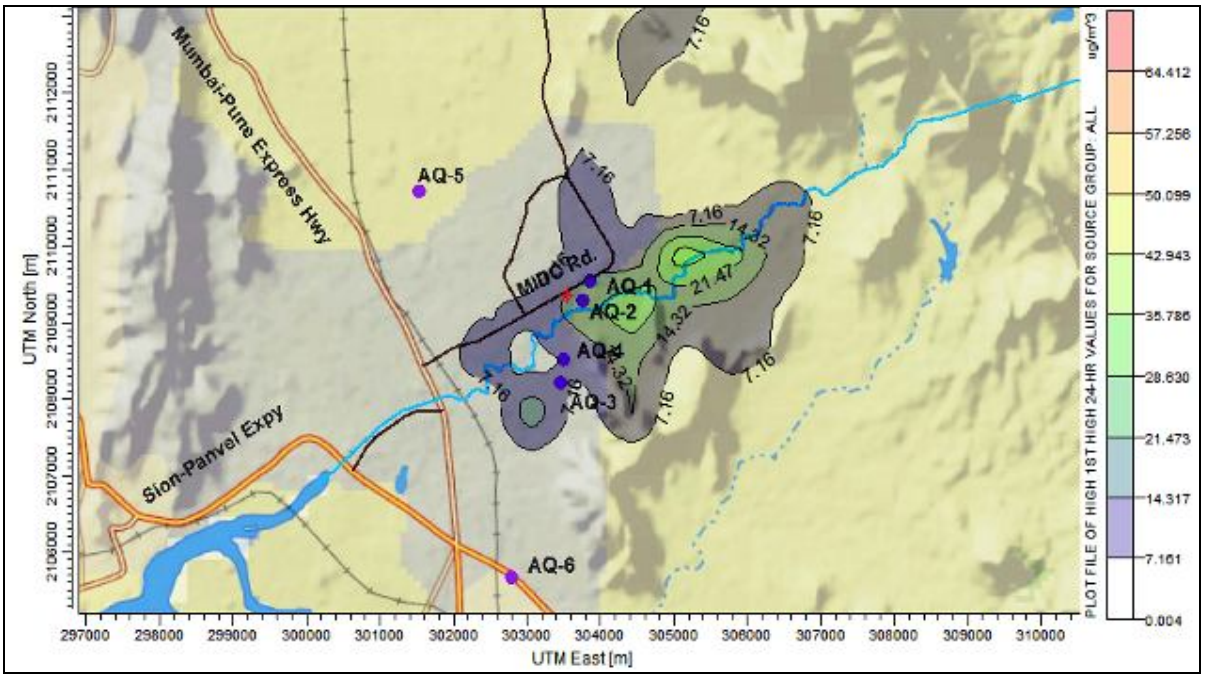


Figure 4.1: Isopleths plot of concentration for NO_x (µg/m^3)

Table 4.4: Predicted 24-hourly Maximum GLC of SO_2 (µg/m^3)

S.No.	Receptor Location		Mean 24-hourly Background Level (µg/m^3)	Predicted 24-hourly Max Incremental GLC (µg/m^3)	Total Projected Level (µg/m^3)	Standard (µg/m^3) (for Industrial, Residential & Rural Area)
1	AQ-1	Existing Plant	4.15	2.386	**6.536**	80
2	AQ-2	Proposed Expansion Site	3.85	2.386	**6.236**	80
3	AQ-3	Pale Bhudrug	3.9	1.193	**5.093**	80
4	AQ-4	Valap Gaon	3.2	1.193	**4.393**	80
5	AQ-5	Taloje Majkur	3.1	0.001	**3.101**	80
6	AQ-6	New Panvel (W)	4.1	0.001	**4.101**	80

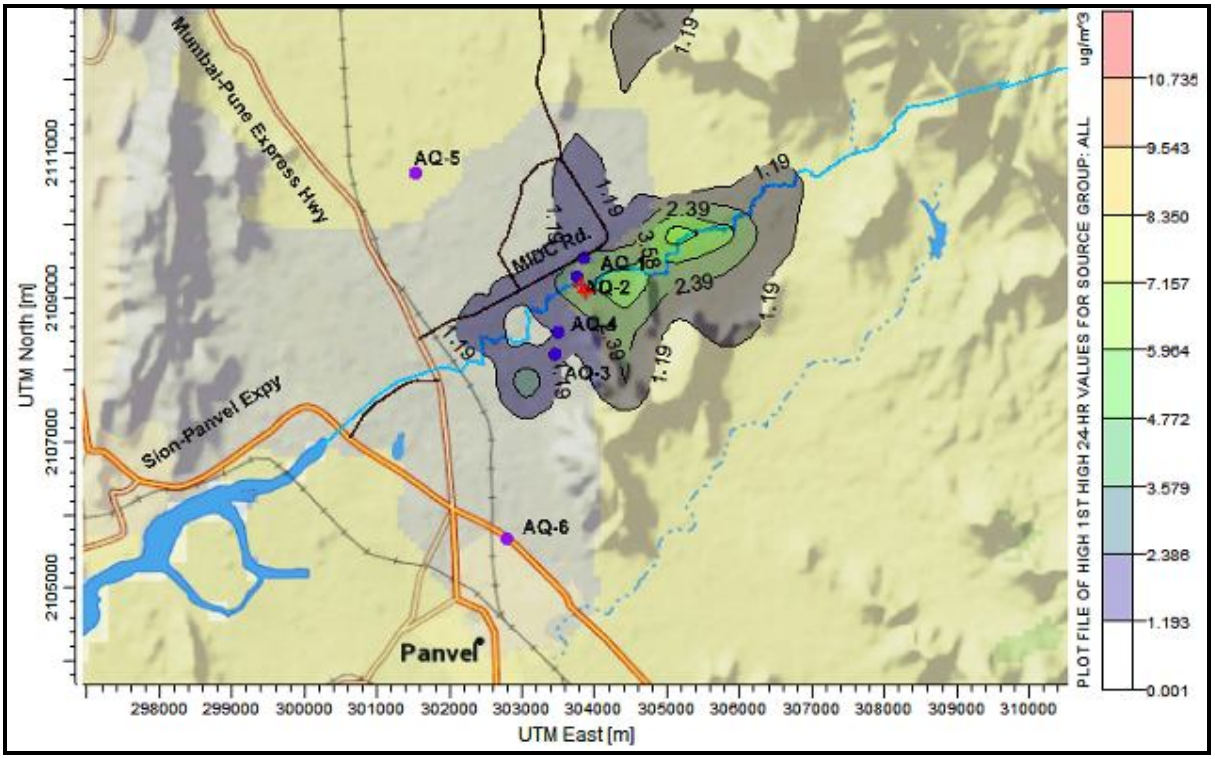


Figure 4.2: Isopleths plot of concentration for SO_2 (µg/m^3)

Table 4.5: Predicted 24-hourly Maximum GLC of PM_{10} (µg/m^3)

S.No.	Receptor Location		Mean 24-hourly Background Level (µg/m^3)	Predicted 24-hourly Max Incremental GLC (µg/m^3)	Total Projected Level (µg/m^3)	Standard (µg/m^3) (for Industrial, Residential & Rural Area)
1	AQ-1	Existing Plant	48.25	4.746	**52.996**	100
2	AQ-2	Proposed Expansion Site	45.08	4.746	**49.826**	100
3	AQ-3	Pale Bhudrug	41.1	0.022	**41.122**	100
4	AQ-4	Valap Gaon	43.2	0.022	**43.222**	100
5	AQ-5	Taloje Majkur	40.5	0.022	**40.522**	100
6	AQ-6	New Panvel (W)	39.05	0.022	**39.072**	100

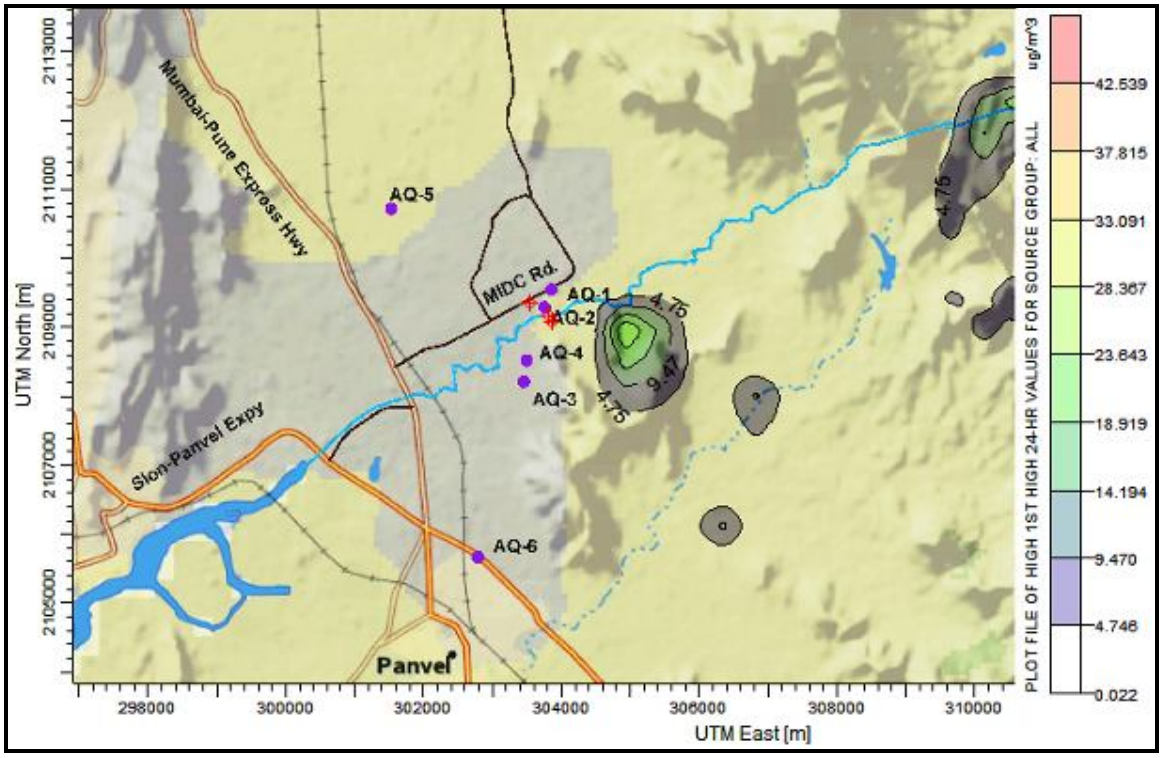


Figure 4.3: Isopleths plot of concentration for PM_{10} (µg/m^3)

Table 4.6: Predicted 24-hourly Maximum GLC of $PM_{2.5}$ (µg/m^3)

S.No.	Receptor Location		Mean 24-hourly Background Level (µg/m^3)	Predicted 24-hourly Max Incremental GLC (µg/m^3)	Total Projected Level (µg/m^3)	Standard (µg/m^3) (for Industrial, Residential & Rural Area)
1	AQ-1	Existing Plant	9.65	0.187	**9.837**	60
2	AQ-2	Proposed Expansion Site	9.01	0.187	**9.197**	60
3	AQ-3	Pale Bhudrug	8.22	0.006	**8.226**	60
4	AQ-4	Valap Gaon	8.64	0.006	**8.646**	60
5	AQ-5	Taloje Majkur	8.1	0.006	**8.106**	60
6	AQ-6	New Panvel (W)	7.81	0.006	**7.816**	60

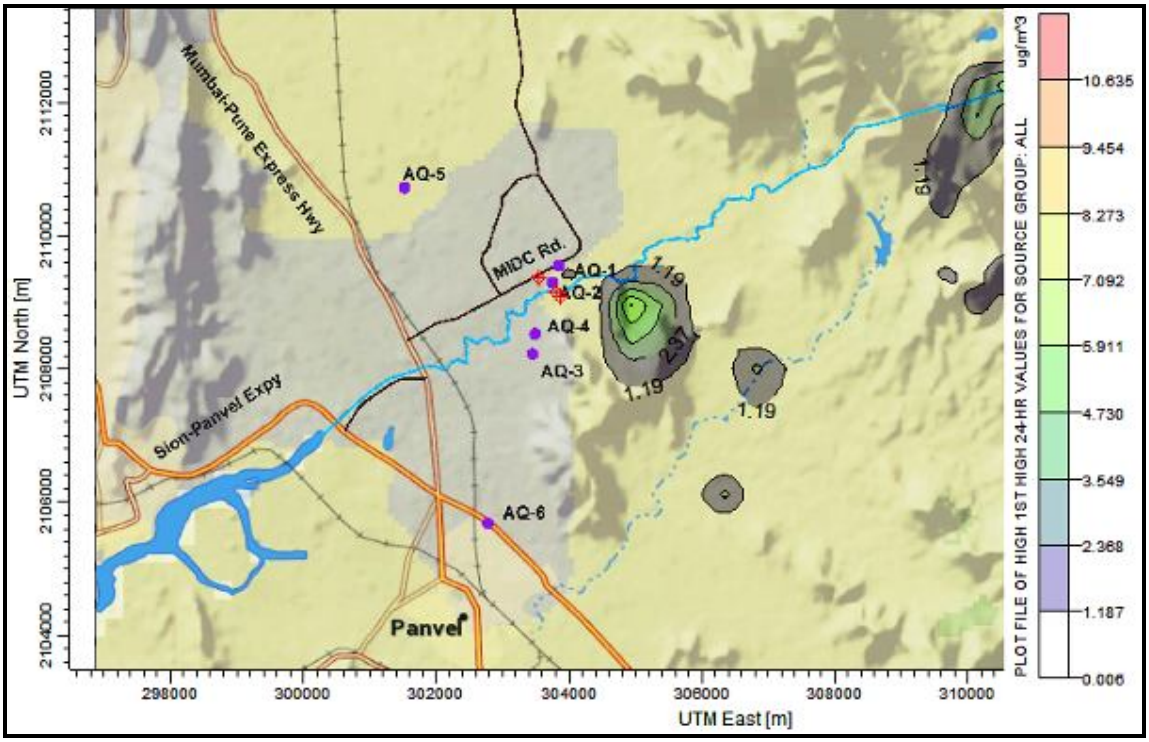


Fig.4.4: Isopleths plot of concentration for $PM_{2.5}$ (µg/m^3)

Table 4.7: Predicted 24-hourly Maximum GLC of NH_3 (µg/m^3)

S.No.	Receptor Location		Mean 24-hourly Background Level (µg/m^3)	Predicted 24-hourly Max Incremental GLC (µg/m^3)	Total Projected Level (µg/m^3)	Standard (µg/m^3) (for Industrial, Residential & Rural Area)
1	AQ-1	Existing Plant	50.55	5.931	**56.481**	400
2	AQ-2	Proposed Expansion Site	48.2	5.931	**54.131**	400
3	AQ-3	Pale Bhudrug	39.6	0.026	**39.626**	400
4	AQ-4	Valap Gaon	42.35	0.026	**42.376**	400
5	AQ-5	Taloje Majkur	35.5	0.026	**35.526**	400
6	AQ-6	New Panvel (W)	34.25	0.026	**34.276**	400

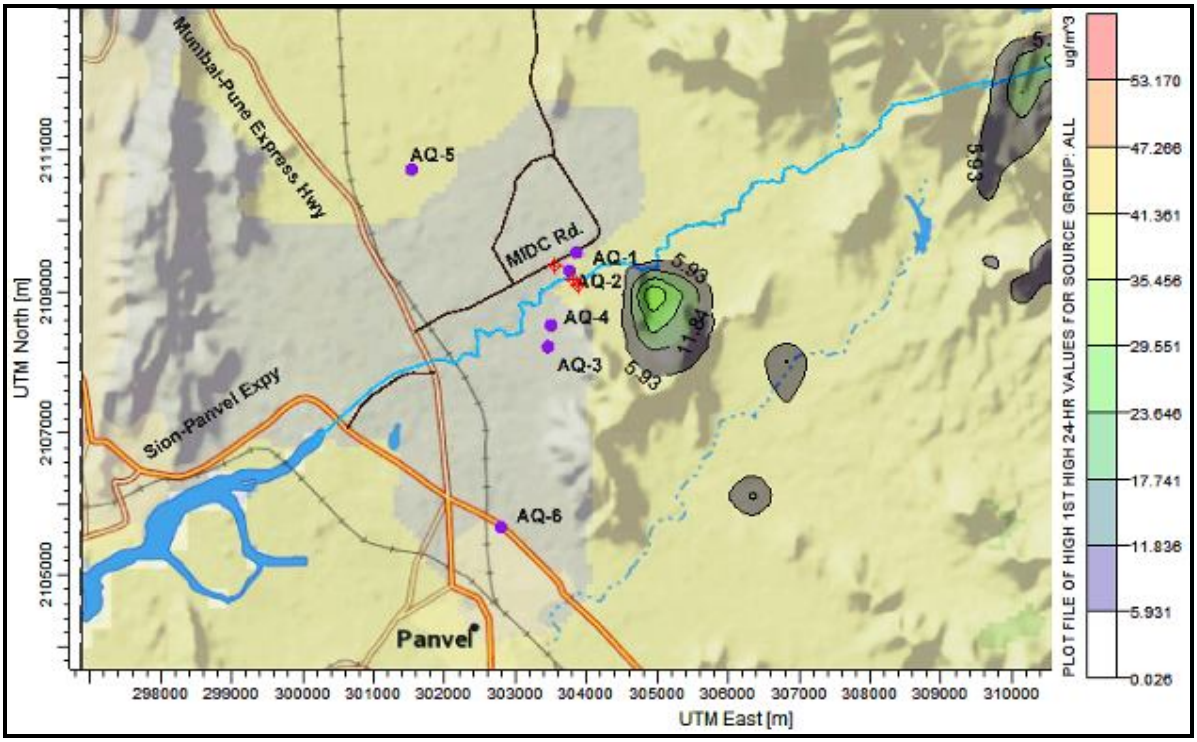


Fig.4.5: Isopleths plot of concentration for NH_3 (µg/m^3)

4.2.7 Discussion on Modeling Results

The predicted 24-hourly maximum incremental GLC for SO_2 is found to be highest (about 6.536 µg/m^3), respectively at the receptor location of AQ-1 (near existing site), this may be because the proposed stacks are close to the mentioned receptor location. The increment of GLCs for SO_2 at other receptor location are found to be lower, the possible reason may be because the other receptor locations are far away from sulphuric acid plant, which is the major source of SO_2 emission.

The increment of GLCs for NO_x, PM_{10}, $PM_{2.5}$ and NH_3 are found to be maximum at receptor location of AQ-1 (near existing site), this may be because the proposed stacks are close to the mentioned receptor location. At other receptor locations, the increment in GLCs for NO_x, PM_{10}, $PM_{2.5}$ and NH_3 are found to be practically negligible as compared to their background levels, and therefore, the resultant post operational NO_x, PM_{10} and $PM_{2.5}$ levels will remain around the existing level.

Referring to the background (monitored) ambient air quality, the mean baseline level when added to the corresponding maximum predicted incremental GLC, the resultant levels of NOx, SO_2, PM_{10}, $PM_{2.5}$ and NH_3 at different receptor locations are found to be well within their permissible standard limits pertaining to industrial, residential rural and other areas.

4.3 Impact on Noise Quality

4.3.1 Construction Phase

Impact on the noise quality may be attributed to the construction and operational phase activities at the proposed expansion site. Impact during construction phase may be due to generation of

noise is due to operation of heavy equipment's and increased frequency of vehicular traffic in the area. Vibration levels will also increase due to these activities. However, these impacts are short term, intermittent and temporary in nature. The nearest residential area is approximately 1.0 km away from the project site. Considering the above, it is expected to have minimal noise and vibration impact from the construction activities.

4.3.2 Operation Phase

Operational phase impacts will mainly result from the operation of fans and transfer pumps. Noise level near the pumps & fans has been predicted to exceed 75 dBA, therefore site workers shall be provided with personal protective equipments (PPEs). Also, it has been envisaged that noise impacts on local community due to proposed expansion activities will be insignificant as noise levels of less than 35 dBA have been predicted at a distance of one kilometer and above and since the most of the human settlement are 2-3 km away from the proposed site, the impacts will be insignificant.

Noise may also generate due to movement of heavy vehicles, medium vehicles and automobiles during both construction and operational phase. However, it has been envisaged that increase in noise impacts due to vehicular movement will be temporary and marginal to be considered for their impacts on nearby human settlement.

4.4 Impact on Water Quality

4.4.1 Construction Phase

The water quality is likely to get affected due to the discharge of construction wastewater, domestic wastewater (sewage water, wastewater from kitchen, laundries, etc) and surface run-off from construction site. However, it has been envisaged that water quality degradation due to these sources shall be negligible as wastewater generated from construction activities; kitchen and toilets shall be directed to appropriate treatment (such as effluent treatment plant etc) to meet the stipulated standards prior to its final disposal. Precautionary measures shall be adopted to mitigate the risk of water contamination due to run off.

4.4.2 Operation Phase

The potential impact on water quality during operation phase of fertiliser plant may be attributed to the usage of maintenance, domestic wastewater and wastewater generated in various processes. As the proposed process will be zero liquid discharge process and all spillages etc. shall be recirculated, the anticipated extent of water pollution level will be very less. However, the impacts shall be mitigated by formulation of waste management plan, wherein wastewater generated from operation and maintenance activities of the project shall be subjected to suitable treatment (such as ETP) prior to its final disposal.

4.5 Impact on Land environment

4.5.1 Construction Phase

The proposed plant will be constructed in place of present godown. However, temporary and short term disturbance to soil ecology and top soil loss may occur during, earth works, and other construction activities. These impacts shall be restricted to limited land area and therefore the impact shall be local and minimal.

4.5.2 Operation Phase

The processing at the proposed expansion plant is basically a granulation with pipe reactor system of phosphoric acid or a mixture of phosphoric and sulfuric acids which is neutralized in the pipe reactors with gaseous or liquid ammonia so as to produce wide range of NPK grades. As such, no solid waste generation due to process activities is envisaged. The operational discharge of liquid effluents may have the impact on soil quality. However, plant is zero liquid discharge unit and hence no risk of soil contamination during operation phese.

4.6 Impact on Biological Environment

4.6.1 Construction Phase

Impact on local flora and fauna is insignificant during the construction phase as the proposed expansion would be done after demolishing the existing bagging storage area hence no habitat destruction due to land clearance. However, this activity shall be restricted to the limited land area and therefore, the impact shall be local and minimal. Emission of particulate matter during construction activities is also likely to impact sarounding vegetation. However, these impacts have been envisaged to be low as the construction phase is a temporary phase. Impact on biological environment due to emissions from movement of vehicles (transportation of construction materials) and operation of generators have been envisaged to be negligible as suitable mitigation measures (such as routine maintenance etc) shall be adopted to minimize the impacts from these sources.

Noise generated from construction activities, operation of equipments, machinery, generators and vehicles have been envisaged to be negligible as the activity is for short duration. and Suitable measures such as barricading the construction site, use of noise attenuation chamber for the generators, copresures etc. where ever possible. No significant impacts on terrestrial flora and fauna may occur due to dumping of demolision /construction wastes and construction wastewater discharges from construction activities. However, these impacts shall be minimized by adoption of waste management plan, which has been discussed in the waste management section.

4.6.2 Operation Phase

Impacts on biological environment due to operational phase of the proposed fertilizer plant shall be mainly due to emission of fertilizer dust and ammonia from ammoniation reactors and drying drum, which may affect the crop yield and health of the animals in the surrounding area. However, adoption of suitable measures such as installation of specially designed dust collectors and scrubbers shall minimize the risk of these impacts.

Emissions from operation of generators and other equipments may also affect the surrounding greenaries as well as naturally occurring animal species like birds, butterfly, small mammals like squirrel etc. However, these impacts shall be minimized by implementation of good engineering practice (such as installation of WHRU to reduce temperature of exhaust gas of GTG).

4.7 Impact on Socio-Economic Environment

The proposed project is likely to have both negative and positive impacts on the socio-economic environment. Although the negative impacts of the project (due to emission of particulate matter during construction activities, process emissions from the stacks and exhaust gases during vehicular movements, noise during construction and operational phase of the proposed plant are likely to affect the socio-economic environment but adoption of suitable mitigation measures

shall minimize the occupational health hazards and impacts on local community, thereby contributing to the net positive impacts on socio-economic environment, which are as follows:

- The project is not likely have any affect on the ongoing agriculture activity in the region, as all development is within the premises of Deepak fertilizer, which is within the MIDC area.Thus no adverse impact on the livelihood of the local people is envisaged. However, this development will boost the local economy by providing additional source of income for local people through generation of new employment opportunities for proposed plant construction and operational activities, supply and transport of raw materials and equipment, auxiliary and ancillary works, etc.
- It will also facilitate infrastructure development, improvement of transportation and communication facilities in the area, which will further improve the standard of living.

4.8 IMPACT EVALUATION

Emissions from the construction phase of proposed project shall be marginal and temporary and therefore, the impacts on air quality during this phase will not be of much significance.

Impact during operation phase of proposed fertilizer plant will result from , process activities, vehicular movement and operation of fans and other equipments. However, these impacts shall be minimized by implementing good engineering practice such as adequate stack height, adopting of appropriate dust control equipments (such as scrubbers, bag filters etc.). Fugitive emissions from the production process shall be mitigate by adopting good maintenance practices and proposed green belt development in the facility. Moreover, the impact of secondary pollutants in the region is envisaged to be negligible as the terrain is plain and sufficient amount of atmospheric mixing is available in the region. Thus, the net impacts of point and fugitive emissions shall be considered to be marginal and shall not affect human health and vegetation.

The impacts of noise on nearby villages due to proposed project has been envisaged to be insignificant as the noise levels (due to operational activities) at a distance of one kilometer and above from the proposed terminal have been predicted to be less than 35 dBA and therefore, will not affect the nearby human settlements, flora and fauna.

Impacts on surface and ground water quality have been envisaged to be insignificant as there is no waste water or hazardous solid waste generated from the process. It has also been envisaged that there will be no changes in groundwater quality due to proposed facility as the ground water is not saline and is fit for drinking purpose.

The proposed project site shall temporarily affect the soil environment due to land clearance and other construction activities. These impacts shall be restricted to limited land and therefore, impacts shall be local and minimal. However, development of green belt within and around the plant shall improve the soil ecology and aesthetic value of the area. There is no impact on soil quality due to solid wastes as there is no solid waste generation/disposal. Discharge of liquid effluents from the processing facilities may have the impact on soil quality. However, since process is zero effluent discharge process, no impact is envisaged.

The proposed project is likely to have overall positive impacts on the socio-economic profile of the area as the proposed development shall not affect the ongoing agricultural activities in the area, thus maintaining the livelihood of the local fishermen community and also provide indirect employment opportunities and improvement in existing infrastructure (such as roads).

4.9 IMPACT SIGNIFICANCE

Evaluation of impacts signifies the potential impacts in terms of its likelihood nature as per the following criteria:

a. The impacts are further classified based on their spatial distribution, i.e. *local*, when impacting an area of approximately 1 km radius from the project area, *moderate spread*, when impacting an area of 1 to 2 km radius and *regional* beyond 2 km;

b. The impacts are classified as *short term, moderate term* and *long term* in terms of their existence in temporal scale. Impacts less than 1 year existence as *short term,* while those with 1 to 3 years as *moderate term* and more than 3 years as *long term*;

c. The negative impacts are termed as *adverse impacts* while positive impacts as *beneficial;*

The significance of environmental impacts of various involved activities has been evaluated based on the criteria outlined in **Table 4.8**.

Table 4.8: Impact Significance Criteria

Impact Significance	Criteria
Long term Adverse	When the impact is of high intensity with high spread and high duration or of high intensity with medium spread and medium duration
Moderate term Adverse	When the impact is of moderate intensity with high spread and high duration or of high intensity with low/ moderate spread and low duration
Short term Adverse	When the impact is of low intensity but with moderate spread and moderate duration or of moderate intensity
Insignificant Adverse	When the impact is of low intensity, low spread and low duration
Beneficial	When the impacts are positive

Based on the above-specified criteria, Matrix method has been used to describe potential environmental impacts due to proposed expansion as shown in **Table 4.9 and 4.10**. It is important to note that one activity may have varying impacts on different receptors i.e. different components of the environment. To avoid repetitions, this section describes various activities, which may have wide impacts on many receptors. For example, waste generation and disposal will have impacts on land, water bodies, odour nuisance etc, therefore, the impacts of waste generation and disposal have been considered as one of the key areas of impacts. Similarly, gaseous emissions may be adverse to air quality; which on exposure may impact upon health of individuals and ecology in the surroundings.

Table 4.9: Potential Environmental Impacts of Proposed Project activity (Without Mitigation Measures)

Environmental Sensitivities	Nature of Likely Impacts										Impact Significance				
	Low Intensity	Moderate Intensity	High Intensity	Local	Moderate Spread	Regional	Short Term	Moderate Term	Long Term	Adverse	Beneficial	Insignifica	Short Term	Moderate	Long Term
Air Quality		√				√			√	√				√	
Noise		√			√				√	√				√	
Water Quality		√			√			√		√				√	
Land Environment		√			√			√		√				√	
Flora	√			√			√			√		√			
Fauna	√			√			√			√		√			
Local Economy		√			√				√		√				

Note: for colour coding refer Table 4.8

4.10 IMPACT MITIGATION MEASURES

4.10.1 Air Environment

The impact during construction phase will be reversible, marginal and temporary in nature. Proper maintenance of vehicles and construction equipment will help in controlling the gaseous emissions. Water sprinkling on roads and construction site will prevent fugitive dust. Green belt development along the road side and in the plant premises will be useful in dust suppression. Over loading of the trucks shall be avoided. Haulage roads, which are used for transportation of material, should be maintained properly. Utmost care and regular inspection schedule will be made to prevent any fugitive emission of dust during transportation of material. People working in and around the dust generating area, will be provided with Personal Protective Equipment (PPE) like dust mask to prevent inhalation of dust particles, and use of the same will be strictly enforced during working hours.

During operation phase air pollution control equipments will be used, which are discussed in detail in Chapter 8 (Environmental Management Plan). Paved roads will be laid to prevent dust emission during vehicular movement. A thick greenbelt is also proposed, which will also control the dust. Regular water sprinkling arrangement shall also be provided at the loading and unloading areas. Workers working near the dust generating area will be provided with dust masks, which will be made as mandatory to wear during working hours.

The following mitigation measures are to be followed:

- Existing and the proposed stacks will comply with the applicable emission norms.
- Adequate stack height will be provided as per norms.
- Scrubbers will be provided to minimize the emissions and to maintain the emissions within the prescribed limits.
- Regular monitoring of emissions from all stacks and ambient air quality will be carried out as per norms.
- Dust collectors will be provided to minimize fugitive emissions and to maintain the emissions within the limits.

4.10.2 Water Environment

- Wastewater generated from the construction sites shall be treated as per industry norms.
- Cooling tower blow down 100 m^3/Day shall be treated in RO Unit. A detailed water balance is given in Annexure –IX.
- Sewage generated from facality shall be treated in the Effluent Treatment Plant (ETP). The treated effluent shall be reused for the purpose of irrigation within and around the plant area for green belt.

4.10.3 Impact on Biological Environment

All precautionary measures shall be adopted to minimize the disturbance to local flora and fauna due to construction and operational activities of the proposed NPK Fertilizer Plant.

4.10.4 Occupational Health Hazards from Noise Pollution

Site workers working near high noise equipment will use personal protective devices to minimise their exposure to high noise levels. Good working practices will be implemented to reduce noise.

4.10.5 Waste Generation and Management

The site would develop and adopt proper system for the management, storage and disposal of the hazardous and non-hazardous waste, including measures such as:

- Solid waste consisting of recyclable waste and non recyclable generated from construction activities, shall be segregated in appropriate bins and shall be disposed off.
- Solid waste including domestic waste (from kitchen, gallery, laundries etc), combustible and recyclable waste generated shall be collected, segregated and stored in specified containers and shall be transferred for its proper disposal.
- Hazardous waste such as waste lube/system oil from machinery, used oil from D.G set (in case of operation); lead acid cells and oil filters are likely to be generated. The waste shall be handled as per Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules, 2008. The waste will be carefully stored in drums and transported to MoEF approved recyclers for its final disposal. All precautions will be taken to avoid spillage from the storage.

Table 4.10: Potential Environmental Impacts of Proposed Project activity (With Mitigation Measures)

Environmental Sensitivities	Nature of Likely Impacts											Impact Significance			
	Low Intensity	Moderate Intensity	High Intensity	Local	Moderate Spread	Regional	Short term	Moderate Term	Long	Adverse	Beneficial	Insignifica	Short term	Moderate	Long
Air Quality	√				√			√		√			√		
Noise	√				√			√		√			√		
Water Quality	√			√			√			√		√			
Land Environment	√			√			√			√		√			
Flora	√			√			√			√		√			

Environmental Sensitivities	Nature of Likely Impacts											Impact Significance			
Fauna	√			√			√			√		√			
Local fish population	√			√			√			√		√			
Local Economy		√			√			√	√		√				

Note: For colour coding refer Table 4.8.

5

ENVIRONMENTAL MONITORING PROGRAMME

5 ENVIRONMENTAL MONITORING PROGRAMME

5.1 Environmental Monitoring Plan

An environmental monitoring plan provides a delivery mechanism to address the adverse environmental impacts of a project during its execution, to enhance project benefits, and to introduce standards of good practice to be adopted. An environmental monitoring plan is important as it provides useful information and helps to:

- Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures.
- Define the responsibilities of the project proponents, contractors and environmental monitors and provides means of effective communication of environmental issues among them.
- Define monitoring mechanism and identify monitoring parameters.
- Evaluate the performance and effectiveness of mitigation measures proposed in the Environment Management Plan (EMP) and suggest improvements in management plan, if required.

From the monitoring point of view, the important parameters are water quality, air, noise, flora and fauna. The suggested monitoring details are outlined in the following sections.

5.2 Ambient Air Quality Monitoring

Construction Phase:

- Monitoring of air quality (PM_{10}, $PM_{2.5}$, SO_2 and NO_x) will be carried out for three seasons in a year.

Operation Phase:

- Monitoring of air quality (PM_{10}, $PM_{2.5}$, SO_2, NH_3, CO, VOC and NO_x) will be carried out on monthly basis.

5.3 Noise Monitoring

Construction Phase:

- General noise monitoring should be carried out once in a week.

Operation Phase:

- Monthly noise monitoring during operation of machineries.

5.4 Water Quality Monitoring

Construction Phase:

- Physico-chemical characteristics of the nearby surface water body (Kasardi river and Rainwater reservoir) will be monitored.
- The effluent from effluent treatment plant will be monitored.
- All the analysis will be carried out as per CPCB guidelines.

Operation Phase:

- Physico-chemical characteristics of the nearby surface water body (Kasardi river and Rainwater reservoir) and ground water will be monitored.
- The effluent from sewage treatment plant and effluent treatment plant will be monitored once in a month.
- All the analysis will be carried out as per CPCB guidelines.

5.5 Ecology

An inventory of the endangered/vulnerable flora and fauna species (like Blue Mormon-butterfly, Uropeltidae-snake, Nilgiri Wood Pigeon etc.) with respect to their population within 2 km of the project site will be made and updated annually.

5.6 Occupational Health

The health of the employees who will be working in the unit will be monitored through general periodical check up and also for respiratory ailments.

A summary of the Environmental Monitoring Plan for construction and operation phase is given in **Table 5.1 and 5.2** below:

Table 5.1: Environmental Monitoring (Construction Phase)

Parameter	Parameters	Frequency	Location
Air	PM_{10}, $PM_{2.5}$, SO_2 and NO_x	Thrice a year	At major construction sites (total 3 stations)
Noise	Equivalent noise level	Once in a week	At major construction site and near generator set
Water	Parameters as per CPCB standards	Monthly	Storm water drainage system, raw water from CETP within DFPCL, treated and untreated waste water.
Effluent from ETP	pH, BOD, COD, TSS, TDS	Monthly	Inlet and outlet of ETP

Table 5.2: Environmental Monitoring (Operation Phase)

Item	Parameters	Frequency	Location
Air	PM_{10}, $PM_{2.5}$, SO_2 , NH_3, CO, VOC and NO_x	Monthly	Stack, generator set, three locations within 100 – 200 m of the project site, two locations within the plant near the production units, storage area for the raw material and fertilizer, packaging area for fertilizer.
Noise	Equivalent noise level	Weekly	Generator set, three locations within 100 – 200 m of the project site, two locations within the plant near the production units, storage area for the raw material and fertilizer, packaging area for fertilizer.
Water	Parameters as per CPCB standards	Thrice a year	Storm water drainage system, raw water from CETP within DFPCL, treated and untreated waste water.
ETP	Parameters as per CPCB standards	Monthly	Before and after treatment from ETP
Soil	pH, moisture content, texture, organic matter, chloride, SAR, CEC, nitrogen, phosphorous, fluoride, sulphur	Once in a year	Three locations around the project site within 200 m distance from the unit.
Ecology	Inventory	Once in a year	Within 2 km of the project site
Occupational Health	General and respiratory ailments check up	Once in a year	-

5.7 Budget

The monitoring and evaluation process will require additional and at times, extensive surveys and primary data collection, either to establish a base line or to measure changes. In order to respond to evolving management needs, a contingency budget will be required-especially where response will require capital works. **Table 5.3** and **5.4** gives the details about the budget required for environmental monitoring plan during construction and operation phases.

Table 5.3: Budget for Environmental Monitoring during Construction Phase

Attribute	Location & frequency	Parameters	Monitoring cost per year in Rs. (A)	Total cost in Rs. (A x)
Air	At major construction sites (Total 3 stations)	PM_{10}, $PM_{2.5}$, SO_2, NO_x and NH_3	samples @ Rs 7600 = / -	Rs.6 Lakhs
Noise	At major construction site and near generator set	Equivalent noise level	In house facility will be used	
Water	Storm water drainage system, raw water from CETP within DFPCL, treated and untreated waste water.	Parameters as per CPCB standards	In house facility will be used	
ETP	Inlet and outlet of ETP	pH, BOD, COD, TSS, TDS	In house facility will be used	
Total Cost				**Rs.6Lakhs**

Table 5.4: Budget for Environmental Monitoring during Operation Phase

Attribute	Location & frequency	Parameters	Monitoring cost per year in Rs.	Total Cost in Rs.
Air	Stack, generator set, three locations within 100 – 200 m of the project site, two locations within the plant near the production units, storage area for the raw material and fertilizer, packaging area for fertilizer.	PM_{10}, $PM_{2.5}$, SO_2 , HC, NHC, NH_3, CO, VOC and NO_x	Rs.12.0 Lakhs	Rs.12.0 Lakhs
Noise	Generator set, three locations within 100 – 200 m of the project site, two locations within the plant near the production units, storage area for the raw material and fertilizer, packaging area for fertilizer.	Equivalent noise level	In house facility will be used	
Water	Storm water drainage system, raw water from CETP within DFPCL,	Parameters as per CPCB standards	In house facility will be used	

Attribute	Location & frequency	Parameters	Monitoring cost per year in Rs.	Total Cost in Rs.
	treated and untreated waste water.			
ETP	Before and after treatment from ETP	Parameters as per CPCB standards	In house facility will be used	
Soil	Three locations around the project site within 200 m distance from the unit.	pH, moisture content, texture, organic matter, chloride, SAR, CEC, nitrogen, phosphorous, fluoride, sulphur	In house facility will be used	
Ecology	Within 2 km of the project site	Inventory	Rs.2.0Lakhs	Rs.2.0Lakhs
Occupational Health	-	General and respiratory ailments check up	In house facility will be used	
Total Cost				**Rs.14.0 Lakhs**

A total amount of **INR 200 lakhs** is allotted for the compliance monitoring of environmental quality during construction phase and operational phase which will be met from the revenue budget.

6

ADDITIONAL STUDIES

6 ADDITIONAL STUDIES

6.1 Introduction

Deepak Fertilisers and Petrochemicals Corporation Ltd. (DFPCL) had proposed to expand its existing NPK Manufacturing Unit located at Maharashtra Industrial Development Corporation Corporation (MIDC) Industrial Area, Taloja, District Raigad, Maharashtra.

Four raw materials in liquid state, namely Ammonia, Phosphoric Acid, Sulphuric Acid and Ammonium Nitrate Solution have been proposed to be used for the manufacturing of NPK fertilizer. Out of which, Ammonium Nitrate will not be stored for the proposed project, but will be utilized directly from Ammonium Nitrate manufacturing unit of the DFPCL located within the same premises. Hazard identification and risk assessment has been carried out for the chemicals proposed to be stored. Safety measures for storage and handling of these chemicals have also been proposed in this chapter.

6.2 Objectives & Methodology of the Risk Analysis Study

A three 'LEVEL' risk assessment approach has been adopted. The brief outline of the three tier approach is given below:

- **Level 1 – Risk Screening**

  This is top-down review of worst- case potential hazards/risks, aimed primarily at storage of chemicals, which pose the highest risk. The Material Safety Data Sheets (MSDS) of the chemicals were reviewed to identify the potential hazards posed by the chemicals.Various screening factors considered include:

  - Inventory of hazardous materials;
  - Hazardous properties;
  - Storage capacity;

- **Level 2 – Risk Scenario Identification**

  After identification of potential hazards, different risk scenarios were delineated for each of the chemicals based on the nature of hazard.

- **Level 3 – Quantitative Risk Assessment**

  ALOHA 5.4.3 version software was used for the risk assessment of the liquid raw materials, which will be stored at the premises. Risk assessment was carried out for each of the risk scenarios identified for the chemicals in case of leakages from the storage tanks. Worst possible scenarios were taken into account for the risk analysis.

6.3 Hazards Classification

The hazard classification has been carried out based on the data provided in MSDS data sheets and as per the classification MSHIC Rules, 1986 and its amendments thereof. The hazard classification is given in **Table 6.1.**

Table 6.1: Potential Hazard Classification and Analysis of Chemicals to be Used in the Proposed Expansion Unit

Sl. No.	Hazardous Material	Quantity to be Stored (T)	Potential Hazards	Hazard Classification as per Part I, Schedule I, MSHIC Rules, 1986 and its amendments thereof
1	Ammonia		**Fire Hazard:** Forms flammable mixture with air. **Explosion Hazard:** Forms explosive mixture with air and highly reactive with other substances, especially metals to form violently explosive substances. **Health Hazard:** Strongly irritant to skin, eyes and respiratory system. Inhalation of high concentration causes suffocation, burning of the tract and may be fatal.	-
2	Sulphuric Acid		**Fire Hazard:** Contact with combustible materials may cause fire. Highly reactive. Contact with many organic and inorganic chemicals may cause fire or explosion. Contact with metals liberates flammable hydrogen gas. **Health Hazard:** Highly corrosive and toxic. Strong sulphuric acid mist is carcinogenic. **Reactivity:** Highly reactive with water, metals, excess heat, combustible materials, organic materials, oxidizers, amines, bases.	Extremely Toxic (Inhalation Toxicity - 0.320 mg/l)
3	Phosphoric Acid		**Fire hazard:** Reacts with most metals to produce flammable/explosive hydrogen gas. Reacts violently with strong caustics, sodium tetrahydroborate metals, fluorides, halogenated organics, cyanides, sulphides, mercaptans, nitrides, metal phosphides, acetylides, silicides, carbides. Potentially dangerous reactions with strong oxidizing agents, reducing agents, organic peroxides. Azo compounds, epoxides, aldehydes and other polymerizable compounds can polymerize violently with phosphoric	Extremely Toxic (Inhalation Toxicity - 0.026 mg/l)

Sl. No.	Hazardous Material	Quantity to be Stored (T)	Potential Hazards	Hazard Classification as per Part I, Schedule I, MSHIC Rules, 1986 and its amendments thereof
			acid. Forms detonable mixture with nitromethane. **Explosion Hazard:** Containers may explode when heated. **Health Hazard:** If heated, releases toxic vapours. Mists may cause irritation of the eyes, nose and respiratory tract. May cause increased pulmonary resistance and transient cough. Severe overexposure can cause pulmonary edema which may be fatal. Symptoms (shortness of breath, cyanosis) may appear several hours after exposure. Concentrated solutions may cause pain and severe burns to the skin. Concentrated solutions cause immediate pain, severe burns and permanent corneal damage which may result in blindness.	

6.4 Risk Scenarios

Based on the identified potential hazards of the chemicals, different scenarios were delineated as given in **Table 6.2.**

Table 6.2: Identified Risk Scenarios

Chemical	Scenario No.	Identified Potential Risk Scenarios
Ammonia	Scenario-1.	Leaking tank, chemical is not burning and forms evaporating puddle.
	Scenario-2.	Leaking tank, chemical is burning and forms a pool fire.
	Scenario-3.	Tank explodes.
Sulphuric Acid	Scenario-1	Leaking tank, chemical is not burning and forms an evaporating puddle.
Phosphoric Acid	Scenario-1	Leaking tank, chemical is not burning and forms an evaporating puddle.

6.5 Risk Assessment

After the identification of hazards and likely scenarios, risk assessment was carried out for each of the scenario using the ALOHA software. The dimension of the tank taken into

account for modelling is tabulated in **Table 6.3.** The modelling was carried out for the study period only, i.e. the climatological data taken into account were for the study period. ALOHA models key hazards- toxicity, flammability, thermal radiation (heat), and overpressure (explosion blast force) - related to chemical releases that result in toxic gas dispersions, fires, and/ or explosions.

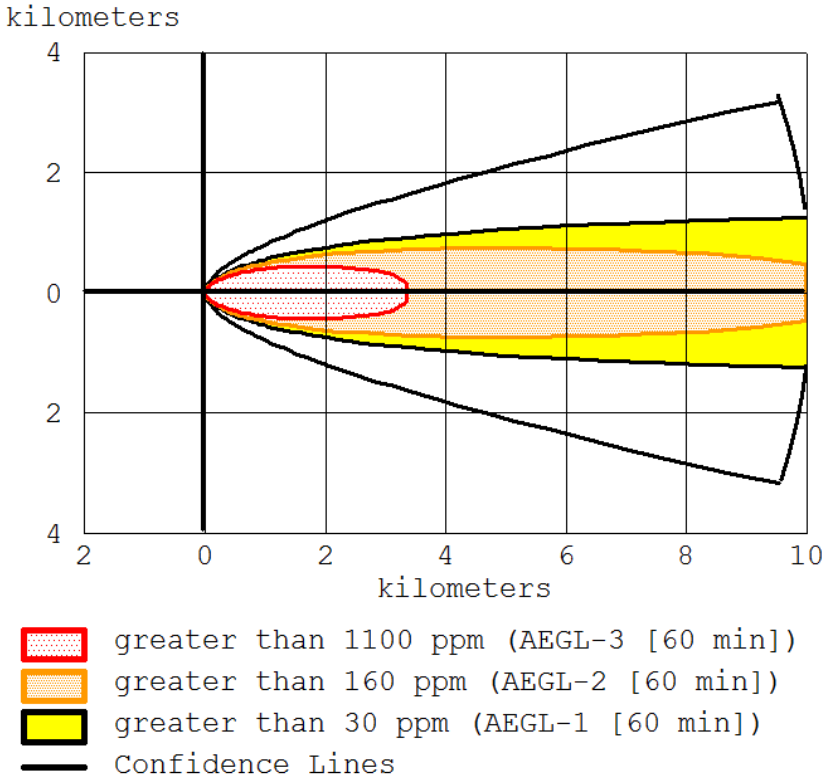
Table 6.3: Details about the Storage Tank Capacity and Dimension

Chemical	Storage Tank Capacity (MT)	Quantity to be Stored (MT)	Dimension
Ammonia	18,000	15,000	22.5 m height and 39.5 m diameter
Ammonia	3,000	2,500	14.5 m height and 20.0 m diameter
Phosphoric Acid	2,200	1,500	11.0 m height and 16.0 m diameter
Sulphuric Acid	700	600	9.0 m height and 7.5 m diameter

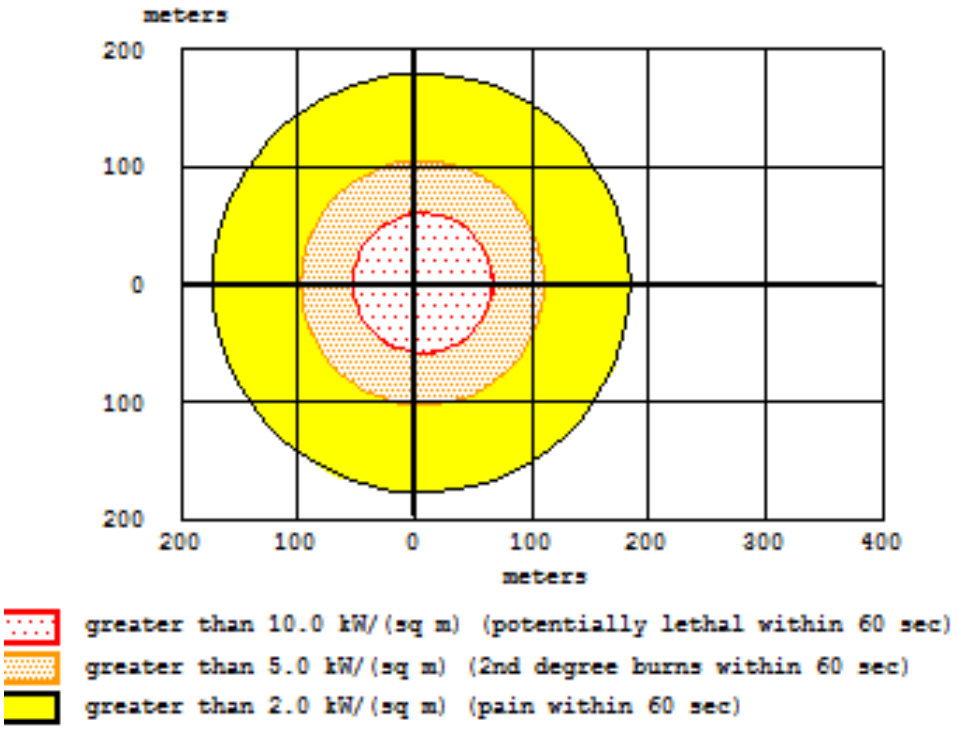
6.5.1 Modelling Output

The modelling output for the identified potential risk scenarios for each of the chemical is given below.

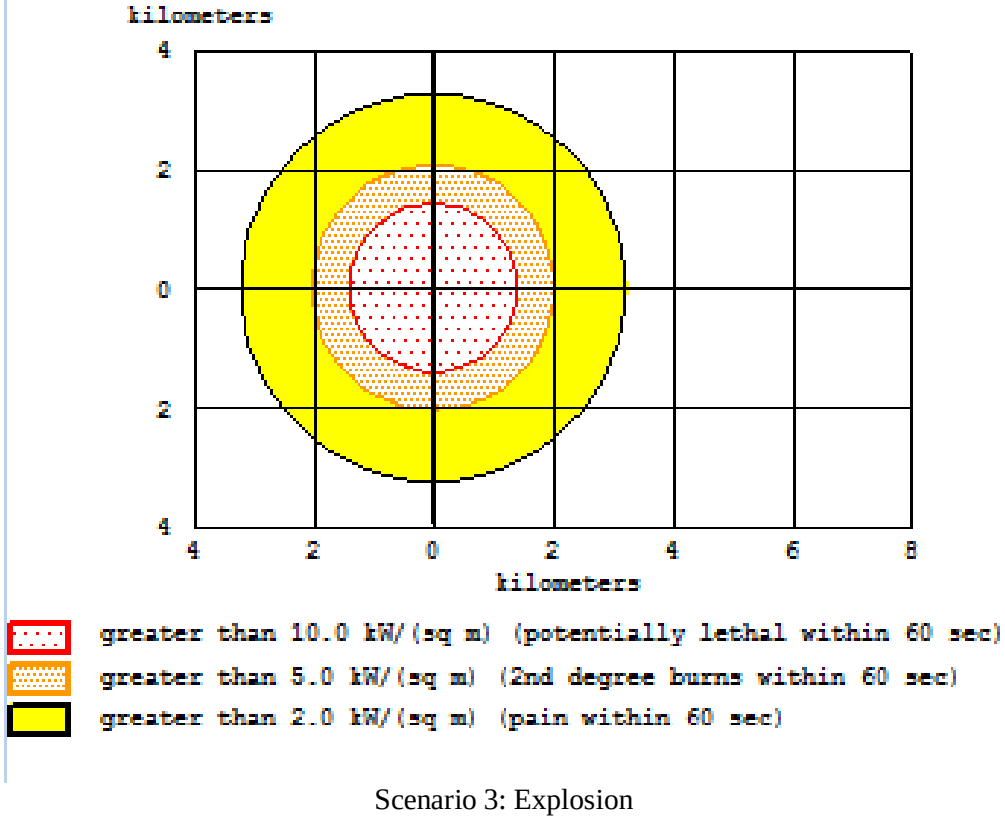
Modelling Output for Ammonia (18,000 MT Capacity Tank)



Scenario 1: Evaporating Puddle

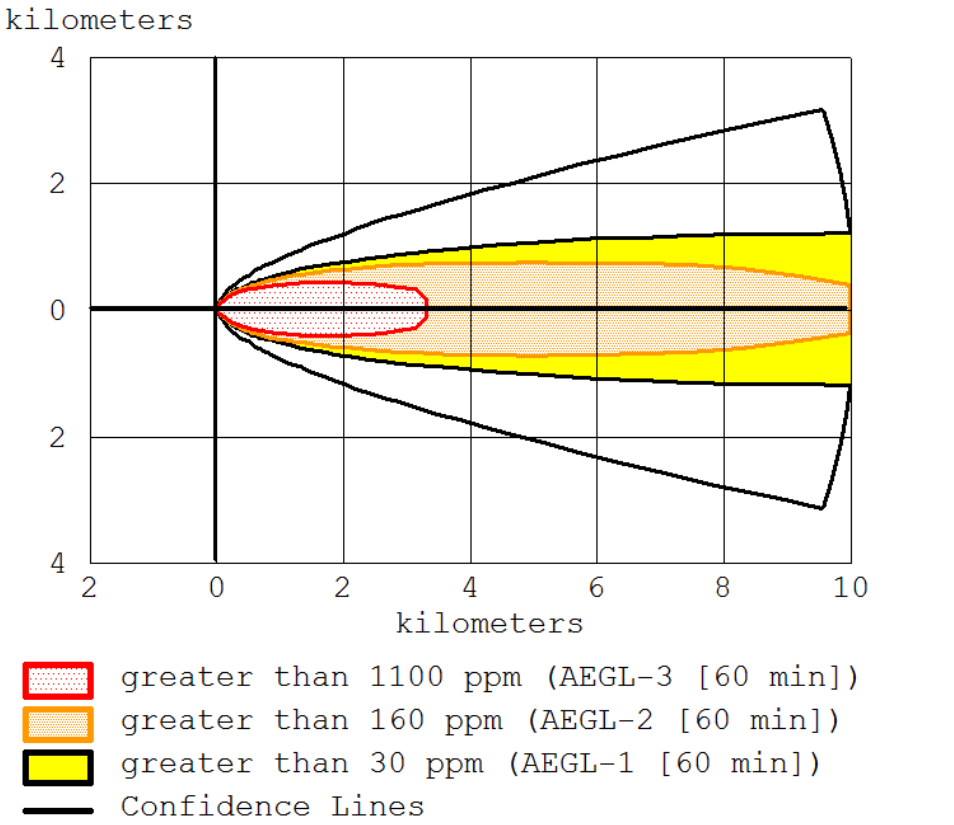


Scenario 2: Pool Fire

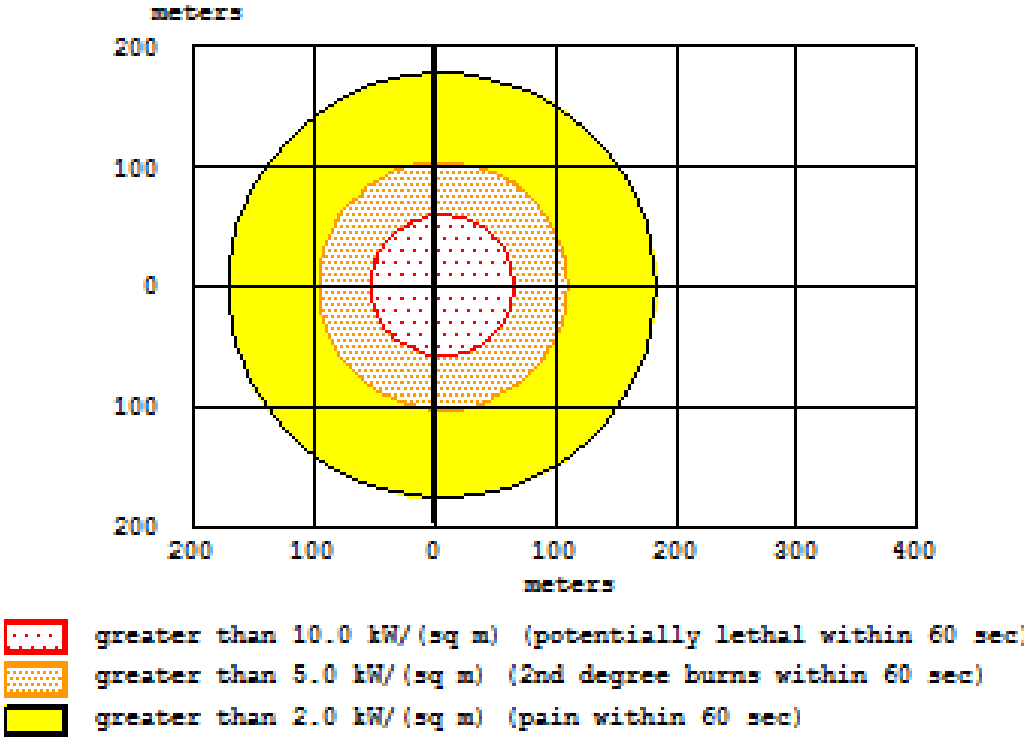


Scenario 3: Explosion

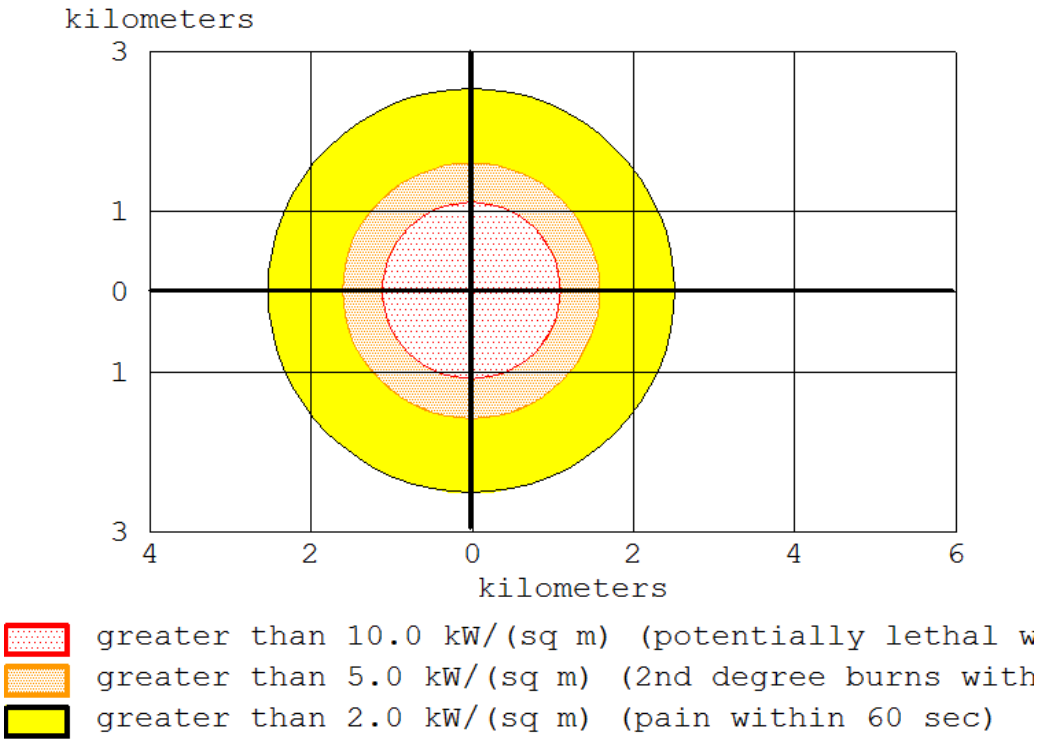
Modelling Output for Ammonia (3,000 MT Capacity Tank)



Scenario 1: Evaporating Puddle

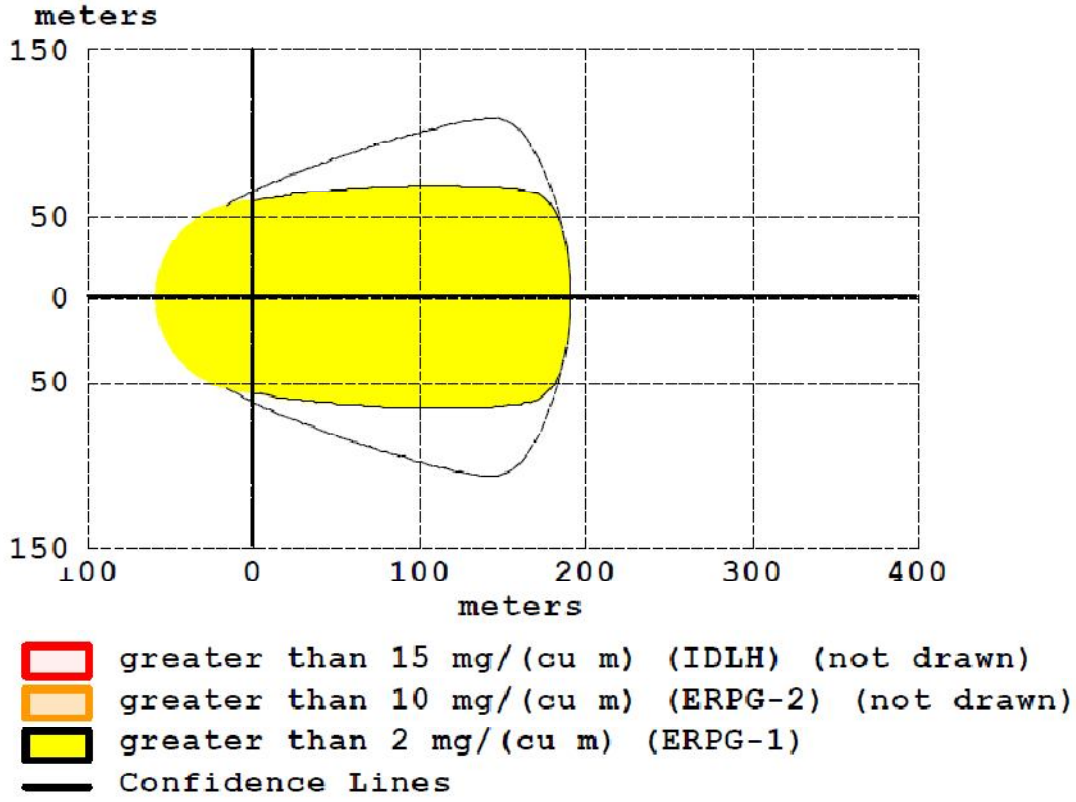


Scenario 2: Pool Fire



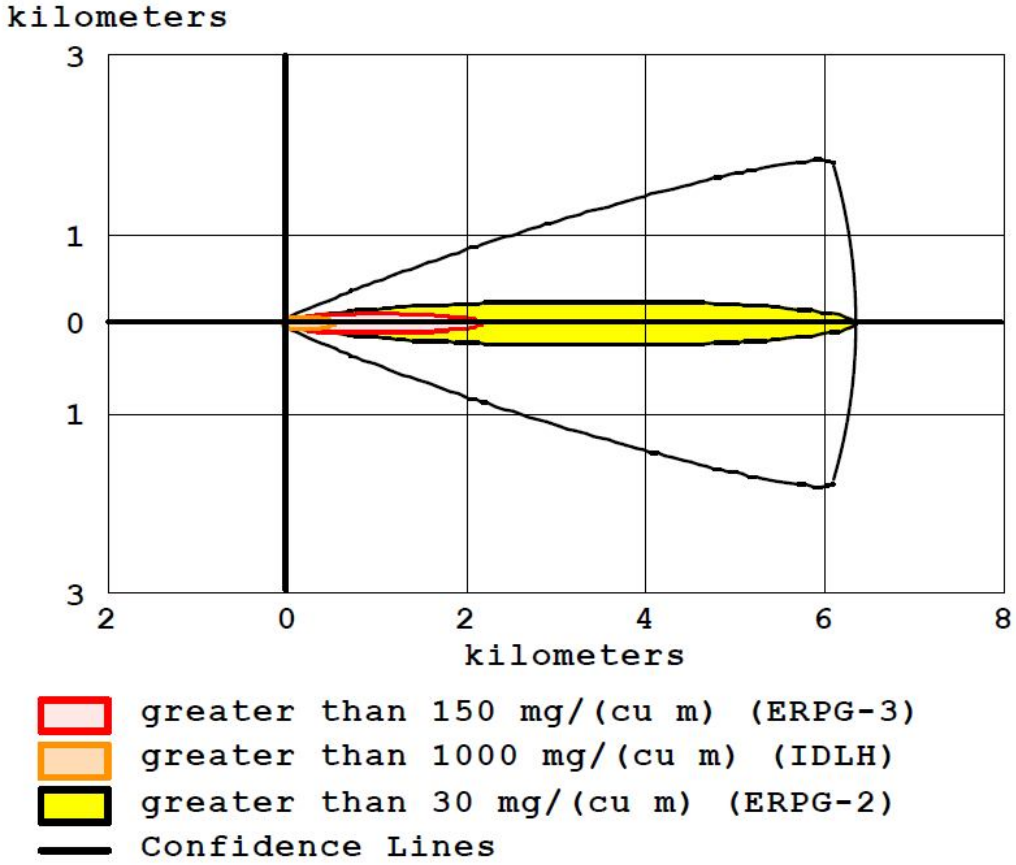
Scenario 3: Explosion

Modelling Output for Sulphuric Acid



Scenario 1: Evaporating Puddle

Modelling Output for Phosphoric Acid



Scenario 1: Evaporating Puddle

6.5.2 Interpretation of the Modelling Output

Around three threat zones have been plotted in the modelling output i.e. Red, Orange and Yellow, representing areas of decreasing hazard. The range for these threat zones is based on the AEGLs (Acute Exposure Guideline Levels) and ERPGs (Emergency Response Planning Guidelines), which are used default by the ALOHA software. The threat zone values and the distance of the threat zone from the storage tank (in the downwind direction) is tabulated in **Table 6.4.**

It can be inferred from the table, that in case of formation of evaporating puddle or explosion of Ammonia storage tanks, the red zone, which is the high hazard zone will fall outside the project area, on the nearby agricultural field. Whereas in case of Sulphuric acid storage the evaporating puddle in case of leakage will be within the project area. Similar to Ammonia, evaporating puddle of Phosphoric acid will fall on the nearby agricultural field.

Table 6.4: Threat Zone Levels and its Distance from the Storage Tank

Chemical	Scenario No.	Threat Zone Level	Distance from the Storage Tank (Downwind direction) in m	Remarks
Ammonia (18,000 MT Capacity Storage Tank)	Scenario-1	Red: > 1100 ppm (60 min)	3,400	Outside the project area.
		Orange: > 160 ppm (60 min)	>10,000	

Chemical	Scenario No.	Threat Zone Level	Distance from the Storage Tank (Downwind direction) in m	Remarks
		Yellow: > 30 ppm (60 min)	>10,000	
	Scenario-2	Red: > 10 kW/m^2 (potentially lethal within 60 sec)	68	Within project area.
		Orange: > 5 kW/m^2 (2nd degree burn within 60 sec)	112	
		Yellow: > 2 kW/m^2 (pain within 60 sec)	186	
	Scenario-3	Red: > 10 kW/m^2 (potentially lethal within 60 sec)	1,400	Outside the project area.
		Orange: > 5 kW/m^2 (2nd degree burn within 60 sec)	2,000	
		Yellow: > 2 kW/m^2 (pain within 60 sec)	3,200	
Ammonia (3,000 MT Capacity Storage Tank)	Scenario-1	Red: > 1100 ppm (60 min)	3,300	Outside the project area.
		Orange: > 160 ppm (60 min)	>10,000	
		Yellow: > 530 ppm (60 min)	>10,000	
	Scenario-2	Red: > 10 kW/m^2 (potentially lethal within 60 sec)	67	Within the project area.
		Orange: > 5 kW/m^2 (2nd degree burn within 60 sec)	111	
		Yellow: > 2 kW/m^2 (pain within 60 sec)	184	
	Scenario-3	Red: > 10 kW/m^2 (potentially lethal within 60 sec)	1,100	Outside the project area
		Orange: > 5 kW/m^2 (2nd degree burn within 60 sec)	1,600	
		Yellow: > 2 kW/m^2 (pain within 60 sec)	2,500	
Sulphuric Acid	Scenario-1	Red:		Within project area.
		Orange:		
		Yellow: 2 mg/m^3	191	
Phosphoric Acid	Scenario-1	Red: 150 mg/m^3 (60 min)	2,200	Outside the project area.
		Orange:	-	
		Yellow: 30 mg/m^3	6,300	

6.6 Safety Measures for Storage of Hazardous Chemicals

The existing unit has well developed emergency management plan, which will be also extended to the proposed project as well. Regular mock drills are being conducted to create awareness among the employees about possible hazards and to train them on the way to react during an emergency situation. The onsite emergency plan is annexed in **Annexure V.** The safety measures with respect to the identified hazard and assessed risk are given in the following sections.

6.6.1 Fire and Explosion Hazard

Ammonia poses fire and explosion hazard. It must be stored in the designated explosive/inflammable storage area.

The following measures should be adopted, while the storage of the above mentioned chemicals:

- Fire alarm system must be installed and regulation inspection of the same should be carried out.
- The storage tank must have safety valve to release any kind of pressure built up within the tank.
- The tank must be jacketed.
- Periodical checking of the containers must be carried out to identify any leakage.
- The storage tank must be closed to avoid evaporation of the ammonia and ignition of the same.
- The area must be cordoned off as No Smoking Area and absolutely no source of iginition must be present in and around the storage area.
- Small spills must be cleaned immediately.
- Good housekeeping practices must be followed.
- No combustible materials must be kept in the storage area.

6.6.2 Toxic and Reactive Hazard

Phosphoric acid and Sulphuric acid are highly toxic and corrosive in nature. Hence, additional precautionary measures as given below must be taken to avoid any adverse impact on the health of the employee:

- All employees handling the chemicals must wear rubber gloves, safety google, safety shoes, and adequately covered dress (to avoid dermal toxicity).
- The nature of toxicity must be labelled on the tanks.

- Supervior must conduct regular inspection to check the usage of PPEs by the employees handling the toxic chemicals.
- First aid training to employees.

The storage tanks must have the following:

- Rubber lining to avoid corrosivity of the storage tanks.
- Safety valve to avoid accumulation of gas (especially hydrogen gas) in the storage tanks.

6.7 Safety Measures for Handling/Storage of Other Hazardous Chemicals

6.7.1 Ammonium Nitrate

Ammonium Nitrate being categorised as "Explosive" and security risks; safety precautions/ recommendations for handling of the same are given below:

- Provision of flame detectors/ thermal sensorsat strategic locations in the transfer area.
- Portable water fire extinguishers or fire hose reels are to be kept in and around the transfer/ handling area.
- Do not use organic materials such as sawdust as an aid to cleaning floors.
- Employees need to be trained and practised in the actions to take in a fire. This includes using portable fire-fighting equipment to tackle any fire in its early stages.
- To enable employees to deal with such incidents, they need to receive specific training to ensure that they do not put themselves at risk of breathing fumes from decomposing ammonium nitrate.
- The effects of the inhalation of these fumes may be delayed so if anyone has, or is suspected of having, inhaled such fumes, remove them to a safe shaded area where they should be kept warm and rested, ideally lying down. Seek immediate medical help.
- Keep walls, floors and equipment clean.
- Do not allow pallets, ropes, covers, or other equipment to become impregnated with ammonium nitrate.

7

PROJECT BENEFITS

7 PROJECT BENEFITS

7.1 INTRODUCTION

The proposed project site will be constructed by unlocking the existing AN bagged storage area and hence, the Resettlement & Rehabilitation Action Plan is not required for the proposed project. The DFPCL Complex is already developed. 33% of greenbelt as specified in Consent to Operate and meeting development rules of MIDC.

7.2 ACCRUALS TO THE EXCHEQUER

This project will contribute additional revenue to the Central Exchequer in the form of excise duty. It will also bring to the State Exchequer additional money by way of royalty etc.

7.3 GREEN BELT DEVELOPMENT

Company will carry out plantation in 33% of the plot area and 600 saplings will be planted in next three years.

7.4 CORPORATE SOCIAL RESPONSIBILITY (CSR)

For over three decades, Deepak Fertilizers has been Enriching, Nourishing and empowering millions of lives by effectively addressing issues that plague our society. Through Ishanya Foundation (Pune & Taloja) and through Deepak Foundation (Vadodara), DFPCL constantly strive to create self-sufficient and self-reliant communities. DFPCL maintains an unwavering, commitment towards improving society and remains sensitive corporate citizen.

Vision:

Act as catalyst to create self-reliant society of youth, women and marginal farmers, having secured livelihood, wherever DFPCL's presence exists.

Mission:

- Select and Conduct courses in vocational skills development and give an edge for employability for economically weaker sections.
- Develop youth, women and marginal farmers to take up social business and to augment family income.
- Extend facilities for preventive health care.
- Undertake Research activities in options for social entrepreneurship.

Following are some of the activities undertaken by DFPCL in various areas to help society in Taloja, Pune & Gujarat.

Livelihood Programmes:

Various vocational training is given to aspirants. Details of programs conducted during last 3 years are described in **Table 7.1 and Photo plate 7.1 &7.2**.

Table 7.1: Details of Livelihood Programs Conducted in last three years

S.No.	Name of the Livelihood Programs conducted	No. of Batches	Completed training	Placement	Self Employment
1.	Professional Beautician Practice, Art of Mehendi Three and a half months + 15 days internship	16	315	182	133
2.	Housekeeping * Duration: 10 days	3	37	32	-
4.	Retail Operations Duration: One month to two weeks	5	80	59	-
5.	Soft skills to enhance employability at CCD for boys * Duration: One Month	1	15	-	-
6.	Security Guard Course Duration: 10 days	8	137	125	-
7.	Four Wheeler Driving Course* Duration: 2months	1	3	-	-
8.	Customer Care Associate * Duration:10 days	1	12	09	-
9.	Patient Care Course/Ward Assistant Course * Duration: 6 months	4	46	41	-
10.	Diploma in Computer Applications, Business Accounting & Multilingual DTP* Duration: One year	3	27	22	
11.	Tailoring Course Need Based	18	256	02	252
12.	Diploma in Information Technology-IT	1	13 (will complete in April)		
13	Home Assistant Course	1	15		

S.No.	Name of the Livelihood Programs conducted	No. of Batches	Completed training	Placement	Self Employment
14	Entrepreneurship Program	1	02		02
15	Diploma in Teachers Art and Craft Program	1	03	03	-
	Total	64	961	475	387

Photo Plate 7.1: Certificate Course in "IT" being conducted at Anjuman Polytechnic.

Photo plate 7.2: Home Assistant Course in Progress at IsFon.

Glimpses of Success Stories:

- Ms Archana More who completed the Diploma in Computer Applications is working with Future Vision and earning a salary of Rs 7000/- per month.
- Ms Rubeena Patel who completed "Certificate course in IT " is working with Career Vision and drawing salary of Rs 8000/- per month
- Ms Shaheen Arab who pursued Cutting and Tailoring course is earning Rs 6000/-per month at Splendeur Haute Coutons.
- Ms Shraddha, Jaya and Swati who completed the beautician course are working with Rashmi's Chalet earning a salary of Rs 7000/- per month.
- Ms Jignyasa who is doing the Pre school Art and Craft teacher's training is employed at Zensar Technology as English teacher earning a salary of Rs 10,000 per month.
- Ms Sunita and Ms Neeta supported with Beauty Kits have started their own parlor and earning approx. Rs 4000 per month

Muskaan Project:

Deepak fertilizers launched this project in March 2011 to help women earn a secondary source of income. Pre-owned clothes donated by Brand Ambassadors sold to over 10,000 underprivileged at fixed affordable prices. 28 Ambassadors donate upto 500 garments once in a year. 'Muskaan Parees' sell these pre-owned garments and gets the share of the profit as income. Foundation facilitates between Ambassadors and Paris. Average income of a Muskaan Paree is close to Rs. 3000 per month. Muskaan Store-on-Wheels is also launched on 8th March 2012 and has completed its First anniversary to reach off to far of areas.

Summary of this project so far:

- Total Garments Received = 16,332
- Total Garments Sold = 6,398
- Total Sale of Garments = Rs 2,24,484
- Earning of Muskaan Parees = 1,17,408

Photo plate 7.3: Muskaan Store on Wheels at Vishrantwadi Basti

Kawant Livelihood Project (KALP):

Since 2008, DFPCL has been working to help the most undeveloped remote tribal block of Gujarat to earn its living. Over 11,000 farmers benefited through the various livelihood activities of agriculture and horticulture promotion, dairy, irrigation and watershed skill development.

Skilling Rural India (SRI):

SRI is a project, which the Foundation has undertaken in collaboration with Dr. Reddy's (DRF). The project is funded and monitored by Ishanya Foundation. DRF mobilizes aspirants, training them on soft skills training and referring them to the employers and arrange on the job training 99 young girls and boys have completed training and are employed at various organizations. They are earning an average income of Rs. 5,000 to Rs. 8000 per month and a few are earning in the range of Rs. 9000 to Rs. 12,000 per month.

Fodder and Cow Breeding as a Secondary Source of Income:

- 25 women from marginal farmers' family have received the donation of cows (HF) with calves.
- Training was given in Fodder management, health and hygiene in cow breeding, resulting in average income of Rs. 3,500 per month by sale of milk.

Photo plates 7.4 and 7.5 shows the Fodder & Cow breeding activities.

Photo plate 7.4: Tarabai Waskar with HF cow and calf from the Pale village

Photo Plate 7.5: Mrs Janabai Nirguda of Karmeli village seen with the HF cow-calf , trough and the cow shed

Income generation programme – Gifting Articles (IGP):

The IGP programme by Ishanya Foundation is now sustainable in which 8 groups consisting of approx. 10 persons in each group were formed. The programme for up-gradation of existing skills in gifting articles was conducted IsFon IGP (**Photo Plate 7.6**) has reached its sustainability.

8 groups consisting of approx. 10 in each group

Upgradation of existing skills in gifting articles was conducted by Anjuman Polytechnic.

The gifting articles is now customized.

Income Rs 3000-4000 per month.

Photo plate 7.6: IsFon –IGP Gifting Articles.

Photo Plate 7.7: Navdekar family ready for the sale of Cucumber in the market.

Horticulture Development Program

IsFon has adopted the "Wadi Model" developed by BAIF

62 women from Marginal Farmers family from the villages of Chindran, Karmeli, Wangni, Morbe, Wavanje, Shirawli and Nitlas are the beneficiaries. Each of the 62 women beneficiary have been given 60 saplings of `Kesar`variety of Mango & 50 saplings of Drumsticks. The inter crop vegetables grown are –Bitter Gourd, Butter Gourd, Cucumber, Cluster Beans have been already harvested and sold by them in the market (**Photo Plate: 7.7**)and they are earning Rs 8000/- per month.

Environmental Initiatives

Dupatta Campaign

- More than 20,000 cloth bags are being stitched every year from dupattas, bedsheets, curtains and other cloth materials including the pre-owned garments.
- The bags are distributed to the Vegetable Sellers, Fruit Hawkers and given to the NGOs who are making products.
- More than 50 financially challenged women are earning an income by stitching cloth bags **(Photo Plate: 7.8)**

Health Initiatives

Every year various programmes are conducted in surrounding villages to guide and help villagers in health matters **(Photo Plate: 7.9)**

Last Year:Three Cataract Detection Camps were conducted in Pale Khurd, Wakadi and Dundre villages. 512 people were screened at the camp. 49 patients were operated for cataract and 69 patients were given spectacles for refraction error correction. 650 children of Wavanje High School were screened for Eye Ailments. 62 children diagnosed with Cataract/Low vision and other deformities were further referred to LCT

Photo plate 7.8: Dupatta Campaign

Photo Plate 7.9: Cataract Detection Camp at Chindran-Taloja

Company also helps needy persons requiring financial support for health treatment. One such example is Renuka who went kidney transplant. She is now recommended with higher education in "Diploma in Computer Application" sponsored by DFPCL **(Photo Plate: 7.10)**

Photo plate 7.10: Ms Renuka Bhandari undergoing the Diploma Course in Computer Applications at Anjuman Polytechnic

DFPCL has also undertaken –

A) Safe Motherhood and Child Survival Project:

This Public-Private Partnership, today focuses on strengthening the public health delivery channel in the tribal areas of Vadodara district. Through this initiative the maternal mortality rate was reduced successfully by 41% and child mortality by 7%.

B) Nutrition Interventions

The Foundation focuses on creating awareness on maternal anemia, correct breastfeeding, complimentary feeding practices and child under-nutrition. In the past three years 6,987

anemic women have been referred for treatment, 1,752 anemic women received life saving Iron Sucrose injectibles and 400 low birth weight babies were referred to health facilities.

C) Mobile Medical Unit

The Foundation started a Mobile Medical Unit in Kawant block of Vadodara District, in partnership with NRHM, Gujarat. The Mobile Medical Unit visits 40 villages in Kawant, where health facilities are scarce and provides essential healthcare and referral services.

D) Public Health Training Institute:

Public Health Training Institute of Deepak Foundation, along with the Department of Health and Family Welfare, Government of Gujarat, undertook a phased training of Modules 6 & 7 to ASHAs in three blocks of Vadodara district which aimed at strengthening ASHA's in three blocks of Vadodara district which aimed at strengthening ASHA's in three blocks at Vadodara district which aimed at strengthening ASHA's role in in villages as "Healthcare Provider at Grass-root Level". The modules aim at reducing maternal and early infant mortality through home based new born care.

EDUCATION:

Ishanya Foundation's Excellence Award and Scholarship at ITI Panvel

To encourage rural youth to pursue education, Ishanya Foundation instituted the Academic Excellence Award and a unique Scholarship programme in four streams of engineering in partnership with ITI, Panvel – the first such in Maharashtra with ITI **(Photo Plate: 7.11)**

Photo plate 7.11: Award being given to one of the topper during the Awards function

APNA KISAN MALL:

With the motto of supplying good quality seeds, pesticides and other agricultural input to poor tribal farmers at reasonable price, Deepak Foundation initiated "Apna Kisan Malls" in three blocks of Vadodara, viz., Naswadi, Pavijetput and Kawant in which nearly 1,500 farmers

have been enrolled. It has benefitted farmers and helped in increasing production with minimal investment.

BUDGET:

In 2012 – 13 DFPCL's budget for CSR activity was Rs. 1.1 crore which has been increased to Rs. 1.25 crore for year 2013 – 2014.

With various initiatives DFPCL are really committed to promotion of women empowerment, livelihood generation, providing quality healthcare services to the marginalized groups of society. DFPCL is also strongly committed to safeguard the environment.

Products from the proposed plant shall reduce demand-supply gap in overall fertiliser scenario in the country. Proposed plant shall be designed to give different combination of nutrient to crops.

7.5 REDUCTION IN LIQUID EFFLUENT & GASEOUS EMISSIONS

DFPCL presently makes single grade of ANP fertiliser. Present process is based on prilling technology. Present plant generates about 125 m^3/day of liquid effluent and consumes about 350 m^3/day of fresh water.

Proposed plants are based on granulation technology which offers variety of technical benefits such as:

1) Zero liquid effluent
2) Reduction in overall gaseous emissions by using high efficiency scrubbers and bag filters
3) No fresh water required
4) Compact layout

In addition to above, major benefit this process offer is in terms of consumption of reject from water recycle plant.

7.6 REDUCTION IN OVERALL EFFLUENT

In case of RO Unit, reject liquid is always an issue. It requires lot of energy to evaporate reject water. Thus effectively RO - Evaporator unit increases carbon emission. This process allows reject water from RO to be used as process water. DFPCL propose to install RO unit as part of project to recycle some of the present effluent. Reject from RO shall go to pipe reactor section and will be consumed in the process.

At 2000 TPD capacity plant can consume approx. 400 to 450 m^3/day effluent generated by other plant (In addition, it will also consume scrubber liquid). This proposed NPK plant will enable DFPCL to reduce overall effluent load considerably.

Reduction in gaseous emission, liquid effluent and fresh water requirement are tabulated below under **Table: 7.2**

Table 7.2: Existing & Proposed Effluent Discharge & Emission Reduction Details.

S. No.	Effluents	Present Process (Prilling)			Proposed Process (Pipe reactor technology)		
	Liquid Effluents :						
1	Effluent from plant	125 m^3/day			Zero		
	Reduction in overall effluent from complex	Not possible as process do not accept recycle water			Reduction in effluent from the complex expected as process can use RO reject. Hence with new process & proposed RO unit DFPCL shall be able to reduce net discharge of the effluent from the complex by 450m^3/day.		
2	Fresh water requirement	350 m^3/day			Zero (As recycle water shall be used)		
3	**Air Emissions :**						
	Pollutant	Present limit as per Act ppm	Off gas flow rate m3/hr	Pollutant qty. Kg/hr	Proposed limit ppm	Approx Gas flow rate m3/hr	Polluted quantity Max.
	Ammonia	< 50	6,80,000	34	< 50	5,60,000	28
	Dust	< 150	6,80,000	102	< 50	5,20,000	28
Note : Thus proposed plant reduces oveall air & water effluents in comparison with old process. New plant also does not require any unoccupied piece of land as plant shall be constructed in place of godowns.							

8

ENVIRONMENTAL MANAGEMENT PLAN

8 ENVIRONMENTAL MANAGEMENT PLAN

8.1 STRUCTURE OF EMP

The purpose of the Environmental Management Plant (EMP) is to minimize the potential environmental impacts from the project and to mitigate the consequences. EMP reflects the commitment of the project management to protect the environment as well as the neighbouring populations. The potential environmental impact envisaged from the project is studied on for the different environmental components.

The management action plan also aims at controlling pollution at the source level to the possible extent with the available and affordable technology followed by treatment measures before they are discharged. Therefore, the additional mitigation measures are recommended in order to synchronize the economic development of the study area with the environmental protection of the region.

Environmental Management Plan (EMP) is the key to ensure a safe and clean environment. The desired results from the environmental mitigation measures proposed in the project may not be obtained without a management plan to assure its proper implementation and function. The EMP envisages the plans for the proper implementation of mitigation measures to reduce the adverse impacts arising out of the project activities. EMP has been prepared addressing the issues like:

- Pollution control/mitigation measures for abatement for the undesirable impacts caused during the construction and operation stages.
- Details of management plans (Landscape plan, storm water management plan, sewage management plan, effluent management plan, hazardous waste management plan etc.).
- Institutional set up identified/recommended for implementation of the EMP.
- Post project environmental monitoring programme to be undertaken (Chapter 5).
- Expenditures for environmental protection measures and budget for EMP.

8.2 PROPOSED ENVIRONMENTAL MITIGATION MEASURES

Preparation of Environmental Management Plan is required for formulation and monitoring of environmental protection measures during construction and operation of proposed plant. The plan should indicate the details as to how various measures proposed to be taken for mitigation of adverse impacts if any from the proposed project.

The following sections describe the Environmental Management Plan for proposed NPK Plant during construction and post construction phases.

Construction Phase

The construction activity includes the handling of the construction material and equipment, vehicular movement etc.

The major culprit during any construction activity is the fugitive emission that is released from the construction activity and the vehicular movement during the construction. Dust control is a major issue during the construction phase along with the waste water generated from the construction and the domestic sewage generated by the construction camp, oil and material spillages during the handling and the transportation of the construction material and the solid waste generated during the construction.

Dust suppression is achieved by spraying water on the unpaved roads and covering the trucks transporting the construction material with tarpaulin or other covers and taking steps to minimize spillages during the transport and the handling of the material.

Noise effect on the nearby habitation during construction activities will be negligible as the nearest habitat is more than 1 km from the plant. However, construction labour would be provided with noise protection devises like ear muffs, and occupational safety ware. It is recommended that all noise generating equipment to be stopped during night timings.

The waste oil generated by construction equipment would be disposed through authorized recyclers and unauthorized dumping of waste oil is prohibited.

Adequate security arrangement should be made to ensure that the local inhabitants and the stray cattle are not exposed to the potential hazards of construction activities.

The details of the impacts resulting due to different activities during construction are tabulated below phases are given in Chapter 5. Based on these mitigation measures, Environmental Management Plan (EMP) is drafted. The environmental mitigation measures for construction phases are briefly listed in **Table 8.1**.

Table 8.1: Proposed Environmental Mitigation Measures

S. No.	Component	Impact	Mitigation Measures
Construction Phase:			
1.	Air	Generation of Dust, CO_2, SO_X, NO_x (Short term for a period of 6 months and Local)	• Covering of construction material with sheets while transportation and storage. • Use of water sprinklers. • Personal Protective equipment for labours. • Project site is inside the existing industrial complex. No impact on general public.
2.	Noise and Vibration	• Increase in the noise levels due to movement of vehicles and construction activities. • Vibration due to movement of vehicles and construction activities. (Short term for a period of 6 months and Local)	• Proper service and maintenance of machines and vehicles to control noise. • Personal protective equipments for labours. • The impact due to vibration will be insignificant. • Project site is inside the existing industrial complex. No impact on general public.

S. No.	Component	Impact	Mitigation Measures
3.	Water	• Water pollution due to disposal of sewage will be curtailed with the existing effluent treatment plant. (Short term, Minor, Local)	• Proper sanitation facilities in the construction site • Treatment of sewage in existing ETP having a capacity of 5040 KLD within DFPCL premises .This is a design capacity for 12000 persons. Presently only 6000 people are using the facility.
4.	Land	• Removal of top soil and change in soil quality. • Soil pollution due to discharge of sewage and solid waste onto land will be curtailed with the existing effluent treatment plant. • No change in Land use pattern as project site is inside the existing industrial complex. (Minor and Local)	• Use of removed soil for landscaping purposes, improving aesthetics. • Sanitation facilities in the construction site as well as labour camps. • Treatment and disposal of sewage and solid waste as per MPCB guidelines.
5.	Biological • Flora • Fauna	• Disturbance due to increase in noise. (Short term, Minor and Local)	• Green belt development.
6.	Socio-Economic	• Employment of construction workers (Direct, Positive)	• People from the study area to be employed as far as possible
7.	Occupational Health and Safety	• Auditory ailment due to noise will be prevented. • Dust emission (Short term, Minor and Local	• The use of personal protective equipments will be made stringent. • Water sprinkling system for dust generating area.
Operation Phase: Project authorities (DFPCL) are planning to implement several measures to curtail pollution to the maximum extent. Environment management at design stage includes all the steps undertaken at the design stage by the project proponents to meet the statutory requirements and towards minimizing environmental impacts. The design basis for all process units will lay special emphasis on measures to minimize effluent generation and emission control at source. The specific control measures related to gaseous emissions, liquid effluent discharges, noise generation, solid waste disposal etc. are described below :			
1.	Air	• Increase in the air pollutant concentration will be addressed using cyclonic Separators and Venturi scrubbers	• Use of cyclonic Separators and Venturi scrubbers to control dust and fugitive emissions within the limits of MPCB regulations • Personal protective equipments

S. No.	Component	Impact	Mitigation Measures
		• Dust generation possibility is minimum as raw materials handled are liquids and product will be bagged in the existing bagging plant (Direct,Local,sustainable)	for labours. • Strict implementation of Hazardous Waste Rules Act 1989, while storage/handling/transportation of hazardous substances. • Regular monitoring of emissions. Provide high efficiency scrubbers.
2.	Noise and Vibration	• Increase in the noise levels will be minimised by using Equipments with noise level below 80db • Vibration during operation of manufacturing unit. (Direct, Minor, Local, sustainable)	• Equipments with noise level below 80db only will be used. • Proper service and maintenance of machines to control noise. • Personal protective equipments for employees like anti vibration gloves and ear plugs. • Project site is inside the existing industrial complex. No impact on general public. • By selecting low noise prone equipment • By isolating the noise prone unit from the working personnel's continuous exposure • By administrative control The administrative control would have a major role to monitor noise, take remedial measures and ensure that no plant personnel are over exposed to noise. • The use of damping material such as thin rubber/lead sheet for wrapping the work places like turbine halls, compressor rooms etc; • Shock absorbing techniques should be adopted to reduce vibration impact; • Efficient flow techniques for noise associated with high fluid velocities and turbulence should be used (like reduction in noise generated by control levels in both gas and liquid systems achieved by reducing system pressure to as low as possible); • All the openings like covers, partitions should be acoustically sealed;

S. No.	Component	Impact	Mitigation Measures
			• Inlet and outlet mufflers should be provided which are easy to design and construct; • Ear plugs will be provided to workmen working near high noise generating sources; • Noise levels should be reduced by the use of absorbing material on roof walls and floors; • Provision of separate cabins for workers/operators
3.	Water	• Insignificant on groundwater. • Degradation of quality due to discharge of sewage and untreated water will be prevented. • Discharge of effluent from the manufacturing unit. (Indirect, Negative, Minor, Local, sustainable)	• Proper sanitation facilities in the plant area. • Treatment of wastewater in existing ETP within DFPCL area. • The effluent generated from the manufacturing unit will be reused for dilution of phosphoric and sulphuric acids. Effluent discharge, if any due to cooling tower blow down, domestic effluent etc shall be treated in the proposed RO with a capacity of 550 m^3/hr. There will be no generation of effluent from the proposed project.
4.	Land	• Pollution due to discharge of sewage waste will be prevented. • Dust generation possibility is minimum as raw materials handled are liquids and product will be bagged in the existing bagging plant (Direct,Negative,Minor ,Local,sustainable)	• Proper sanitation facilities in the plant area. • Proper treatment and disposal of sewage and solid waste to CETP as per the guidelines of MPCB in existing ETP within DFPCL premises. This has a design capacity for 1200 persons. Presently only 600 people are using the facility.
5.	Biological • Flora • Fauna	• Disturbance due to increase in noise. (Minor,Direct,Local ,sustainable)	• Operational activities of heavy machineries and transportation only in daytime. • Green belt development.
6.	Socio-Economic	Employment to local people (Positive, Local)	• People from the local area to be employed as far as possible
7.	Occupational Health and Safety	• Auditory ailment due to noise generated from the production unit will be minimised by using Equipments with noise level below 80db	• Equipments with noise level below 80db only will be used. • Wearing of personal protective equipments like gas masks, ear muffs etc. will be strictly enforced.

S. No.	Component	Impact	Mitigation Measures
		• Accidents due to handling/storage/ transportation of hazardous materials. (Local and sustainable)	• Training/awareness programme about the handling / storage / transportation of hazardous materials. • Signage's showing the hazardous nature and the method of handling near storage / handling area of all the hazardous materials. • First aid training for chemical /fire hazard related accidents.

8.3 ENVIRONMENTAL MANAGEMENT PLANS

8.3.1 Rainwater Harvesting System

Rainwater harvesting system was not installed in past as ground water table is high. However, DFPCL is making rooftop water collecting system. Reservoir for rainwater is ready. Connecting pipelines are being laid. System shall be ready before 2014 monsoon. For proposed plant there shall be separate rooftop collection system.

8.3.2 Air Pollution Management Plan

In the manufacturing process, dust is emanated from the cooler and dryer compartments. The dust laden air originating from cooler and dryer compartments are treated separately.

A series of gas scrubber connected to the different equipments for a double purpose will be used: to retain as much as possible all recoverable products, and to minimize emissions (especially ammonia, fertilizer dust and fluorine) to the atmosphere. The scrubbing liquid will be diluted phosphoric / sulphuric acids or water, depending on the scrubber. The scrubbing system has a first scrubbing step composed of a Venturi-Type fume prescrubbing for the granulator. The prescrubbing liquid is the result of mixing fresh phosphoric acid and sulphuric acid with scrubbing liquid coming from scrubber tank. From the granulator prescrubber, the liquid is sent to the pipe reactor tank, where the concentration of P_2O_5 required for feeding the Pipe Reactor is adjusted with additional fresh concentrated phosphoric acid. The prescrubbing step objective is to retain most of the ammonia and dust leaving from the granulator.

Occasional additions of sulphuric acid can be done to the scrubber tank. The gases coming out of the prescrubber will be sent to the ventury type scrubber, where they are using as scrubbing liquid fresh phosacid diluted with the slightly polluted water coming from tail gas scrubber. The objective of this scrubber is to complete the recovery of ammonia and dust. From the same common tank the scrubbing liquid is also recirculated to the venture dryer scrubber, where the dust which has been not retained by the dryer cyclones is recovered; and the venture cooler and dedusting scrubber where a part of the gases coming out from the cooler cyclones are jointly washed with the dedusting gases coming from cyclones.

It is recommended to install final scrubber (packed column) for final scrubbing. All exhaust gases from the above scrubber shall be sent to the final washing step: the Tail Gas Scrubber,

which shall include a multi-spraying system in the horizontal feeding arm and a packed section in the vertical tower. Gases are washed with water, to avoid the fluorine emissions created during phosphoric acid washing, as well as to recover dust and NH_3. The first washing consists of a duct multi-spraying system and uses the water advanced from the second one. A pH controlling system, using sulphuric acid as acidic media, assures the best pH to achieve both ammonia and fluorine recovery. The second step includes a packed section, to efficiently complete the dust, ammonia and fluorine removal. Scrubbing liquid is basically composed of water, which is sprayed on top of the packing. Scrubbed liquor shall be re-circulated to the process.

Gases, after washing, are finally released to the atmosphere through a common stack. The last section of TGS is equipped with a demister to avoid droplet entrainment. The liquid from the tail gas will contain water, a small quantity of ammonia, fertilizer dust and fluorine retained during the scrubbing. This liquid will be recovered into the scrubber tank; where with the addition of phosphoric acid will constitute the scrubbing liquid. The process flow diagram for dust and other gases scrubbing is shown in **Figure 8.1**.

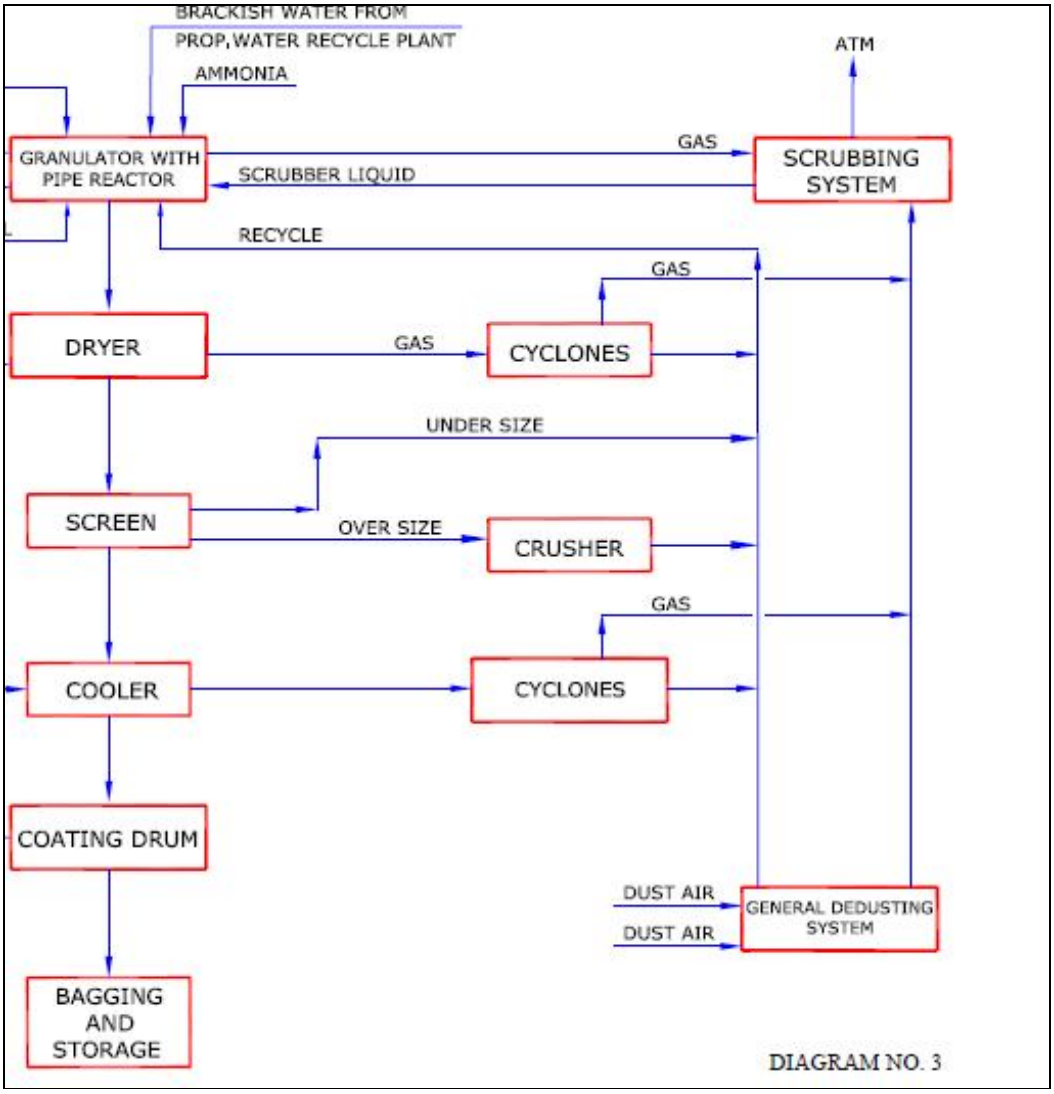


Figure 8.1: Process Flow Diagram for Scrubbing

8.3.3 Storm Water Management Plan

DFPCL plant area already has a storm water drainage system. It is made up of partially covered drains with brick masonry work. The outlet of the storm water drainage is connected with the Kasardi River.

8.3.4 Sewage Management Plan

Around 1-2 m^3/h of domestic effluent is expected to be generated during the construction and operation phases. The generated sewage will be collected and the waste water will be treated in the ETP of capacity 5000 KLPD.

8.3.5 Effluent Management Plan

The wastewater generated during the maintenance of the expansion unit like cleaning/ servicing, will be treated in the proposed RO system of 550 m^3/Day capacity. The proposed unit shall be designed for zero liquid effluent discharge. Reject of RO shall be recycled to NPK unit. Treated effluent from RO shall be used in the cooling tower make up & domestic

use. The proposed NPK Granulation project will reduce overall effluent discharge by approx. 450 m^3/day i.e. by 12% & New project will not require additional fresh water. Thus proposed project will result in conservation of natural resources and green environment. **Figure 8.2** shows the Effluent reduction flow chart for the proposed NPK effluent treatment process and **Figure: 8.3** Water balance of the entire complex including the proposed NPK Plant.

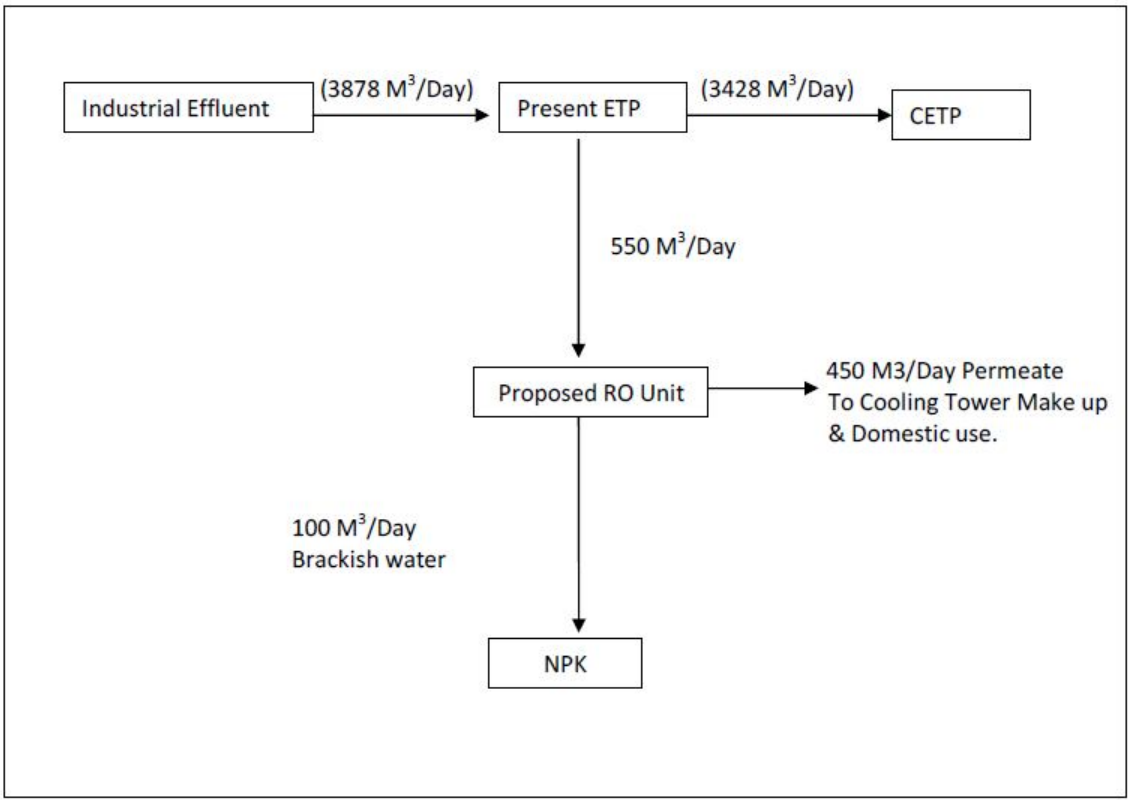


Figure 8.2: Effluent Reduction flowchart for the Proposed Unit

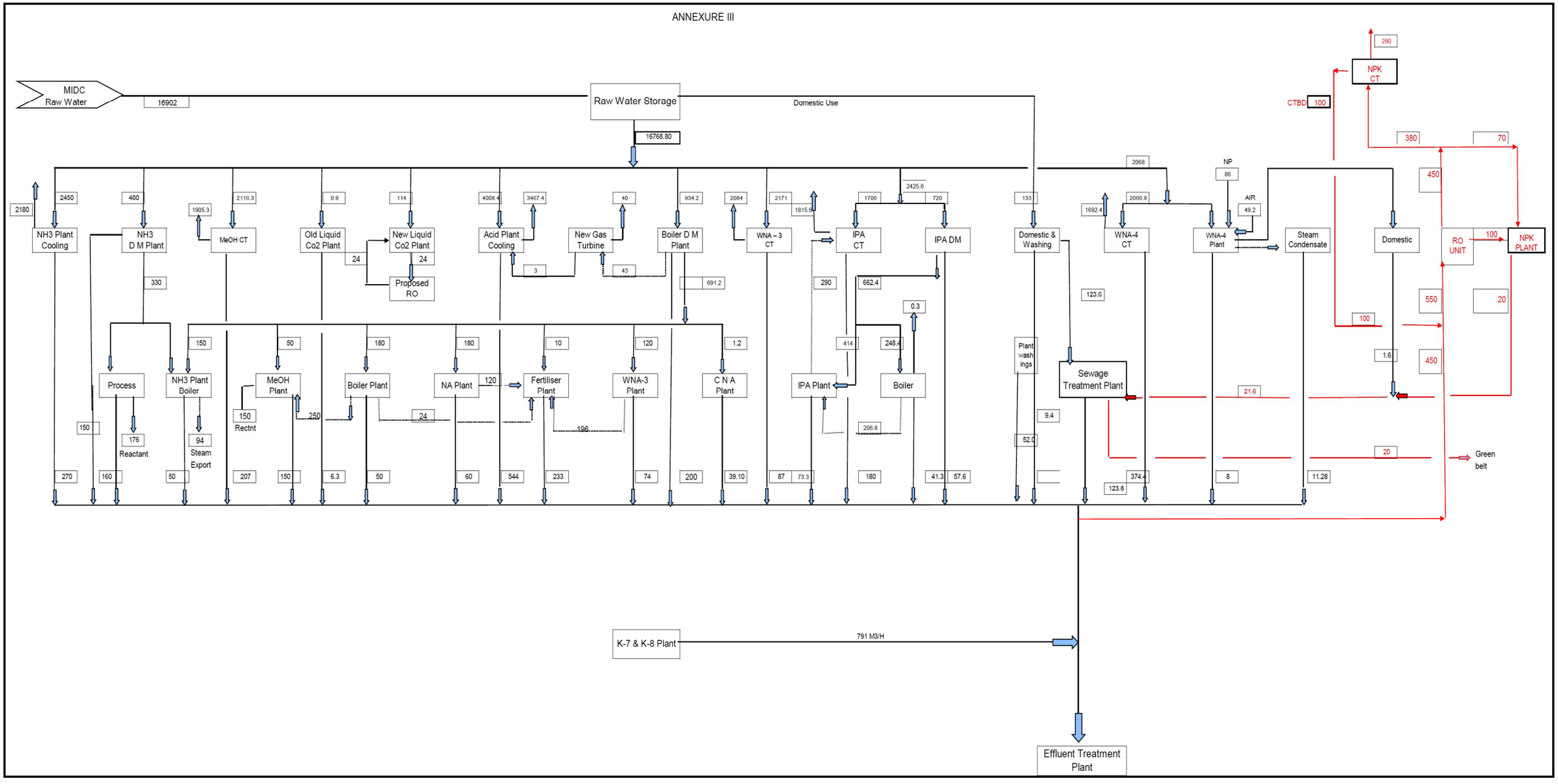


Figure 8.3: Water Balance Diagram for entire complex including proposed NPK expansion

8.3.6 Solid Waste Management Plan

Empty, drums, containers etc. will be washed thoroughly with before selling them to Government authorized recyclers. The wash water will be recirculated to the process.

8.3.7 Hazardous Waste Management Plan

No hazardous waste will be generated from the manufacturing process.

The possible hazardous waste which will be generated from the proposed unit is the used/spent oil from generator sets which has been classified as hazardous under Hazardous Waste Category 5.1 as per Hazardous Wastes (Management and Handling) Amendment Rules, 2003. The used oil will be collected in a shock proof, puncture proof, tear and wear proof as well as air tight barrels of 200 l capacity. Every year it will be disposed off through Government authorized used/spent oil recyclers.

8.3.8 Green Belt Development

The purpose of a greenbelt around the plant site is to capture fugitive emissions, attenuate the noise generated and improve the aesthetics. The greenbelt at the plant site would form an effective barrier between the plant and the surroundings. Open spaces, where tree plantation may not be possible, will be covered with shrubs and grass to prevent erosion of topsoil. Adequate attention will be paid to plantation of trees, their maintenance and protection. During commissioning of the project management is proposing to develop a greenbelt all along the boundary wall of plant, along the roads, and surroundings of the production block, boiler, ETP etc.

A Green belt with 2500 plants is developed in the plant area consisting of species like Gulmohar, Bamboo, Karanj, Jambhool, Astumbul, and Neem. Annually and proposed to add around 200 plants per year.

Plant Species of Greenbelt

While selecting the plant species for the proposed green belt, the following guidelines will be considered.

- ❖ Fast growing type
- ❖ Should have a thick canopy cover
- ❖ Should be perennial green
- ❖ Native origin
- ❖ Should have a large leaf area index.

Design of Green Belt

As far possible the following guidelines will be considered in green belt development.

- The spacing between the trees will be maintained slightly less than the normal spaces, so that the trees may grow vertically and slightly increase the effective height of the green belt.

- Planting of trees in each row will be in staggered orientation.
- In the front row shrubs consisting of Callistemon, Prosopis etc. Will be grown
- Since the trunks of the tall trees are generally devoid of foliage, it will be useful to have shrubs and trees in front of the trees so as to give coverage to this portion.
- Shrubs and trees will be planted in encircling rows around the project site
- The short trees (<10 m height) will be planted in the first two rows (towards plant side) of the green belt. The tall trees (> 10 m height) will be planted in the outer three rows (away from plant side).

Tall trees one line and short trees one line will be planted around the boiler house, DG set room and around the production blocks to control the fugitive emissions and to reduce the noise.

The lists of plants proposed to be planted in future for developing greenbelt are given in **Table 8.2** to **Table 8.4**.

Table 8.2: Plant Species Recommended for Reduction of Noise Level

S.No.	Scientific Name of Plant Species	Common Name
1	Azadirachta indica	Neem
2	Aegle mamelos	Bel
3	Calbezia trocera	Dhala sirisa
4	Carissa carandas	Karaunda
5	Peltophorum inerme	Perungondrai
6	Saraca indica	Asoka
7	Syzygium cumini	Zaman
8	Tamarindus indica	Imli
9	Pongamia pinnata	Beng
10	Cassia siamia	Chakundi

Table 8.3: Plant Species Recommended For Protection against Gases and Particulates

S. No.	Scientific name	Common Name
1	Butea monosperma	Dhak
2	Cassia fistura	Amaltas
3	Cassia siamia	Kassod
4	Citrila toona	Mahanim
5	Dalbergia sissoo	Shisham
6	Dilenia indica	Chalta
7	Ficus religosa	Pipal
8	Hardwick binata	Anjan
9	Mathuca indica	Mahua
10	Millingtonia hortensis	Akash nim

Table 8.4: Suggested Plant Species for Green Belt Development

S.No.	Scientific name	Common Name
	Large Plants	
1	Cedrreia toona	Mahanim
2	Dalbergia sissoo	Shisham
3	Azadirachta indica	Neem
4	Delonix regia	Gul mohr
5	Millingtonia hortensis	Aksh nim
6	Miomosops elengi	Maulsari
7	Peltophorum inerme	Perungondrai
8	Samania saman	Debdari
9	Thespisia populnea	Paras papal
	Medium Plants	
1	Cassia siamia	Kassod
2	Dillenia indica	Chalta
3	Mathuca indica	Mahua
4	Casuriana equisetifolia	Jungali Suru
5	Pongamia pinnata	Beng
6	Tabulia spasiosa	-
7	Ticoma stans	
8	Terminalia catappa	Jangli badam
9	Thevetia peruviana	Pile kamer
10	Lucaena leucocephala	Subabul
	Small Plants	
1	Averehoa carabbola	Carabola
2	Nallotus philippensis	Sundur
3	Artaboteys odoratissimus	Madanmast
4	Caesalpinia pulcherima	Gulotora
5	Callistemon lanceolatus	Bottle brush
6	Caryota urens	Mari
7	Cestrum dirunum	Din-ka Raja
8	Nelia azedarch	

The DFPCL Plant area already has a green cover of 42,820 m^2 within its four industrial plots at Taloja Complex and now planned to develop 15.80 acres in the proposed expansion project. The saplings proposed for plantation includes Jamun (Sizigium Cumini), Kokam (Garcinia Indica), Ashok (Saraka Asoka), Karanj (Pongamia Pinata), Bahawa (Casia Fistula). All these species are all time green and tropical have better control for fugitive emission and noise control.

It has also been proposed to develop a green belt area around the proposed expansion unit as demarcated in the layout map (**Figure 8.4**).

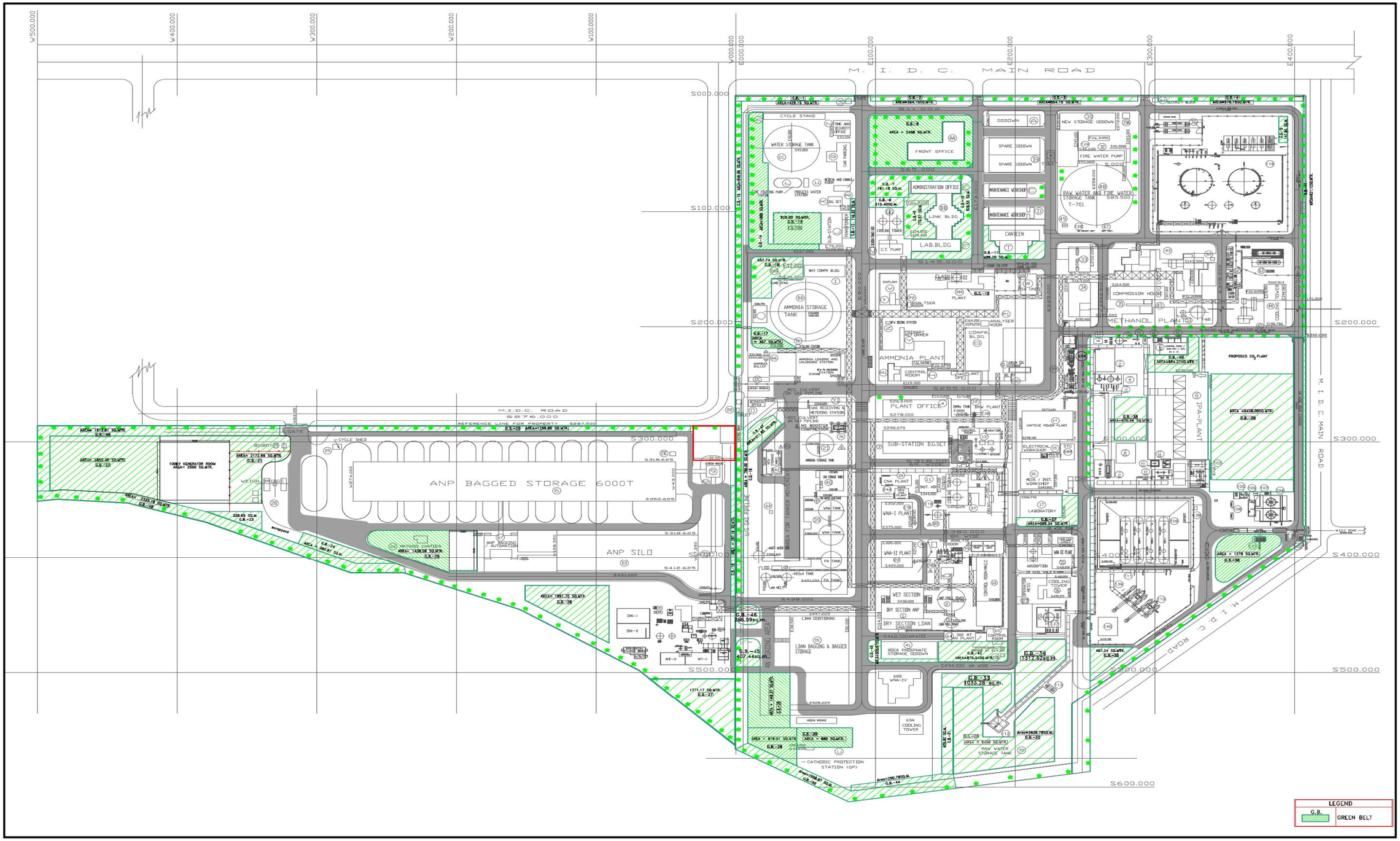


Figure 8.4 Proposed Green Belt Development in the Expansion Unit

8.3.9 Industrial Health, Safety and Hygiene

The DFPCL has existing set up of safety, health and environment cell with a qualified person as in charge for safety, health and environment reporting to the factory manager directly. The chemical laboratory with qualified chemist carries out the necessary analysis and reports to Manager (SH&E). Annual Medical check-up is done for all employees. Further checkups are done as and when necessary on doctors advice; required qualified external experts are appointed as and when necessary.

DFPCL follow strict norms for handling of chemicals at our end and recommend safety norms for handling and transportation of our products.

- ❖ General Safety Parameters for loading and Transportation of chemicals
- ❖ Vehicle Permit System
- ❖ Product-wise Safety Precautions

8.3.10 Post Project Environmental Management

The environmental management in the proposed unit will also be handled by the existing setup. Presently the environmental management department is headed by Sr. Manager (Safety and Environment) reporting to GM (Tech/VP (Manufacture). The Sr. Manager is assisted by three assistant managers to look after the safety and environmental factors round the clock. Each assistant engineer to run is assisted by the staff trained in safety and environmental protection.

The organisation set up for Environmental Management of the proposed project is given in **Figure 8.5**.

The department is the nodal agency to co-ordinate and provide necessary services on environmental issues during operation of the project. This environmental group is responsible for implementation of environmental management plant, interaction with the environmental regulatory agencies, reviewing draft policy and planning. This department interacts with Maharashtra State Pollution Control Board (MSPCB) and other environment regulatory agencies. The department also interacts with local people to understand their problems and to formulate appropriate community development plan.

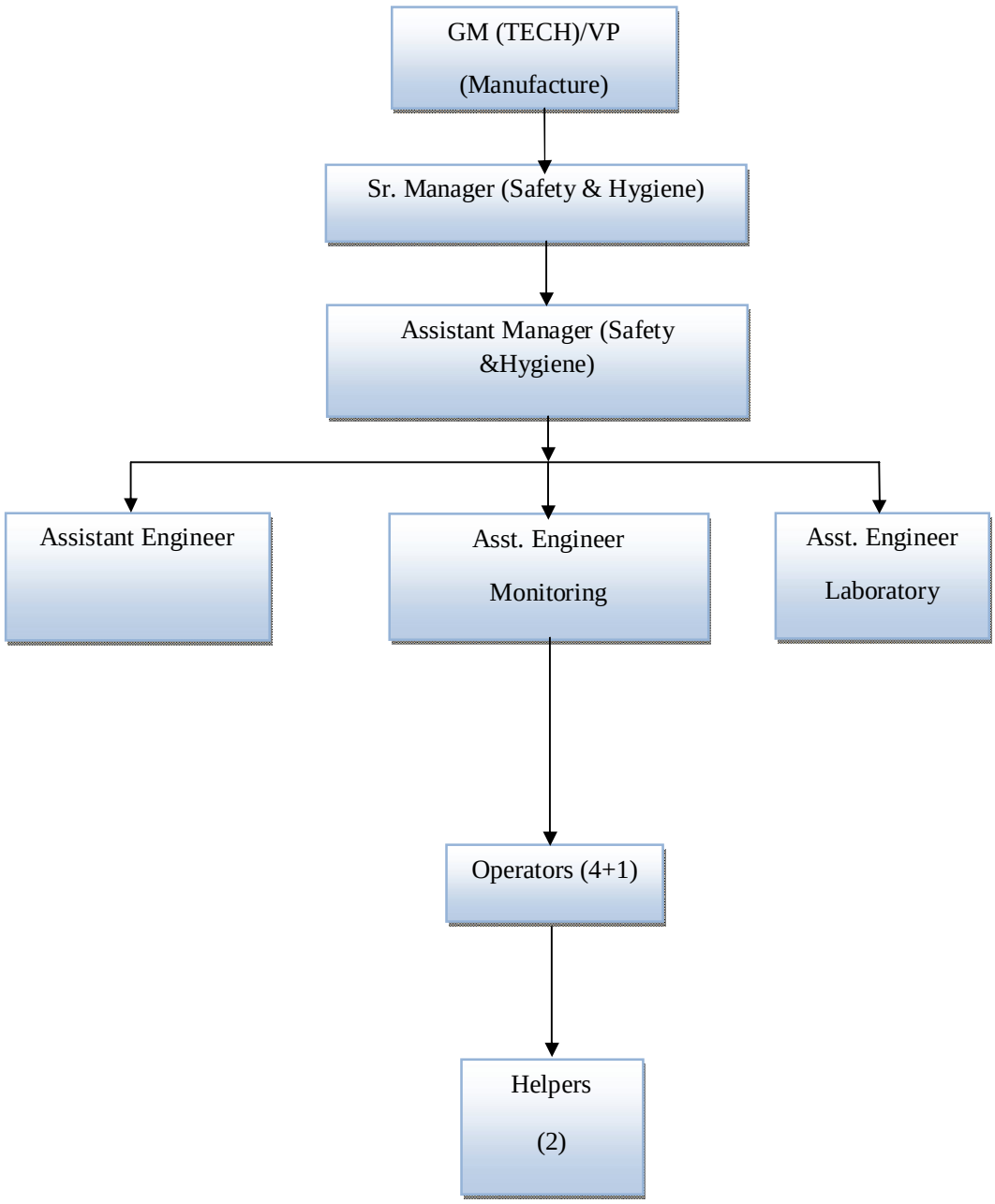


Figure 8.5: Environmental Management Cell

8.3.11 Corporate Responsibility for Environmental Protection (CREP)

The compliance to the Charter on Corporate Responsibility for Environmental Protection (CREP) for Fertilizer industries proposed by the Central Pollution Control Board (CPCB), Ministry of Environment and Forest (MoEF) in March 2003 is given below:

Wastewater Management:

- No effluent will be discharged from the manufacturing unit as the proposed process is a Zero Effluent Discharge manufacturing process.
- As the process does not involve any catalytic reaction, use of arsenic or chromium is not envisaged.
- Groundwater monitoring has been proposed in the Environmental Monitoring Plan.
- No effluent will be discharged into the storm water drainage system.

Air Pollution Management:

- Suitable air pollution control equipments have been proposed for the control of air pollution.
- Regular monitoring of air is proposed in the Environmental Monitoring Plan.

Solid Waste Management:

- Generation of gypsum, sulphur muck, spent catalyst, carbon slurry or Chromium/ Arsenic bearing sludge is not envisaged from the proposed manufacturing process.

The detail of CREP has been provided in **Table 8.5.**

Table 8.5: CREP for Fertilizer Sector Factories: Compliance Status for Present Operations

S.No.	Item	Remarks
1	Water consumption : Efforts will be made for water consumption for Urea plants	Efforts are being done for reduction in water consumption by recycling of condensates and effluents
2	Phasing out Ar based for CO2 absorption and Chromate for cooling towers system	Arsenic based CO_2 absorption, Chromate for cooling tower system: Not in existence at DFPCL
3	Adequate treatment for removal of oil, chromate and fluorine	oil is being removed from effluents, chromate system is not used for cooling towers. Fluorine problem is not there as we do not have Rock phosphate processing.
4	Proper Nitrification/denitrification system in the effluent treatment to be established	Denitrification system is established In ETP
5	Ground water monitoring for pH & Flurides as per CPCB norms	It is being monitored regularly through MOEF accredited agencies.

S.No.	Item	Remarks
6	No effluent to be released through storm water drain, measure of the quantity released	separate storm water drains are provided and monitored
7	In the industry, where some effluent gets released through storm water drain, shall route the effluent through ETP	storm water drain system is kept closed except for Monsoon Pumping arrangement is provided for routing the same through ETP
	Air Pollution Management	
1	All upcoming Urea plants will be on natural draft	not applicable
2	Existing Urea plants with forced draft will install scrubber system	not applicable
3	Sulfuric Acid plants of SCSA will be switched over to DCDA	not applicable
4	Sulphuric Acid Plants with DCDA will improve for SO2 emission	not applicable
5	Proper height shall be provided for Sulphuric Acid Plant	not applicable
6	Proper Dust Control System for rock phosphate grinding unit	not applicable
7	Particulate as well as gaseous fluride emission control system shall be installed and will be monitored for 25 mg/NM3	Yes
8	Continuous SO2 monitoring system for Sulphuric Acid plants	not applicable
9	Regular Ambient Air Monitoring for SO2,Nox,PM & SO3	We have installed Ambient air monitoring station hooked up with MPCB and CPCB
	Solid Waste Management	
1	Gypsum will be effectively managed by providing lining	not applicable
2	Action plan for proper handling, storage and disposal of spent catalyst having toxic metals, explore possibility of recover/ buy back of catalyst	Not applicable.
3	carbon slurry, sulphur muck & Chalk shall be properly disposed	not applicable
4	Existing stocks of Ar and Cr sludge will be properly disposed	properly disposed

8.4 ENVIRONMENTAL MONITORING PLAN

Detailed Environmental Monitoring Plan for the proposed project is given in Chapter 5. A comprehensive list of parameters to be monitored during the construction and operation phase is given in **Table 8.6.**

Table 8.6: List of Parameters to be monitored during Construction and Operation Phases

Component	Parameters	Frequency	Location
Construction Phase			
Air	PM_{10}, $PM_{2.5}$, SO_2 and NO_x	Thrice a year	At major construction sites (total 3 stations)
Noise	Equivalent noise level	Once in a week	At major construction site and near generator set
Water	Parameters as per CPCB standards	Monthly	Storm water drainage system, raw water from CETP within DFPCL, treated and untreated waste water.
Effluent from ETP	pH, BOD, COD, TSS, TDS	Monthly	Inlet and outlet of ETP
Air	PM_{10}, $PM_{2.5}$, SO_2 and NO_x	Thrice a year	At major construction sites (total 3 stations)
Operation Phase			
Air	PM_{10}, $PM_{2.5}$, SO_2 , NH_3, CO, VOC and NO_x	Monthly	Stack, three locations within 100 – 200 m of the project site, two locations within the plant near the production units, storage area for the raw material and fertilizer, packaging area for fertilizer.
Noise	Equivalent noise level	Weekly	Three locations within 100 – 200 m of the project site, two locations within the plant near the production units, storage area for the raw material and fertilizer, packaging area for fertilizer.
Water	Parameters as per CPCB standards	Thrice a year	Storm water drainage system, raw water from CETP within DFPCL, treated and untreated waste water.

Component	Parameters	Frequency	Location
ETP	Parameters as per CPCB standards	Monthly	Before and after treatment from ETP
Soil	pH, moisture content, texture, organic matter, chloride, SAR, CEC, nitrogen, phosphorous, fluoride, sulphur	Once in a year	Three locations around the project site within 200 m distance from the unit.
Ecology	Inventory	Once in a year	Within 2 km of the project site
Occupational Health	General and respiratory ailments check up	Once in a year	-

8.5 EMP BUDGET

A total capital and recurring cost provision of about **INR 41.45 Crores** has been kept in the project cost towards the environmental protection, control and mitigation measures and implementation of the EMP. The budgetary cost estimate for the EMP is given in **Table 8.7**.

Table 8.7: Environmental Budget

S.No.	Items	Approx. Capital Cost Crores)
1.	Water pollution control (Capital cost of RO system and recurring cost of water & effluent quality monitoring)	20
2.	Air pollution control (Capital cost of stacks & air pollution control equipments and recurring cost of stack emission monitoring)	20
3.	Noise pollution control (Capital cost of DG room enclosure & acoustic treatment and recurring cost of noise monitoring)	0.05
4.	Solid wastes management (Capital cost of bins for solid wastes, storage space for hazardous wastes and recurring cost of handling & disposal)	0.10
5.	Rainwater harvesting system	0.50
6.	Storm water drainage system	0.05
7.	Fire fighting system	0.50
8.	Landscaping	0.15
9.	Environmental management (recurring cost of annual monitoring, hiring of consultants and payment of various statutory fees)	0.10
Total		**41.45**

9

SUMMARY AND CONCLUSION

9 SUMMARY AND CONCLUSION

9.1 Summary and Conclusion

The status of the environment at the project site and within the study area of 10 km radius is delineated with respect to air, noise, water, land, biological and socio-economic environment. The different project activities during the construction and operation phases are identified. To identify the impacts, the interaction between the project activities and different components of environment are classified phase wise. A summary of the identified impacts are given in the following paragraphs.

During the constructional phase, the transportation of construction material may have an impact, especially on air, noise, vibration, and soil. However, since the proposed expansion project is within the existing NP plant i.e. inside the existing industrial complex at Taloja with well-maintained infrastructure facilities, even this impact is minimal and temporary.

The additional strength of labourers could temporarily increase the pressure on the resources of the area. During the operational phase, there could be minor change in air quality .Transportation of raw material, storage and handling of hazardous material and the production process could cause a temporary disturbance to environment variables which will be prevented with the proposed mitigation measures proposed in Chapter 4.

With respect to occupational health, minimal impacts are anticipated on the health of the employees during operation phase.

In general, production of fertiliser shall help in enhancement of agricultural productivity in the region as well as generate direct and indirect employment in the area.

10

DISCLOSURE OF CONSULTANTS

10 DISCLOSURE OF CONSULTANTS ENGAGED

10.1 Introduction

Asian Consulting Engineers Pvt. Ltd. (ACE) is an independent consulting company in the field of water and environment engineering with its headquarters located in New Delhi, India. ACE provides consulting services and sustainable solutions for infrastructure projects (roads, railways, ports, hydropower, water resources and other urban infrastructural plan outs), industrial projects (refineries, petrochemicals, gas pipelines, offshore and onshore oil & gas exploration, fertilizers, steel plants, power plants, textiles, hotels, distilleries and tanneries) and social development projects.

ACE is committed to provide consultancy services of international quality at local costs to suit its client's requirements. ACE believes that the key to success is the ability to work effectively with clients to understand, define, and resolve their environmental concerns. ACE offers technical talent, specialized expertise, physical resources, and requisite facilities that are important in responding to water and environmental issues, the world faces today. The quality of work and timely completion of project are of paramount importance in each assignment that ACE undertakes.

We, at ACE, know what makes for a successful project. Clients turn to ACE because

- We understand the issue at hand
- Have the required experience and expertise to develop unique solutions
- Complete work on time and within budget
- Work towards client satisfaction as our ultimate goal

ACE offers this combination of quality and performance through its professionals, managers and support personnel. Our people are equipped with state-of-the-art technologies and they are motivated to implement the project to the satisfaction of the client.

10.2 Quality of Services

ACE is committed to providing a high quality consultancy service. As a recognition of same, ACE has been awarded ISO 9001: 2008 certified (Certificate no: 22340/10/S) by RINA, to provide consultancy services for water supply, waste water treatment, municipal solid waste management, environment and social impact assessment, environment impact and audit, remote sensing and geographical information systems. In addition to this, ACE is also accredited with Quality Council of India for preparation of EIA of Chemical Fertilizer sector (Category A).

10.3 Area of Specialization

- Water Resources Engineering

- Water Supply
- Wastewater Management
- Urban Environment Improvement
- Environmental Management
- Social Development
- GIS and Remote Sensing

10.4 Resources

Panel of Experts

ACE has experts in the following specialized areas:

- Water supply engineering
- Water resources engineering
- Wastewater engineering
- Solid waste management
- Public Health and Sanitation
- Environmental Management
- Forestry and Wildlife
- Environmental modeling
- Fisheries
- Aquaculture
- Social development

Infrastructural Resources

Following facilities are available with ACE:

- Air quality models
- Noise quality models
- Water quality models
- Water distribution analysis software
- Sewer network analysis software

Software Availability

- AERMOD
- CALINE4
- Erdas Imagine
- Arc GIS
- AutoCAD
- Map Info