

Environmental & Social Management Plan (ESMP)

Cherry Hydro cooling Facility at Jarol Tikkar

Shimla, Himachal Pradesh



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Table of Contents

Chapter 1	Introduction	Page No
1.1	Environmental and Social Management Plan	1.1
1.2	Objective of ESMP	1.1
1.3	Scope of ESMP	1.2
1.4	Methodology of ESMP	1.2
1.5	Policy, legal & administrative frame work	1.3
	1.5.1 Introduction	1.3
	1.5.2 Applicable national regulatory acts and notifications	1.3
1.6	Project description	1.4
	1.6.1 Location & access to the facility	1.4
	1.6.2 Land details	1.5
	1.6.3 Proposed facility	1.7
	1.6.4 Man power requirement	1.7
	1.6.5 Power requirement	1.7
	1.6.6 Water requirement	1.7
	1.6.7 Roads & street lights	1.8
1.7	Structure of ESMP	1.8
Chapter 2	Environment and Social Mitigation Plans	Page no
2.1	Summary of environmental impacts	2.1
2.2	Technical details of mitigation measures	2.2
2.3	Estimates for impact due to mitigative measures	2.8
2.4	Description of environmental and social mitigation measures	2.8
	2.4.1 Planning of mitigation measures	2.8
	2.4.2 Implementation of mitigation measures	2.8
2.5	Commitment to mitigation	2.26
Chapter 3	Environmental and Social Monitoring Plans	Page no
3.1	Environmental Monitoring Program	3.1
	3.1.1 Establishment of monitoring, evaluation and reporting mechanism	3.1
	3.1.2 Planning year wise implementation schedule	3.7
	3.1.3 Monitoring ESMP progress	3.9
3.2	Institutional arrangements and capacity development for implementation of ESMP	3.11
	3.2.1 Identification and assessment of training needs	3.12
	3.2.2 Budgetary provision for ESMP	3.15
	3.2.3 Grievance Redressal Mechanism (GRM)	3.17
	3.2.4 Grievance Response Mechanism	3.18

Annexures

Annexure 1 - Site Photographs	A1
Annexure 2 - Equipment details	
Annexure 3– Rain Water Collection Tank	
Annexure 4 – Storm Water Drain	
Annexure 5 – Packaged STP (Brochure)	
Annexure 6 – Septic Tank	
Annexure 7 – Toilet Block	
Annexure 8 – DG set room	
Annexure 9 – Organic Waste Converter	
Annexure 10 – Solid waste collection bins (Brochure)	
Annexure 11 – Air pollution control equipment (Brochure)	
Annexure 12 – Bag filter (Brochure)	
Annexure 13 – Eco-sorb equipment (Brochure)	

List of Tables

Table No	Description	Page No
1.1	Salient features of the project site	1.4
1.2	Land use details of the facility	1.5
1.3	Built up area	1.7
1.4	Water requirement	1.8
2.1	Criteria for classification of potential impacts	2.1
2.2	Technical details of potential impacts due to project activity	2.3
2.3	Description of mitigation measures and action plan	2.9
3.1	Environmental measures during construction phase	3.2
3.2	Treatment details of STP	3.4
3.3	Treatment details of Pre-treatment scheme	3.5
3.4	Environmental monitoring during operational phase	3.6
3.5	Record keeping particulars	3.8
3.6	Implementation schedule	3.8
3.7	ESMP progress monitoring – template	3.10
3.8	Manpower for Environment & Social Management Cell	3.11
3.9	Identified gaps and training needs common for all four interventions	3.13
3.10	Budget for implementation of Environmental Management Plan	3.15
3.11	Budget for implementation of Social Management Plan	3.16

List of Figures

Figure No	Description	Page No
1.1	Major components of ESMP	1.3
1.2	Base map of the study area (2km radius)	1.5
1.3	Project layout	1.6
3.1	Treatment Scheme for STP	3.4
3.2	Pre-treatment Scheme for waste water	3.5
3.3	Process flow of communication of status of grievance	3.19

Abbreviations

AAQ	:	Ambient Air Quality
BIS	:	Bureau of India standards
BOD	:	Biological Oxygen Demand
CA	:	Controlled Atmosphere
CFE	:	Consent for Establishment
CFO	:	Consent for Operation
CHC	:	Cherry Hydro Cooling
COD	:	Chemical Oxygen Demand
DG	:	Diesel Generator
E&SM Cell	:	Environment & Social Management Cell
ELCB	:	Earth Leakage Circuit Breaker
EMP	:	Environmental Management Plan
ESIA	:	Environmental & Social Impact Assessment
ESMF	:	Environmental and Social Management Framework
ESMP	:	Environmental & Social Management Plan
GOHP	:	Government of Himachal Pradesh
GOI	:	Government of India
HP	:	Himachal Pradesh
HPHDP	:	Himachal Pradesh Horticulture Development Project
HPMC	:	Horticultural Produce Marketing and Processing Corporation Limited
HPMC	:	Horticultural Produce Marketing and Processing Corporation Limited
HSD	:	High Speed Diesel
IIT	:	Indian Institute of Technology
IPH	:	Irrigation & Public Health
IS	:	India standards
IUCN	:	International Union for Conservation of Nature

MBBS	:	Batcher of Medicine
MSIHC	:	Manufacture, Storage and Import of Hazardous Chemical
OSHA	:	Occupational Safety and Health Assessment
PIU	:	Project Implementation Unit
POD		project development objective
PPE	:	Personal Protective Equipment
PSTP	:	Packaged Sewage Treatment Plan
RCCB	:	Residual Current Circuit Breaker
SPCB	:	State Pollution Control Board
STP	:	Sewage Treatment Plant
TDS	:	Total Dissolved Solids
TN	:	Total Nitrogen
TSS	:	Total Suspended Solids
WB	:	World Bank

Chapter 1

Introduction

Chapter 1

Introduction

1.1 Environmental and Social Management Plan

The Environmental and Social Management Plan (ESMP) is the main output of the Environmental and Social Impact Assessment (ESIA) process and documents project's risk management strategy to provide inputs into the design of HPHDP in accordance with the World Bank Operational Guidelines. The ESMP will become an integral part of the project proposal and contractor tender documents.

The study helps to develop an ESMP detailing the measures that have been identified for avoiding adverse environmental and social impacts, for minimizing them to acceptable levels or to compensate for them. For identified mitigation measures, following operational details are provided:

- Evidence of their technical feasibility, cultural adequacy, expected effectiveness (in providing mitigation to all affected groups) and sustainability;
- Resources required and estimated costs (including initial investment and recurring expenses), and, where applicable, expected and agreed contributions from stakeholders and beneficiaries (including in-kind contributions);
- Responsibility for implementing the measure;
- Schedule for implementation along with the requirement that mitigation measures be implemented in a timely manner.
- Institutional Capacity Building and Training for effective implementation of ESMP

1.2 Objective of ESMP

The main aim of the ESMP is to ensure that various adverse impacts are mitigated and positive impacts are enhanced. It is developed to ensure identified impacts during all stages of the projects are handled by the most effective and cost effective methods.

Objective of ESMP at various stages of the project planning and implementation can be summarized as follows:

- Ensuring compliance with all relevant environment & social acts, notifications and policies of Government of Himachal Pradesh (GOHP), Government of India (GOI) and World Bank (WB)
- Ensuring that there is sufficient allocation of resources on the project budget so that the scale of ESMP-related activities is consistent with the significance of project impacts;

- Realizing the agreed environmental and social objectives of project and verifying environmental and social performance through information on impacts as they occur
- Responding to changes in project implementation not considered in the impact assessment process thus far or responding to unforeseen events.
- Provide better conditions to workers and stake holders.

1.3 Scope of ESMP

The scope of ESMP is to:

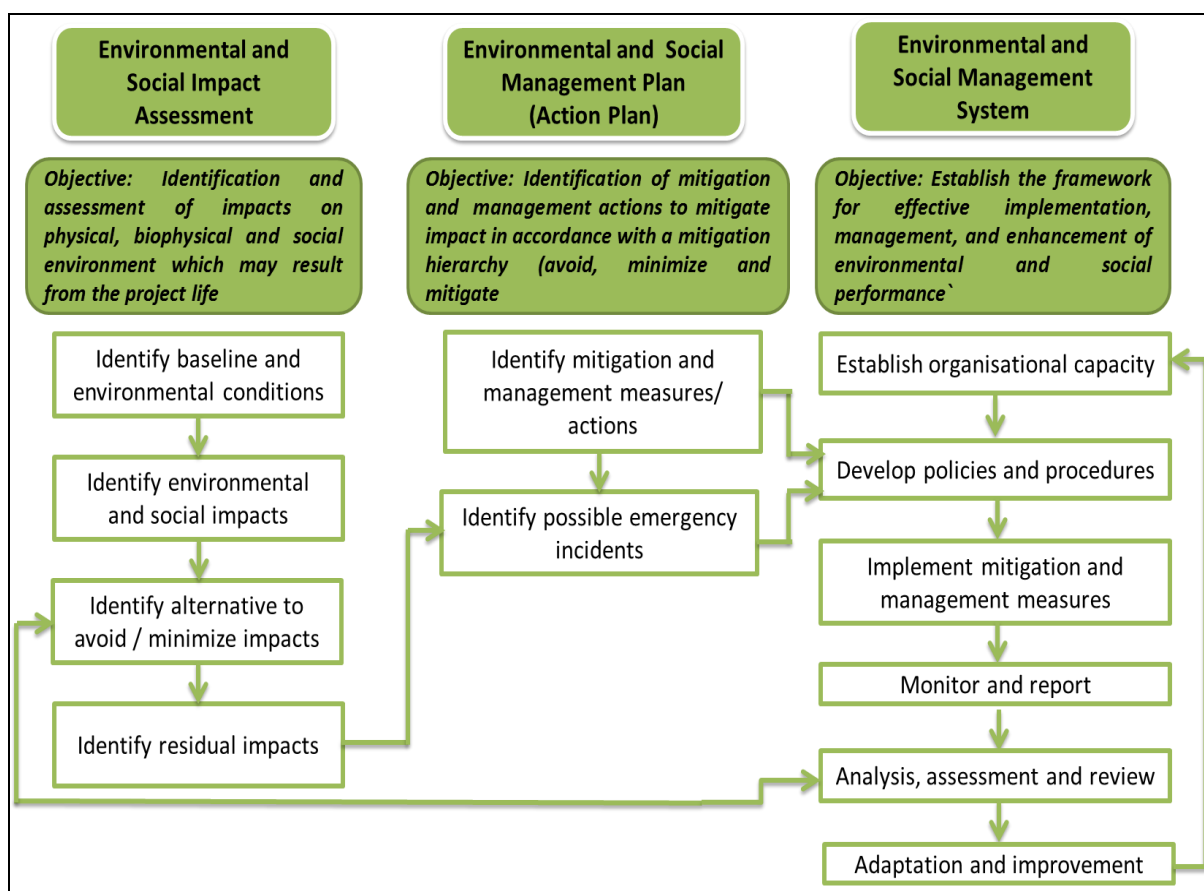
- Develop impact, mitigation and enhancement programs : it covers description of mitigative measures for the identified impacts, Resources & Costs required, responsibilities and schedule
- Identify applicable legal frame work: ensure applicable standards, guidelines, limits of applicable changes are identified, issues & concerns of stakeholders included and ESMP is sent to the stake holders for the comments.
- Develop environmental monitoring plan : to evaluate the performance of mitigation measures proposed in the ESMP and to suggest improvements in management plan
- Develop Capacity building measures for identified capacity gaps: identify capacity building measures to ensure effective implementation of ESMP.
- Monitor the ESMP: to track the process in implementing the agreed mitigation measures

1.4 Methodology of ESMP

The ESMP is based on the ESIA study carried out for the project. The ESMP consists of set of mitigation, monitoring and institutional measures to be taken during the design, construction and operation stages of the project to eliminate adverse environmental and social impacts, to offset them, or to reduce them to acceptable levels. The plan also includes the actions needed for the implementation of these measures. The ESMP will be integrated with the bid document for contractor for construction and the implementation of ESMP will become contractual obligation for the contractor.

The major components of the Environmental and Social Management Plan are given **Figure 1.1**

Figure 1.1: Major components of ESMP



1.5 Policy, legal & administrative frame work

1.5.1 Introduction

The ESMP report is prepared by considering the key applicable environmental and social acts, notifications and polices of Government of Himachal Pradesh (GOHP), Government of India (GOI) and World Bank (WB), as applicable to this project.

1.5.2 Applicable national regulatory acts and notifications

All developmental projects, subject to the applicability, are required to strictly comply with the relevant national environmental laws and regulations of the GOI respective state laws and regulations. The important laws and regulations applicable for the project are given below.

- 1 Wild life (Protection) Act, 1972 and its amendments
- 2 The Water (Prevention and Control of Pollution) Act, 1974 and its amendments
- 3 The Forest (Conservation) Act, 1980 and its amendments
- 4 The Air (Prevention and Control of Pollution) Act, 1981 and its amendments
- 5 The Environmental (Protection) Act, 1986 and its amendments
- 6 Central Motor Vehicle Act /Rules 1989
- 7 The Manufacture, Storage and Import of Hazardous Chemicals Rules

- (MSIHCR) 1989, 2000 and its amendments
- 8 The Batteries (management and handling) rules, 2000 and its amendments
 - 9 The Noise Pollution (Regulation and Control) rules, 2000 and its amendments
 - 10 Ozone Depleting Substances (Regulation and control) rules, 2000
 - 11 Food Safety & Standards Act (Integrated food law), 2000
 - 12 Environmental Impact Assessment notification, 2006 and its amendments
 - 13 Guidelines/criteria for evaluation of proposals/requests for ground water abstraction (with effect from 16.11.2015) and its amendments
 - 14 Solid Waste Management rules, 2016 and its amendments
 - 15 Construction and demolition waste management rules, 2016 and its amendments
 - 16 Bio-Medical waste management rules, 2016 and its subsequent amendments
 - 17 Plastic Waste Management rules, 2016 and its subsequent amendments
 - 18 Hazardous and other wastes (Management and Transboundary Movement) rules, 2016 and its amendments
 - 19 E-Waste (Management) rules, 2016 and its amendments

Some of the above mentioned laws are applicable at the time of construction, while the others are applicable at the time of operations, and some during both the stages of the project.

1.6 Project description

The hydro cooling facility for cherries is proposed to be set up at existing CA store and G&P unit, Jarol Tikkar, Shimla district on pilot basis. This unit is complete with a feeding line and conveyor belt. The effective length of the cooling area will be 3,000 mm and width will be 750 mm. The capacity of the unit will be 1,000 kg cherries per hour. Supplying water temperature will be controlled at level of 0.5-2.5°C. The unit is manufactured in stainless steel. A control unit for water quality (chlorine dosing) is a part of the unit. Wastewater generated from the facility will be treated in the proposed Sewage Treatment Plant, and the treated water shall be reused. The total power requirement (CA Stores, Grading and Packing & Cherry Hydro cooling) 600 kVA will be sourced from Himachal Pradesh State Electricity Board.

1.6.1 Location & access to the facility

The salient features of the project site are given in **Table 1.1**.

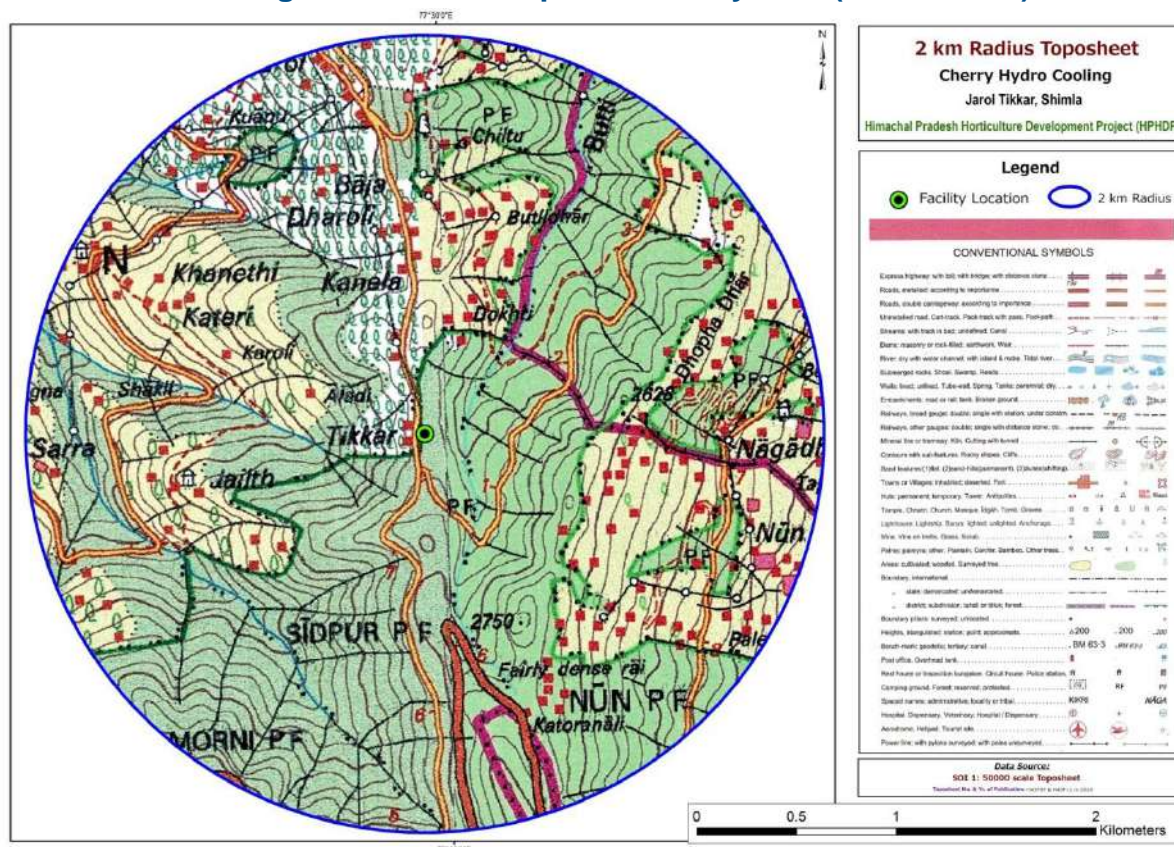
Table 1.1: Salient features of the project site

Location	Tikkar (V), Nankhari (T), Shimla (D)
Geographical co-ordinate	31° 15' 14.49" N 77° 29' 45.69" E (Elevation - 2700 m)
Elevation	2700 m above MSL
Total Land Area	2.61 acres
Nearest railway station	Nearest Railway Station is in Shimla, 37km to south west of project site.

Nearest highway	NH-5, 3.5 km (W)
Nearest water body	Sutlej river, 11 km (N)
National parks/Wildlife sanctuaries	None in the vicinity of the site
River	Sutlej, 11 km (N)

Figure 1.2 shows the study area (2 km radius).

Figure 1.2 Base map of the study area (2 km radius)



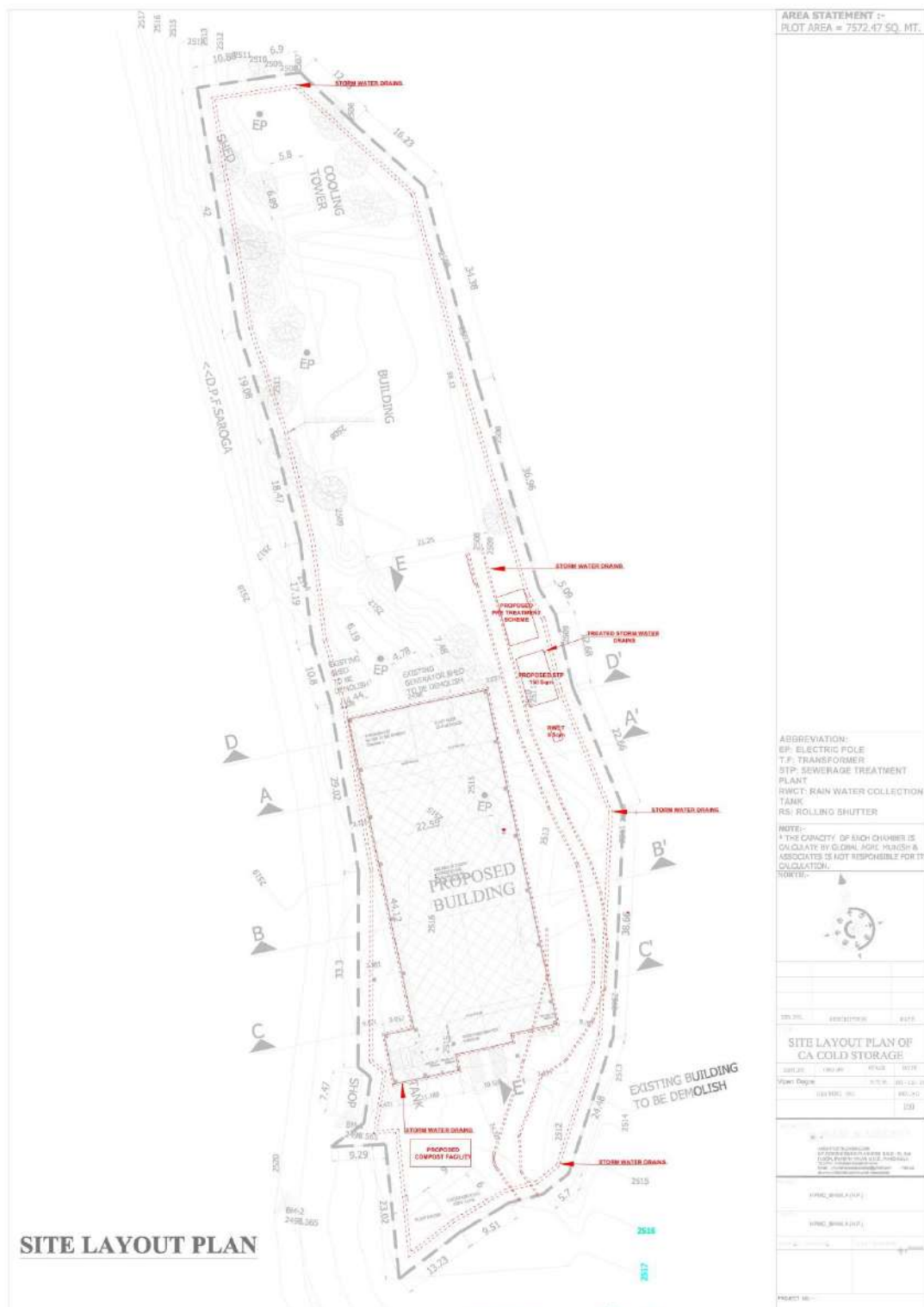
1.6.2 Land Details

The Cherry hydrocooling facility will be established within the CA store. The land breakup for proposed project is given in Table 1.2. Project layout is provided in Figure 1.3.

Table 1.2: Land use details of the Facility

S.No	Description	Area in Sqm	Percentage (%)
1	Ground cover	2948.63	39
2	Roads	348	5
3	Greenbelt	3118.5	33
4	Open space	3035	32
Total		9450	100

Figure 1.3: Project Layout



1.6.3 Proposed facility

The infrastructure requirement for the existing project at Jarol Tikkar, Shimla can be broadly classified into the following two heads.

The built up area is given in **Table 1.3**.

Table 1.3: Built Up Area

S.No	Description	Area in Sqm
1. Existing Building		
1.1	Controlled Atmosphere Storage Facility	1235.05
2. Proposed building		
2.1	Cherry Hydro Cooling and Grading & Packing	
	Plant room	108.5
	chamber -1	78.3
	P&G area and Cherry Hydro cooling	1063.84
	Testing lab	11.31
	Receiving & Dispatch area	54.8
	Lifts & stairs	195.27
	Sub total	1512.02
	Controlled Atmosphere Storage Facility	1577.58
	Total Built up Area	4324.65
<i>Source: DPR on Expansion, Upgradation and Strengthening of Pack house & CA-store and Development of Hydro-cooling facilities for cherries at Jarol Tikkar</i>		

1.6.4 Man power requirement

The maximum man power required for construction activity is around 5 persons. For day to day activities around 5 people are required during the peak season. Most of manpower will be taken from local community for construction and operation activities.

1.6.5 Power requirement

The power requirement for grading & packing, CA Store and cherry hydro cooling activities after expansion is about 600 kVA (400 kW). DG set capacity of 470 kVA will be used in case of power failures.

1.6.6 Water requirement

Water for the existing/proposed project is sourced through Irrigation & Public Health (IPH). The details of water requirement for different activities of the project are mentioned in **Table 1.5** below:

Table 1.4: Water Requirement

Category	Water Requirement	Remarks
Process	1	10 KL of water shall be one time requirement and 1 KLD of water required for makeup water.
Domestic KL/day	0.5	
Total	1.5 KLD	

1.6.7 Roads & street lights

Transport is a basic infrastructure, which is usually a pre-requisite for day to day travel. The roads would be wide enough to meet emergency requirement for movement of fire engine, ambulance etc. All along the internal roads and along the periphery of the project site, adequate street lighting will be provided.

1.7 Structure of ESMP

The ESMP is structured as follows:

Chapter 1 Introduction: provides a description of objective, scope, metrology, policy, legal and administrative framework, project description and structure of the report

Chapter 2 Environment and Social Mitigation Plans: provides summary of environmental impacts, description of mitigative measures, implementation of mitigative measures and Environmental & Social cell structure

Chapter 3: Environment and Social Monitoring Plan: covers Environmental monitoring program, Institutional arrangements and capacity development for implementation of ESMP

Chapter 2

Environmental and Social Mitigation Plans

Chapter 2

Environmental and Social Mitigation Plans

2.1 Summary of environmental impacts

Description of environmental and social mitigation plan for construction and operation activities of the project is provided in this section. Action plan is a list of mitigation/management/avoidance measures against identified potential adverse impacts by ESIA study. For each mitigative measure the action plan provides operational details like impacted location, cost, time of implementation (phase) and implementation & supervisor responsibilities.

Environmental impact classification is a simple, objective and transparent method for classifying impacts due to project activities in terms of magnitude of their impacts on the recipient area/ environment. Classification of impacts was done based on i) nature of predicted impacts ii) significance of the predicted impacts and iii) duration of the predicated impacts. The details of attributes used for each of the above parameter are given in **Table 2.1**.

Table 2.1 Criteria for Classification of potential impacts

S.no	Classification	Definition
1	Nature of predicated impact	
	Neutral	No overall environmental Impact
	Adverse	Negative environmental impact
	Beneficial	Positive environmental impact
2	Duration of predicted impact	
	Short term	Impact only during the activity or persisting for less than 3 months
	Medium term	Impact persisting for 3 to 6 months
	Long term	Impact persisting for more than 6 months
3	Significance (Magnitude) of predicated impact	
	Insignificant	Impact too small to be measured or quantifiable, not giving rise to any change in environment
	Minor	Impact capable of causing change in the environment but not affecting /changing the environment quality status (within standards)
	Significant	Impact capable of causing sufficient change in the environment affecting /changing the environments quality status (above standards)
	Major	Impact capable of causing irreversible change in the environment causing considerable effect on environments quality status. (above standards)

Based on the above criteria the potential impacts identified due to construction and operation activities were classified.

2.2 Technical details of mitigation measures

Detailed mitigation plans and measures were identified for all the significant impacts arising out of construction and operation activities. The impact for all the environmental categories like air, water, soil, noise, ecology and socio economic components are identified and classified based on the magnitude of impact. The technical details are provided in **Table 2.2**.

Table 2.2 Technical details of potential impacts due to project activity

S.no	Phase	Activity	Potential Impact	Nature	Duration	Significance
1	Air Environment					
	Construction activities	Site preparation, build & infrastructure construction work	Fugitive dust emissions	Adverse	Short- term	Minor
		Vehicular movement & Construction equipment	Fugitive dust, CO & NO _x emissions	Adverse	Short- term	Minor
	Operation activities	Loading, Unloading and handling activity	Fugitive dust emissions	Adverse	Long-term	Minor
		Traffic/ Vehicles movement	Fugitive dust, CO & NO _x emissions	Adverse	Long-term	Minor
		DG set usage	Particulate matter, SO ₂ & NO _x emissions	Adverse	Long-term	Minor
2	Water Environment					
	Construction activities	Water consumption for domestic purpose	Availability of municipal water	Neutral	Short- term	Insignificant
		Water consumption for construction work	Availability of water	Beneficial	Short- term	Significant
		Curing/ watering, spillovers and cleaning of construction instruments	Suspended solids and oil & grease	Adverse	Short- term	Minor
		Domestic sewage generation	Physical, chemical & Biological parameters	Adverse	Short- term	Significant
	Operation activities	Water consumption for domestic purpose	Availability of municipal water	Neutral	Long-term	Insignificant
		Water consumption for cleaning of fruits and green belt development	Treated water reused	Beneficial	Long-term	Significant
		Domestic sewage generation	Physical, chemical & Biological parameters	Adverse	Long- term	Significant
		Waste water generation from cleaning of	Suspended solids and oil &	Adverse	Long- term	Minor

		fruits	grease			
3	Noise & Vibration Environment					
	Constructi on	Noise and vibration generated due to construction activity and equipment used	Increased noise levels	Adverse	Short- term	Significant
		Noise generated by movement of trucks carrying construction materials and equipment	Increased noise levels	Adverse	Short- term	Significant
	Operation	Anthropogenic activities during auction and related activities	Increased noise levels	Adverse	Short- term	Significant
		Noise generated due to use of DG set during power failure.	Increased noise levels	Adverse	Short- term	Significant
		Noise generation from vehicles carrying the supplies to and from the site	Increased noise levels	Adverse	Short- term	Minor
4	Solid Waste					
	Constructi on	Construction and demolition waste generated by new and up gradation activity	Generation of inert construction waste	Adverse	Short- term	Minor
		Site clearance, site formation and excavation work	Generate inert waste	Adverse	Short- term	Minor
	Operation	Waste generated from vegetable and fruits handling	Generation of bio degradable waste	Adverse	Long - term	Significant
		Waste generated from office activities	generation of waste	Adverse	Long - term	Minor
5	Ground water					
	Constructi on	Consumption for domestic and construction activity	Depletion of ground water	Neutral	Long - term	Insignificant
		Discharge of construction wastewater on land	Impact on ground water	Adverse	Short- term	Minor
	Operation	Consumption for operation activity	Depletion of ground water	Neutral	Long - term	Insignificant
		Discharge of untreated domestic sewer on land	Impact on ground water	Adverse	Long - term	Minor

6	Soils, Hydrogeology and Land use and land cover impact assessment					
	Constructi on	Compaction of soils by earth moving equipment	Degradation of top soil	Adverse	Short- term	Minor
		Disturbing natural drainage contours, slopes	Impact on soil condition and hydrology	Adverse	Short- term	Minor
	Operation	Indiscriminate use of fertilizers for greenbelt development	Impact on soil conditions	Adverse	Long - term	Minor
		Discharge of wastewater not meeting standards on land	Impact on soil conditions	Adverse	Long - term	Minor
		Not maintaining proper storm water drains, rain water harvesting pits, etc.	Impact on soil condition and hydrology	Adverse	Long - term	Minor
		Oil and grease leakage due to vehicle breakage within the site.	Impact on soil conditions	Adverse	Long - term	Minor
7	Flora and Fauna					
	Constructi on	Site clearance, site formation and excavation work	Impact on vegetation	Adverse	Short- term	Insignificant
		Moment of vehicles, dust and noise generation	Impact on fauna/ animals	Adverse	Short- term	Insignificant
	Operation	Green belt development in and around the site	Improvement in vegetation and fauna quality	Beneficial	Long - term	Significant
8	Sanitation, occupational health & safety					
	Constructi on	Open defecation and hygienic maintenance of toilets	Impact on hygiene and health	Adverse	Short- term	Significant
		Accidents at work place and due to movement of construction vehicles	Impact on health & safety	Adverse	Short- term	Minor
		Indiscriminate disposal of waste generated on land near collection bins	Impact on hygiene and health	Adverse	Short- term	Minor
		Transport facility for workers	Impact on health & safety	Beneficial	Short- term	Significant
		Availability of medical facilities	Impact on health	Beneficial	Short- term	Significant

	Operation	Open defecation and hygienic maintenance of toilets	Impact on hygiene and health	Adverse	Long - term	Significant
		Indiscriminate disposal of waste generated on land near collection bins	Impact on hygiene and health	Adverse	Long - term	Significant
		Accidents at work place and due to movement of transport vehicles, loading and unloading activities and movement of fruits.	Impact on health & safety	Adverse	Long - term	Minor
		Injuries due to lifting, carrying and improper sitting techniques (Ergonomics)	Impact on health & safety	Adverse	Long - term	Significant
		Un hygienic up keeping and poor ventilation of the work locations	Impact on hygiene and health	Adverse	Long - term	Significant
		Transport facility for workers	Impact on health & safety	Beneficial	Long - term	Significant
		Day care facility for children of workers	Impact on hygiene health & safety	Beneficial	Long - term	Significant
		Availability of medical facilities	Impact on health	Beneficial	Long - term	Significant
9	Socio-economic Impacts					
	Construction	Increase in employment opportunities	Increase in financial and living standards	Beneficial	Short- term	Significant
		Employment of women	Empowerment of women	Beneficial	Short- term	Significant
		Health and safety of workers	Improvement in living standards	Beneficial	Short- term	Significant
	Operation	Increase in employment opportunities	Increase in financial and living standards	Beneficial	Long - term	Significant
		Employment of women	Empowerment of women	Beneficial	Long - term	Significant
		Development around site	Increase in economy of the area	Beneficial	Long - term	Significant
		Health and safety of workers	Improvement in living standards	Beneficial	Long - term	Significant
10	Environmental risks					

	Construction & Operation	Earthquake	Potential damage to life and property	Adverse	Long - term	Significant
		Landslide	Potential damage to life and property	Adverse	Long - term	Insignificant
		Flash flood	Potential damage to life and property	Adverse	Short- term	Minor
11	Fire and explosion hazards					
	Construction	Combustion of flammable material and short-circuit	Potential fire accident causing damage to life and property	Adverse	Short- term	Significant
	Operation	High speed diesel (HSD)	Potential explosion causing damage to life and property	Adverse	Long - term	Significant
		Combustion of flammable material and short-circuit	Potential fire accident causing damage to life and property	Adverse	Long - term	Significant
		Liquid Ammonia	Potential health hazard	Adverse	Short-term	Minor

2.3 Estimates for impacts due to mitigative measures

There will not be any negative impacts due to the proposed mitigative measures. These measures will help eliminate or reduce the expected environmental impacts due to construction and operation activities within the applicable standards.

No involuntary resettlement, impact on indigenous people and cultural property is expected due to proposed mitigative measures

2.4 Description of environmental and social mitigation measures

Environmental and social mitigation measures provide an action plan to implement measures for various identified potential impacts due to construction and operation activities.

2.4.1 Planning of mitigation measures

To improve the effectiveness and sustainability of the project, environmental and social considerations need to be mainstreamed into project planning, implementation and monitoring activities. The main objective is to identify and mitigate all the potential impacts due to construction and operational activities, and to further enhance the potential benefits. Considering inputs on environmental and social impacts during design will help minimise modification and can be included as part of the DPR recommendations.

Environment and social mitigation and management measures due to construction and operation activities are listed in Table 2.3 and will be applied as per the defined implementation and monitoring plan.

2.4.2 Implementation of mitigation measures

Implementation and monitoring of mitigation measures shall be carried out during construction and operation activities as detailed below

Construction activities: Implementations of mitigative and management measures during construction activity shall be the responsibility of the project contractor. Environment and Social Management Cell (E&SM cell)/ Project Implementation Unit (PIU) shall monitor and supervise compliance and effectiveness of the recommended mitigation measures by the contractor.

Operation activities: Implementations of mitigative and management measures during operational activity shall be the responsibility of the E&SM cell or identified contractor. Project Implementation Unit (PIU) shall monitor and supervise compliance and effectiveness of the recommended mitigation measures by the contractor.

Table 2.3 Description of mitigation measures and action plan

S. no	Affected Receptor	Mitigation Measures	Feasibility, Effectiveness & Sustainability	Time Frame	Source	Institutional Responsibility	
						Implementat ion	Supervision
I	Construction activities						
1	Air Environm ent	<ul style="list-style-type: none">➤ Provide tin sheet of about 3 m height around construction site to prevent dust nuisance➤ Excavated soil at the construction site should be carefully handled and stored as heaps which is appropriately covered to minimise dust generation.➤ Construction machinery shall be properly maintained to minimize emission of CO, PM10 & PM2.5, SO₂ and NO_x.➤ All vehicles entering the site to be asked to have valid pollution control certificate.➤ Watering over all the exposed construction area should be done at least twice a day to reduce dust generation.	<ul style="list-style-type: none">➤ Proposed mitigative measures are feasible and easy to implement.➤ After implementing the mitigative measures, impact due to construction activities on AAQ is likely to be minimal and within the standards.	During constructi on period	Part of construction contract	Contractor	E & SM cell
2	Water Environm	<ul style="list-style-type: none">➤ Proper drainage and collection	<ul style="list-style-type: none">➤ Proposed mitigative	During	Part of	Contractor	E & SM cell

	ent	<p>systems would be provided so that the runoff water from the site gets collected in sedimentation basin/tank for treatment. This would help avoid waste water stagnation in the form of cesspools promoting breeding of mosquitoes and creating insanitary conditions.</p> <ul style="list-style-type: none"> ➤ The treated water will be reused for construction purposes, for sprinkling of water on roads to control dust emissions and for green belt development. ➤ The wastewater generated from temporary sanitation facilities provided for the work force during construction will be diverted to septic tank followed by soak pit or will be diverted to the proposed portable STP. 	<p>measures are feasible and easy to implement.</p> <ul style="list-style-type: none"> ➤ After implementing the mitigative measures impact due to construction activities on water environment (surface and ground) is likely to be minimal and within the standards. 	constructi on period	construction contract		
3	Noise & Vibration Environm ent	<ul style="list-style-type: none"> ➤ Construction activities and equipment generating noise and vibration will be used only during day time and should be avoided at night in order to maintain calm conditions during night and early hours. ➤ Wherever possible, use of noise 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact due to construction activities on ambient noise quality is likely to be 	During constructi on period	Part of construction contract	Contractor	E & SM Cell

		<p>and vibration generating equipment will be kept away from the human habitations.</p> <ul style="list-style-type: none"> ➤ All the construction vehicles entering into the project will be informed to maintain speed limits, and not to blow horns unless it is required. ➤ The workers involved in operating major noise generating equipment's will be provided with personal protective equipment (PPE) like ear plugs/ear muffs etc. 	minimal and within the standards				
4	Solid Waste	<ul style="list-style-type: none"> ➤ All construction waste would be stored within the site itself. A proper screen will be provided around construction and storage area so that the waste does not get scattered. ➤ Top Soil excavated from the site shall be handled carefully and utilized for greenbelt development. ➤ Attempts will be made to keep the waste segregated into different heaps as far as possible so that their further gradation and reuse is facilitated. 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact due solid waste generated is likely to be minimal and within the standards 	During construction period	Part of construction contract	Contractor	E & SM Cell

		<ul style="list-style-type: none"> ➤ Materials, which can be reused for purpose of construction, levelling, making roads/ pavement will also be kept in separate heaps from those which are to be sold or land filled. 					
5	Ground water	<ul style="list-style-type: none"> ➤ Ground water is not used hence there will be no impact on quantity ➤ Care will be taken to eliminate construction water stagnation and any possibility of ground water contamination 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact on ground water is likely to be minimal and within the standards 	During construction period	Part of construction contract	Contractor	E & SM Cell
6	Soils, Hydrogeology and LU&LC	<ul style="list-style-type: none"> ➤ Top soil excavated from the site will be carefully handled and will be used for greenbelt development. ➤ Soil will be stored as heap and appropriate cover will be provided. ➤ Care will be taken to avoid disturbing or changing drainage contours during excavation or green belt development. ➤ There will be no change in LU&LC as all the proposed activities will be within the existing site. 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact due to construction activities on soil, hydrology and LU&LC is likely to be minimal and within the standards 	During construction period	Part of construction contract	Contractor	E & SM Cell

7	Flora and Fauna	<ul style="list-style-type: none"> ➤ Care will be taken to avoid any disturbance to flora and fauna of the area 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact due to construction activities on Flora and Fauna is likely to be minimal and within the standards 	During construction period	Part of construction contract	Contractor	E & SM Cell
8	Sanitation, occupational health & safety	<ul style="list-style-type: none"> ➤ Eliminate open defecation by providing separate well maintained toilets for men and women with provision for physically challenged people at atleast one toilet. ➤ Top soil excavated from the site will be carefully handled and will be used for greenbelt development. ➤ Soil will be stored as heap and appropriate cover will be provided. ➤ Provide personal protection equipment (PPE) like helmet, shoes, grousers and ear plugs/ ear muffs to the construction labour ➤ Notice boards with all safety measures to be taken at 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact due to construction activities on Sanitation, occupational health & safety is likely to be minimal and within the standards 	During construction period	Part of construction contract	Contractor	E & SM Cell

		<p>construction site and accident proven areas will be displayed all strategic locations within the construction site.</p> <ul style="list-style-type: none"> ➤ Maintain basic First aid kit with sufficient quantity of medi care to meet requirement of about 30 labours during construction activity ➤ Speed of transport vehicles will be restricted to 20 km/hr and proper sign boards at entry exist, turning and accident proven areas shall be provided to minimise the accidents within the site. ➤ Provide transport facility to workers for pick up and drop ➤ Day care facility for children of staff & workers to be provided 					
9	Socio-economic Impacts	<ul style="list-style-type: none"> ➤ Increase in employment opportunities for the local people ➤ Help enhance empowerment of women ➤ Improve health and safety of the construction workers 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact due to construction activities on Social economic conditions likely to be improve and will be a 	During constructi on period	Part of construction contract	Contractor	E & SM Cell

			positive impact.				
10	Environmental risks	<ul style="list-style-type: none"> ➤ Site construction should be in line with codes and guidelines, finalized and published by the BIS for retaining walls and landslide control ➤ Construction of earthquake resistant building as per codes IS: 1893 (Part 1): 2002 and IS 1893: Part 4: 2002 ➤ Retrofitting of the existing building and structures to code specified level ➤ Sewerage and storm water systems to be provided based on maximum rainfall and maintained properly with regular checks for smooth flow of water ➤ Provision to be made to harvest most of the rain water from the proposed site. This will reduce the water shortage as well as runoff water on the site ➤ Educate workers about the basic first-aid instructions which may be useful after a severe earthquake and conduct safety training and drills informing necessary 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact due to Environmental risks is likely to be minimal and within the standards. 	During construction period	Part of construction contract	Contractor	E & SM cell

		<p>authorities</p> <ul style="list-style-type: none"> ➤ Move to higher floor of the building when the ground/site is flooded ➤ Turn off electricity to reduce the risk of electrocution ➤ Alert necessary government agencies/departments to make evacuation plan 					
11	Fire and explosion hazards	<ul style="list-style-type: none"> ➤ All construction equipment used should be tested and certified by a national or reputed standards testing authority ➤ The plant manager is advised to ensure that the fire-fighting equipment is in good working conditions in sufficient numbers . ➤ It will be advised to keep oxygen cylinders, medical kits and masks to prevent smoke inhalation. ➤ An emergency evacuation plan to be prepared ➤ Regular mock drills to create awareness on procedures to be followed in times of emergency situation/evacuation. 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact due to Fire and explosion hazards is likely to be minimal and within the standards. 	During construction period	Part of construction contract	Contractor	E & SM cell

II		Operation activities					
1	Air Environm ent	<ul style="list-style-type: none"> ➤ Provide sheet of about 3 m height around loading and unloading areas to prevent dust nuisance ➤ All vehicles entering the site to be asked to have valid pollution control certificate. ➤ Proper maintenance of DG Sets should be carried out on regular basis ➤ DG stack monitoring to be carried out on regular basis (once a month 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact due to operational activities on AAQ is likely to be minimal and within the standards. 	Operation phase	Part of ESMP cost	E & SM cell	PIU
2	Water Environm ent	<ul style="list-style-type: none"> ➤ The process waste water generated will be collected through drainage networks and will be sent for pre-treatment before sending to STP. ➤ The sewage generated will be collected through drainage networks and will be sent to sewage treatment plant (STP) by underground gravity sewers. ➤ Treated water will be used for cleaning of fruits, flushing in toilets, 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures impact due to operational activities on water environment (surface and ground) is likely to be minimal and within the standards. 	Operation phase	Part of ESMP cost	E & SM cell	PIU

		<p>floor cleaning, green belt development and sprinkling on roads to control dust emissions in the site. The remaining treated water will be discharged into nearest sewer line.</p> <ul style="list-style-type: none"> ➤ No waste water/ sewage will be discharged outside site without treatment. Hence there will be no adverse impact on the quality of surrounding water bodies and ecology. ➤ Proper maintenances of vehicles will be ensured to avoid any leakage of oil and grease. In case of leakage due to breakdown of vehicle oil and grease will be collected and sent for treatment to Oil & grease removal trap followed by min STP located within the site. 					
3	Noise & Vibration Environment	<ul style="list-style-type: none"> ➤ In the high noise intensity working areas / zones earmuffs or earplugs will be provided to the working personnel. ➤ Regular noise level monitoring will be done periodically for taking corrective action, wherever required. 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures impact due to operation activities on ambient noise quality is likely to be minimal and 	Operation phase	Part of ESMP cost	E & SM cell	PIU

		<ul style="list-style-type: none"> ➤ Proper maintenance and tuning of DG set will be done regularly. ➤ Acoustically designed cabin for DG set is proposed ➤ Green belt all along the boundary and with total area not less than 33% would be developed as the greenbelt. 	within the standards.				
4	Solid Waste	<ul style="list-style-type: none"> ➤ With an aim to provide a clean and litter free site, it is proposed to install sensor-fitted underground waste bins. ➤ For segregation of waste generated by shops and offices within site adequate number of separate bins for collection of biodegradable, non- biodegradable and in organic waste shall be provided based on the quantity of waste estimated. Storage bins shall be designed to avoid odour & spillages, easy to operate, handle, transfer and transport the waste to nearest bins. ➤ Bins provided for storage of biodegradable wastes shall be painted green, those for storage of recyclable wastes shall be painted 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures impact due to solid waste generated at site is likely to be minimal and within the standards. 	Operation phase	Part of ESMP cost	E & SM cell	PIU

		<p>blue and those for storage of in organic/ other wastes shall be painted yellow.</p> <ul style="list-style-type: none"> ➤ About 90% waste generated at site consists of fruit wastes. It is proposed to implement Compost method to recycle organic waste which breaks down organic material to generate stable, sanitized and humus-like material rich in organic matter and free from odors. 					
5	Ground water	<ul style="list-style-type: none"> ➤ Ground water is not used hence there will be no impact on quantity ➤ Care will be taken to eliminate waste water stagnation and any possibility of ground water contamination 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact on ground water is likely to be minimal and within the standards 	Operation phase	Part of ESMP cost	E & SM cell	PIU
6	Soils, Hydrogeology and LU&LC	<ul style="list-style-type: none"> ➤ Use of fertilizer will be minimized/ eliminated as it is proposed to use the compost generated from site organic waste. ➤ Rain water from roof tops and run off water will be properly collected and transferred to proposed rain 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact due to operation activities on soil, hydrology 	Operation phase	Part of ESMP cost	E & SM cell	PIU

		<p>water harvesting pits constructed within the site open area.</p> <p>➤ Proper maintenances of vehicles will be ensured to avoid any leakage of oil and grease. In case of leakage due to breakdown of vehicle oil and grease will be collected and sent for treatment to Oil & grease removal trap followed by min STP loaded with in the site.</p>	<p>and LU&LC is likely to be minimal and within the standards</p>				
7	Flora and Fauna	<p>➤ Care will be taken to avoid any disturbance to flora and fauna of the area</p> <p>➤ It is proposed to create 3 tier green belt areas within the site using local species which will help enhance flora & fauna of the area.</p>	<p>➤ Proposed mitigative measures are feasible and easy to implement.</p> <p>➤ After implementing the mitigative measures, impact due to operation activities on Flora and Fauna is likely to be minimal and within the standards</p>	Operation phase	Part of ESMP cost	E & SM cell	PIU
8	Sanitation, occupational health & safety	<p>➤ Eliminate open defecation by providing separate well maintained toilets for men and women with provision for physically challenged people at atleast one toilet.</p> <p>➤ The solid waste generated will be collected and stored in bins to</p>	<p>➤ Proposed mitigative measures are feasible and easy to implement.</p> <p>➤ After implementing the mitigative measures, impact due to operational activities on Sanitation,</p>	Operation phase	Part of ESMP cost	E & SM cell	PIU

		<p>avoid order, unhygienic conditions and stay animal nuisances.</p> <ul style="list-style-type: none"> ➤ Maintain walkways and working surfaces to be clean and dry by preventing spillages water/liquids during operational activities ➤ Provide personal protection equipment (PPE) like helmet, shoes, grousers and ear plugs/ ear muffs to the workers. ➤ Notice boards with all safety measures to be taken at within the site and accident proven areas will be displayed all strategic locations within the site. ➤ Maintain basic First aid kit with sufficient quantity of medi care to meet requirement of about 30 labours during construction activity ➤ Speed of transport vehicles will be restricted to 20 km/hr and proper sign boards at entry exist, turning and accident proven areas shall be provided to minimise the accidents within the site. ➤ Medical doctor (MBBS) will be available within the site once a 	<p>occupational health & safety is likely to be minimal and within the standards</p>				
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		<p>week to attend to medical needs of labours construction labour.</p> <ul style="list-style-type: none"> ➤ All workers shall be trained on the basic ergonomics principles. This should cover the correct lifting, carrying and setting down techniques to prevent incidences of hernias, sprains, strains, back injuries and other muscular-skeletal disorders due to improper handling of objects. 					
9	Socio-economic Impacts	<ul style="list-style-type: none"> ➤ Increase in employment opportunities for the local people ➤ Help enhance empowerment of women ➤ Improve health and safety of the construction workers ➤ There will be overall development and prosperity in the study area 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact due to operational activities on Social economic conditions likely to improve and will be a positive impact. 	Operation phase	Part of ESMP cost	E & SM cell	PIU
10	Environmental risks	<ul style="list-style-type: none"> ➤ Place large & heavy objects at ground level and provide strong support to gas and power appliances ➤ Educate workers about the basic first-aid instructions which may be 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact due to 	Operation phase	Part of ESMP cost	E & SM Cell	PIU

		<p>useful after a severe earthquake and conduct safety training and drills informing necessary authorities</p> <ul style="list-style-type: none"> ➤ Move to higher floor of the building when the ground/site is flooded ➤ Turn off electricity to reduce the risk of electrocution ➤ Alert necessary government agencies/departments to make evacuation plan 	<p>Environmental risks is likely to be minimal and within the standards.</p>				
11	Fire and explosion hazards	<ul style="list-style-type: none"> ➤ All appliance used should be tested and certified by a national or reputed standards testing authority ➤ All electrical wiring, rewiring or extension work must be carried out by licensed electrical contractors. On completion, the contractors should test before electricity supply is connected. ➤ To ensure electrical safety in the facility, a current-operated earth leakage circuit breaker (ELCB) or residual current circuit breaker (RCCB) set to operate at a very small leakage current is recommended. In case of 	<ul style="list-style-type: none"> ➤ Proposed mitigative measures are feasible and easy to implement. ➤ After implementing the mitigative measures, impact due to Fire and explosion hazards is likely to be minimal and within the standards. 	Operation phase	Part of ESMP cost	E & SM cell	PIU

		<p>dangerous electrical leakage to earth, it should automatically cut-off the supply of electricity.</p> <ul style="list-style-type: none"> ➤ Plant manager is advised to ensure that the fire-fighting equipment is in good working conditions in sufficient numbers as there were no such equipment present ➤ It will be advised to keep oxygen cylinders, medical kits and masks to prevent smoke inhalation. ➤ An emergency evacuation plan to be prepared ➤ Regular mock drills to create awareness on procedures to be followed in times of emergency situation/evacuation. 					
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2.5 Commitment to mitigation

For all mitigation measures proposed during construction and operation activities, information on their feasibility, effectiveness, timeframe and institutional responsibilities are detailed in mitigation measures and action plan. The Environmental & Social cell will help to supervise implementation of the proposed mitigative measures.

Chapter 3

Environmental & Social

Monitoring Plans

Chapter 3

Environmental and Social Monitoring Plans

3.1 Environmental Monitoring Program

Regular monitoring of environmental parameters is very important to assess the status of environment during project operations. With the knowledge of baseline conditions, the monitoring program will serve as an indicator for any deterioration in environmental conditions due to operation of the proposed project. This shall enable taking up timely measures to mitigate any adverse impacts on the environment. Based on the predicted and assessed impacts as well as the baseline environmental status of the project area, an environmental monitoring program is suggested for implementation during various stages of the project cycle.

3.1.1 Establishment of Monitoring, Evaluation and Reporting Mechanism

The environmental monitoring is systematic collection of samples of the environmental parameters like air, water, soil, noise in order to observe and study the environmental changes if any due to the project activity. The monitoring program will help the project on maintaining the standards as per the existing guidelines. The monitoring program also gives action plan for how to maintain the standards for each parameter.

Based on the predicted and assessed impacts as well as the baseline environmental status of the project area, an environmental monitoring program is suggested for implementation during various stages of the project cycle. All monitoring strategies and programs have reasons and justifications which are often designed to establish the current status of an environment or to establish trends in environmental parameters. In all cases, the results of monitoring will be reviewed, analyzed statistically and submitted to concerned authorities.

The project shall implement the environment monitoring program in line with the planned schedule. The proponent shall ensure that necessary requisite facilities are made available and budgetary provision is made as and when required to ensure regular efficient environmental monitoring activities. The monitoring program covers following activities

- Construction phase
- Operation phase

3.1.1.1 Construction Phase

The generic environmental measures that need to be undertaken during project construction stage are given in the following **Table 3.1**.

Table 3.1: Environmental monitoring during construction phase

S. No	Potential Impact	Detailed action to be followed as per ESMP	Parameters for Monitoring	Frequency of Monitoring
1.	Air Emissions	All equipment's are operated within specified design parameters.	Random checks of equipment logs/manuals	Once in a quarter/as per CFE issued by SPCB
		Vehicle trips have to be minimized to the extent possible	Vehicle Logs	Once in a quarter/as per CFE issued by SPCB
		Any dry, dusty materials stored in sealed containers are prevented from blowing.	Stockpiles or open containers of dusty materials	Once in a quarter/as per CFE issued by SPCB
		Compaction of soil during various construction activities	Construction logs	
		DG set emissions have to meet stipulated standards	Gaseous emissions (SO ₂ , HC, CO, NO _x)	Once in a quarter/as per CFE issued by SPCB
		Ambient air quality within the premises and adjacent villages of the proposed unit to be monitored.	PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , and CO	At 3-4 locations in every quarter/as per CFE issued by SPCB
2.	Noise	List of all noise generating machinery onsite has to be prepared.	Equipment logs, noise monitoring	Once in a month/as per CFE issued by SPCB
		Working during night has to be minimized.	Records of working hours	Daily till the construction activities are completed/ as per CFE issued by SPCB
		Generation of vehicular noise has to be minimized	Maintenance of records of vehicles	
		Implement good working practices (equipment selection and siting) to minimize noise and also reduce its impacts on human health (ear muffs, safe distances, and enclosures).	Maintaining records of noise levels	
		Machinery should not be run when not required.	Continuous checking	
		Acoustic mufflers/enclosures have to be provided for large equipment	Mufflers/enclosures shall be in place.	
		Noise levels have to be monitored in ambient air within the plant premises.	Continuous recording of noise levels	

S. No	Potential Impact	Detailed action to be followed as per ESMP	Parameters for Monitoring	Frequency of Monitoring
		The noise levels shall not exceed the permissible limits both during day and night		
		All equipment's shall be operated within specified design parameters.	Random checks of equipment logs/manuals	
		Vehicle trips to be minimized to the extent possible	Vehicle logs	
3.	Soil Erosion	Minimize the area of site clearance by complying within the defined boundaries	Site boundaries not extended/ breached as per plan document.	Once in six months/ as per CFE issued by SPCB
		Protect topsoil stockpile	Effective cover in place.	
4.	Wastewater Discharge	No direct discharge of wastewater to be made into surface water, groundwater or soil.	No discharge hoses shall be in vicinity of watercourses.	Once in a quarter/ as per CFE issued by SPCB
		The discharge point would be selected properly and sampling and analysis would be undertaken prior to discharge	Discharge norms for sewage as given in permits	
		Take care of the disposal of wastewater generated such that soil and groundwater resources are protected	Discharge norms for sewage as given in permits	
5.	Drainage and Effluent Management	Ensure drainage system and specific design measures are working effectively. They are designed to incorporate existing drainage pattern and avoid disturbing the same.	Visual inspection of drainage and records	Once in a month/ as per CFE issued by SPCB
6.	Waste Management	Implement waste management plan that identifies and characterizes every waste associated with the proposed activities Also to identify the procedures for collection, handling and disposal of each waste that arises.	Comprehensive Waste Management Plan should be in place and available for inspection onsite. Compliance with solid waste management rules	Once in a quarter/ as per CFE issued by SPCB
7.	Non-routine events and accidental	Plan will be drawn, considering the likely emergencies and steps	Mock drills and records of the same	Once in six months/ as per CFE issued by SPCB

S. No	Potential Impact	Detailed action to be followed as per ESMP	Parameters for Monitoring	Frequency of Monitoring
	releases	required to prevent/limit consequences.		
8.	Health	Health check-ups for employees and migrant labour.	All relevant parameters of occupational health	Once in six months/ as per CFE issued by SPCB/as per Factories Act

3.1.1.2 Operation Phase

During operational phase, air emissions from DG set, treated water from STP etc., would be monitored by internal laboratory or third party laboratory.

The domestic waste water generated will be collected and diverted to portable Sewage Treatment Plant (STP) of capacity 8 KLD. Process waste water is diverted to Pre-treatment scheme for oil & grease removal before sending it to STP. The treated water from STP will be used for gardening, floor washing, etc.

The treatment details are given in **Figure 3.1 and Figure 3.2** and technical details, dimensions are given in **Table 3.2 and Table 3.3**.

Figure 3.1: Treatment Scheme for STP

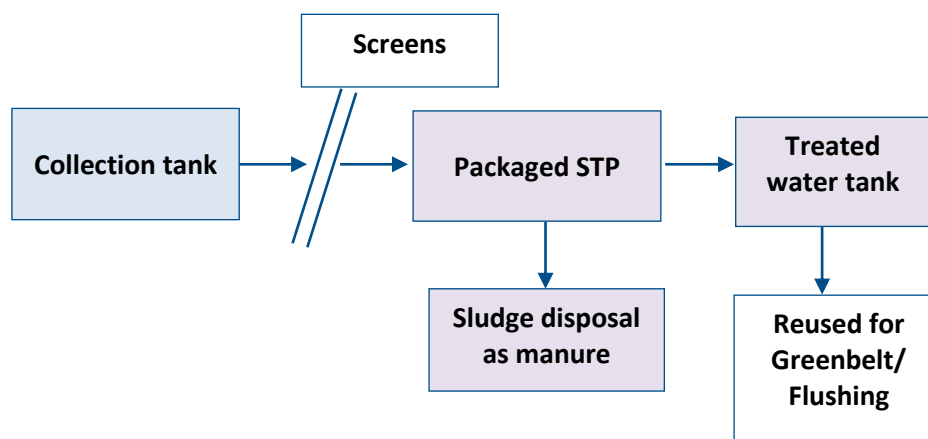


Table 3.2: Treatment details of STP

S No.	Name of the Unit	Purpose	Size
1.	Collection tank	To collect the domestic wastewater from facility.	1.5 x 1.0 x 1.5 m SWD + 0.5 m FB
2.	Bar screen chamber	Screening intercepts floating & suspended debris with a rake to remove the screenings & residue for the disposal offsite.	0.5 x 0.5 x 0.5 m SWD + 0.3 m FB

S No.	Name of the Unit	Purpose	Size
3.	Packaged STP	Packaged Sewage Treatment Plant (PSTP) is housed in specially designed and highly durable FRP tank. Packaged STP is designed to bring the treated sewage parameters (BOD, COD, TSS, TN etc.) below the permissible limit which is stipulated by Pollution Control Boards.	
4.	Treated water tank	To disinfect and store treated water for reuse (Greenbelt/flushing)	1.0 x 1.0 x 1.0 m SWD + 0.3 m FB
5.	Sludge drying beds	To dry the sludge in presence of sun light	
SWD: Side Water Depth; FB: Free Board			

Figure 3.2: Pre-treatment scheme for waste water

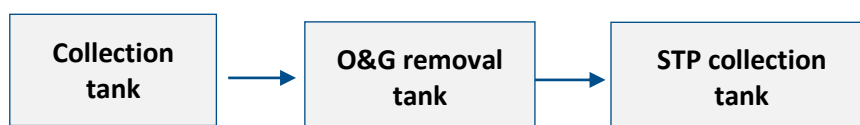


Table 3.3: Treatment details of Pre-treatment scheme

S No.	Name of the Unit	Purpose	Size
1.	Collection tank	To collect the waste water from the facility	1.5 x 1.5 x 1.0 m SWD + 0.3 m FB
2.	O&G removal Tank	To remove Oil & Grease from the waste water	0.5 x 0.5 x 1.0 m SWD + 0.3 m FB
SWD: Side Water Depth; FB: Free Board			

The attributes which are subject to regular monitoring based on the environmental setting and nature of project activities are listed in **Table 3.4.:**

- Point Source emissions and ambient air quality in nearby villages
- Ground water level and its quality
- Water and wastewater and sewage quality etc.
- Solid and hazardous waste characterization (Incinerator ash, leachate etc.)
- Soil quality
- Noise levels (machinery, occupational exposures and ambient noise)

- Noise levels (equipment and machinery noise levels, occupational exposures and ambient noise levels)
- Ecological preservation and afforestation.

Table 3.4: Environmental monitoring during operational phase

S. No	Potential Impact	Action to be Followed	Parameters for Monitoring	Monitoring Frequency
1.	Air Emissions	Stack emissions from DG sets	As per CFE conditions PM, SO ₂ , NO _x	Once in a month as per CFE/CFO conditions given by SPCB.
		AAQ within the project premises.	As per CFE conditions/ NAAQ Standards	
		Vehicles used shall have PUC certificate.	Vehicle logs to be Maintained	
		Meteorological data	Wind speed, direction, temp., relative humidity and rainfall.	
2.	Noise	Noise generated from DG sets, pumps, equipment's etc to be monitored	Noise levels (day and night equivalents)	Once in a month/ as per CFE/CFO conditions given by SPCB
3.	Wastewater Discharge	Comply with wastewater discharge standards as per CPCB/SPCB	pH, TSS, TDS, BOD, COD & Oil & grease (pesticides)	Daily at regular intervals/ as per CFE/CTO conditions given by SPCB
4.	Solid waste/ Haz. Waste	Comply with statutory rules	Segregation into recyclable, compostable, inert	Once in a month/ as per CFE/CFO conditions given by SPCB
5.	Groundwater quality	Monitoring ground water quality in and around project site	Monitoring parameters as per CPCB norms	Once in a quarter/ as per CFE/CFO conditions given by SPCB
6.	Flora and Fauna	Vegetation, green cover and greenbelt development	Survival of native plant species and maintenance of planted species	Once in a season/ as per CFE/CFO conditions given by SPCB
7.	Soil quality	Checking and maintenance of soil quality in and around the project site	Physico-chemical parameters such as NPK, heavy metals etc.	Once in a quarter/ as per CFE/CFO conditions given by SPCB

S. No	Potential Impact	Action to be Followed	Parameters for Monitoring	Monitoring Frequency
8.	Health	Health check-ups for employees and migrant labour	All relevant parameters of occupational health	Once in six months/ as per CFE/CFO issued by SPCB/ as per Factories Act

3.1.2 Planning Year wise implementation schedule

Mitigation plan is the key to ensure that the environmental qualities of the area will not deteriorate due to the construction and operation of the proposed project. The mitigation plan covers all aspects of the construction and operation phases related to environment. The mitigation plan needs to be implemented right from the conception phase and should continue till the end of operations at the project site. The plan can be divided into two phases viz. construction phase and operation phase.

During both phases air, water, wastewater, soil, noise, etc., have to be monitored and the reports should be kept at secured place and submitted to all concerned departments as and when they ask or as per the conditions mentioned in the statutory norms.

Documentation is an important step in implementing ESMP, all statutory clearance obtained should be kept at one place for quick reference. All monitoring results should be kept at selected folders for quick references and access. The results obtained over the period should be tabulated and converted into graphs and diagrams to see the trend in environmental quality changes. Documents which need to be kept in secured place are given below.

- Major technical information in operation
- Organizational charts
- Environmental monitoring standards to achieve
- Environmental and related legislations to be followed
- Operation procedures
- Monitoring records
- Quality assurance plans
- Emergency plans (onsite and offsite disaster management plan)
- MSDS of the various chemicals used in the project

Record keeping and reporting of performance is an important management tool for ensuring sustainable operation. Records should be maintained for regulatory, monitoring and operational issues. Typical record keeping requirements for the units are summarized in **Table 3.5** below.

Table 3.5: Record keeping particulars

Parameter	Particulars
Solid Waste Handling and Disposal	<ul style="list-style-type: none"> Daily quantity of waste generated
Waste water	<ul style="list-style-type: none"> Daily quantities of wastewater & treated sewage Point of generation & usage of treated wastewater Treated water quality
Regulatory Licenses (Environmental)	<ul style="list-style-type: none"> Environmental permits / consents from SPCB – renewals
Monitoring and Survey	<ul style="list-style-type: none"> Records of all monitoring carried out as per the finalized monitoring protocol
Accident reporting	<ul style="list-style-type: none"> Date and time of the accident Sequence of events leading to accident & history of accidents Investigation reports of previous accidents Chemical datasheet assessing effect of accident on health and environment Emergency measures taken Corrective measures and steps taken to prevent recurrence of such events
Other	<ul style="list-style-type: none"> Log book of compliance Employee environmental, health and safety records Equipment inspection and calibration records Vehicle maintenance and inspection records

The detailed implementation schedule is given **Table 3.6**

Table 3.6: Implementation schedule

Phase	Period	Remarks
Construction phase	Before starting construction activities at site	<ul style="list-style-type: none"> Necessary arrangement will be made in identifying third party labs in carrying monitoring Necessary funds will earmarked in the budget
Operation phase	Monthly, quarterly, six monthly, yearly	<ul style="list-style-type: none"> In house monitoring for regular day to day needs. Third party monitoring for additional studies if required as per statutory norms ESMP capital cost will be allotted during initial stages and recurring cost will be provided for regular operation and maintenance, chemicals, etc.

3.1.3 Monitoring ESMP progress

ESMP needs to be monitored in order to track the progress in implementing the agreed mitigation measures. This should be done on monthly/ quarterly/ annual basis (on agreed periodicity) to capture details if measures are implemented according to schedule and where delays are encountered, reasons need to be explained and solutions suggested. ESMP Progress Monitoring template is provided in **Table 3.7**.

The executing agency should use observations and stakeholder consultations (in particular with affected groups) in order to judge the measures' effectiveness. The agency is also encouraged to seek synergies with the project's monitoring plan which might include indicators that can be used for judging the effectiveness of mitigation measures (e.g., livelihood indicators of affected groups).

Monitoring should also check for additional environmental or social risks that may have emerged since the project start and establish appropriate mitigation measures for any significant new risk. These risks and their mitigating measures should be added to the ESMP and then reported.

The reporting system shall operate linearly with the executing agency/contractor, who will report to Environment and Social Management cell who will in turn report to the Project Implementation Unit (PIU). All reporting by the Contractor and E&SM cell shall be on monthly/quarterly/annual basis. The PIU shall be responsible for preparing targets for each of identified ESMP activities.

Table 3.7: ESMP Progress Monitoring – template

Environmental Progress Monitoring TO BE COMPLETED BY EXECUTIVE AGENCY				
Period covered by the report:				
A	B	C	D	E
Social & Environment Impact iv	Mitigation measures	Progress	Described status of completion, suggest solutions where problems are encountered	Early judgment: does this measure seem effective?
Construction Activity				
Air Environment				
Water Environment				
New ESMS impacts that have emerged				
Operation Activity				
Air Environment				
New ESMS impacts that have emerged				
TO BE COMPLETED BY IMPLEMENTING AGENCY (IUCN)			Date/Name of reviewer:	
Progress monitoring – main findings:			Status ESMP <input type="checkbox"/> On schedule <input type="checkbox"/> Slightly delayed <input type="checkbox"/> Major delays/issues	

Note ^{iv} Columns A & B are copied from the Table 4.2 : Environmental and social impact mitigation action plan
 Progress of implementing mitigative measures to be color coded as **Green**= Ahead or on schedule or completed; **Orange**= Slightly delayed; **Red**= Delayed

3.2 Institutional arrangements and capacity development for implementation of ESMP

For implementation of ESMP, an Environment & Social Management Cell (E&SM cell) has to be formed. The E&SM cell will be headed by Environment Health and Safety manager followed by other officers and technicians. E&SM cell will be the nodal agency to co-ordinate and provide necessary services on environmental & social issues during operation of the project. E&SM cell will be responsible for implementation of ESMP, interaction with the environmental regulatory agencies, project stake holders and reviewing draft policies and planning. The department also interacts with local people to understand their problems and to formulate appropriate community development plan. The major duties and responsibilities of E&SM cell shall be as given below:

- To monitor/ implement the environmental and social management plan.
- To assure regulatory compliance with all relevant rules and regulations.
- To ensure regular operation and maintenance of pollution control devices.
- To minimize environmental impacts of operations by strict adherence to the ESMP.
- To initiate environmental monitoring as per approved schedule.
- To review and interpret monitored results and corrective measures in case monitored results are above the specified limit.
- To maintain documentation of good environmental practices and applicable environmental laws as ready reference and ensure that they are followed and maintain environmental records.
- Coordination with regulatory agencies, external consultants

The educational qualifications and experience details of the E&SM cell are given in **Table 3.8**.

Table 3.8: Manpower for Environmental & Social Management cell

S. No	Designation	Minimum Qualification	Experience	Minimum no. of persons	Salary per month
1	EHS Manager/ Site In-charge	Graduate /Post Graduate	2	1	Rs 25,000
2	Supervisor/Operator	Graduate/ITI/Diploma	2	1	Rs 15,000
3	Electrician	ITI/Diploma	1	1	-
4	Mechanic	ITI/Diploma	1	1	-
5	Gardener	-	1	1	-
6	Helpers/Collectors	10 th / Intermediate	1	4	-
Note: Mechanic/electrician/horticulturist – can be part time employees on call will attend.					

The site in charge /EHS manager as well as supervisor/operators can be trained from the internal manpower resources and imparted capacity building to handle the environmental management plan activities of the project. It is not mandatory to appoint or recruit any new staff members for the project.

3.2.1 Identification and assessment of training needs

Capacity building is a long-term, deliberate process of increasing the ability of an organization/group to identify and solve its own problems and risks, and to maximize its opportunities. This involves the mobilization of human, institutional and other resources and their subsequent strengthening and development.

In the present assignment, capacity building in the form of training and awareness programs will be conducted to ensure the sustainability of the project. Training will be provided to the target groups (PCU/PIUs) to make them understand possible environmental and social issues associated with the moderate to high risk interventions of project and strategy to mitigate these issues.

The training sessions shall majorly emphasize on environmental issues related to the project interventions such as air, water, soil, noise pollution prevention and control, integrated solid waste management and the importance of waste separation, recycling and reuse, environmental monitoring, health and safety measures etc. An exposure about these issues to the participants will help identify the problems and enhance capacity to solve problems on their own. Following the training sessions, IE&C material will be provided to all the participants.

3.2.1.1 Assessment of training needs

The facilities were visited by the team experts for conducting primary survey. The existing capacities were analyzed through obtaining primary information from the facility in charges, the working personnel, and nearby habitants with the help of well framed questionnaires.

The following training needs were identified for all the four interventions given in **Table 3.9**.

Table 3.9: Identified gaps and training needs common for all four interventions

S. No	Anticipated Risks / Identified needs	Personnel to be trained	Proposed training topics
1	Material handling and operational posture related risks & hazards	Individuals Managers / Supervisors	Best ergonomic postures on-site and their significance in long run. Significance of PPE Signifying counseling sessions on proper shift change logistics, sitting or standing facilities, conducting health checkups
2	Fire & Safety related risks a. Electricity supply b. Fire safety	Individuals Managers/supervisors	Importance of taking proper safety measures, wearing safety and personal protective equipment. Signifying importance of workplace safety and hygiene, installation of proper sign boards at appropriate places, maintenance of sufficient first aid safety equipment.
3	Improper housekeeping facilities a) Drinking water facilities. b) Sanitation facilities. c) Maintenance of workplace hygiene	Individuals Managers	Maintain work place etiquette, good housekeeping practices bring to the notice of higher authorities regarding observed any improper housekeeping operations Maintenance and supervising for availability of proper and safe drinking water, common and other logistic supply, taking action if and as required
4	Emergency response as required	Individuals Managers	Work to avoid any potential risk / hazard and immediately intimate to the higher levels regarding any observed emergency situations Training on handling emergency situations and take necessary responsive and corrective

S. No	Anticipated Risks / Identified needs	Personnel to be trained	Proposed training topics
			actions
5	Waste management and pollution control d) Solid waste generation e) Waste water generation f) Air and noise pollution	Individuals Managers	Best practices for waste minimization, importance of 3 R's and waste segregation. Alternative technologies, waste and pollution mitigation measures
6	Collectivization and Quality of life for Women workers	Women workers	To educate and motivate the women workforce through dialogic process, thereby find solutions to their problems through collective action
7	Issues of Migrant labor, child labor	Managers/ Supervisors	Sensitization against child labor, issues of migrant labor, rights of unorganized workers
8	Learning attitude and Development	Managers/ supervisors & workers	Education and skill development, Health and personal hygiene, developing positive work place attitude
9	Stakeholder Engagement (Enterprise/Corporate Social responsibility)	Managers/ Supervisors	Rules and guidelines of CSR, social responsibility, stakeholder engagement and community development
10	Workers' Management	Managers/ Supervisors	An overview of labour law in terms of all applicable labour laws, like contract labour act, minimum wages act, workmen compensation act etc., will be covered.
11	Gender at work	Managers/ supervisors individual workers	Gender Sensitization, Equality of Work and Inclusive Development.

3.2.2 Budgetary Provision for ESMP

In order to comply with the environmental protection measures as suggested in the above sections, the project management has made budgetary provision for environmental protection and safety measures. Cost towards environmental mitigation measures are given in **Table 3.10** and social mitigation measures in **Table 3.11**.

Table 3.10: Budget for implementation of Environmental Management Plan

Environmental Control Equipment	Description	Units/ Dimensions	Capital Cost (Rs. Lakhs)	Recurring Cost (Rs. Lakhs/annum)	Timeline*
Air Pollution control equipment	Stack Equipment/air filters/air scrubbers	1 set	2	0.5	6 months
	Odor control (Eco-scrub unit)	1 no.	1	0.2	
	Sub Total		3	0.7	
Water Pollution control equipment	Rainwater Collection Tanks (3mx3mx2.5m)	1 no.	1.4	0.2	3 months
	Storm Water Drain	740 rmt	7.5	1	
	Packaged sewage treatment plant (8 KLD)	1 no.	8	1.5	
	Pre treatment scheme (5 KLD)	1 no.	4.5	0.5	
	Septic Tank/Soak pit (4mx4mx2m)	1 no.	1	0.2	
	Toilet block (4mx4.5m)	2 nos.(one for W, one for M)	1.8	0.5	
	Sub Total		24.2	3.9	
Noise Pollution control equipment	DG set sound proof room (8mx5m)	1 no.	1.2	0.2	1 month
	Sub Total		1.2	0.2	
Solid Waste equipment	Organic waste converter of capacity 50kg/day	1 no.	10	2	2 months
	Process waste collection bins (660 liters)	2 no.	0.4	0.05	

	Waste collection bins (240 liters)	7 no.	0.25	0.1	
	Muck management	-	0.5	0.2	
	Sub Total		11.15	2.35	
Energy Saving equipment	LED Street lighting	6 no.	0.8	0.2	3 months
	Sub Total		0.8	0.2	
Environmental Health and Safety Equipment	Personal Protective equipment (helmets, hand gloves, ear plugs, nose mask, glasses, safety belts)	20 no.			1 month
	Fire extinguishers	10 no.	1	0.5	
	Safety siren/ alarm (at admin building)	1 no.			
	Sand buckets	3 no.			
	Sign boards for equipment , passages	As required			
	Sub Total		1	0.5	
	Grand Total		41.35	7.85	
<p>Note: All the above components are common for all facilities (Grading and Packing, Cherry hydro cooling & CA store) as these facilities are located within common premises. Hence the above facilities are designed to cater the environmental management needs.</p> <p>The above cost estimates do not include GST, area weightage and contractor profit.</p> <p>*After obtaining necessary regulatory permissions for execution of project</p>					

Table 3.11: Budget for implementation of Social Management Plan

Social Management / Equipment cost	Description	Unit	Capital Cost (Rs. Lakhs)	Recurring Cost (Rs. Lakhs/annum)	Timeline
Temporary accommodation for migrant workers	Temporary sheds for accommodation of 25 migrant workers	All weather resistant temporary shed with 8 mx10mx3m specification	4.0	0.5	2 months
	Provision of Drinking water	1 unit	0.25	0.25	

	Sanitation facilities for workers(Toilet block)	1 Unit (Two blocks-one for W, one for M)	3.0	0.25	
	Sub Total		7.25	1.0	
Healthcare facilities	Setting up of In-premises dispensary/health center for workers	1 unit 3.60mx3mx3m	2.5	0.5	-
	Procurement of Ambulance	1 Maruti Omni with emergency equipment	4.0	0.5	
	Organizing Medical Camps for Workers	1 camp in each quarter covering 20 workers	-	1.0	
	Sub Total		8.5	2.0	
Transportation and Conveyance	Procurement of Pick-up vehicle (13 seat) to be used for transportation of workers	1 unit	5.5	1.0	1 month
	Sub Total		5.5	1.0	
Leisure and recreation	Establishment of Crèche' for workers children within the facility	1 unit	1.0	0.5	1 month
	Sub Total		1.0	0.5	
Stakeholder Awareness and Capacity Building programmes	Health Awareness on HIV/AIDS for migrant workers and Truck drivers	2 camps for month during the season	-	0.8	-
	Awareness on eradication of child labour in operations and supply chains	2 camps in an year for growers and workers	-	0.4	
	Skill Up-gradation, On-the-Job Trainings for the workers	1 training program in each quarter	-	1.0	
	Skill Development trainings for selected youth	2 training programs in an year (half-yearly)	-	0.5	

	from the local community				
Stakeholder Grievance redressal and communication	Organizing stakeholder consultations from time to time to identify and examine the impacts and possible mitigation measures thereof	1 consultation in each quarter covering 50 stakeholders	-	1.0	-
	Sub Total		-	3.7	
Grand Total			22.25	8.2	
Note: All the above components are common for all facilities (Grading and Packing, Cherry Hydro-cooling & CA store) as these facilities are located within common premises. Hence the above facilities are designed to cater the environmental management needs					

3.2.3 Grievance Redressal Mechanism (GRM)

During consultation processes, the study indicated that the execution and operation activities of the facility have the potential to generate environmental concerns which are linked to quality of life of people in the immediate surroundings. These impacts include waste and sanitation, dust and noise generation. These instances make it imperative in developing a grievance mechanism which addresses concerns and complaints raised by affected persons or communities by the project.

The grievance redress process shall comprise the tiers mentioned below:

- first level would be the Executive committee of Water User Association, Farmers' Producer Organizations.
- second level would be the sub-divisional level wherein the sub-divisional Magistrate would be supported in the grievance resolution processes by Block Development Officer, Horticulture Development Officer, Horticulture Extension Officer and facilitators;
- third level would be the district level implementation committee;
- fourth level at PIUs and PCU level.

These would also be supported by complaint handling mechanisms at the PIU levels besides the existing state-wide grievance monitoring system "e-samadhan" and World Bank Grievance Redressal system. The GRM would comprise of arrangements at PCU and PIU levels, complaint handling mechanisms, user satisfaction surveys etc.

Affected persons can channel their grievances to the concerned departments verbally, or through telephone calls, text messages and letters. The duration for

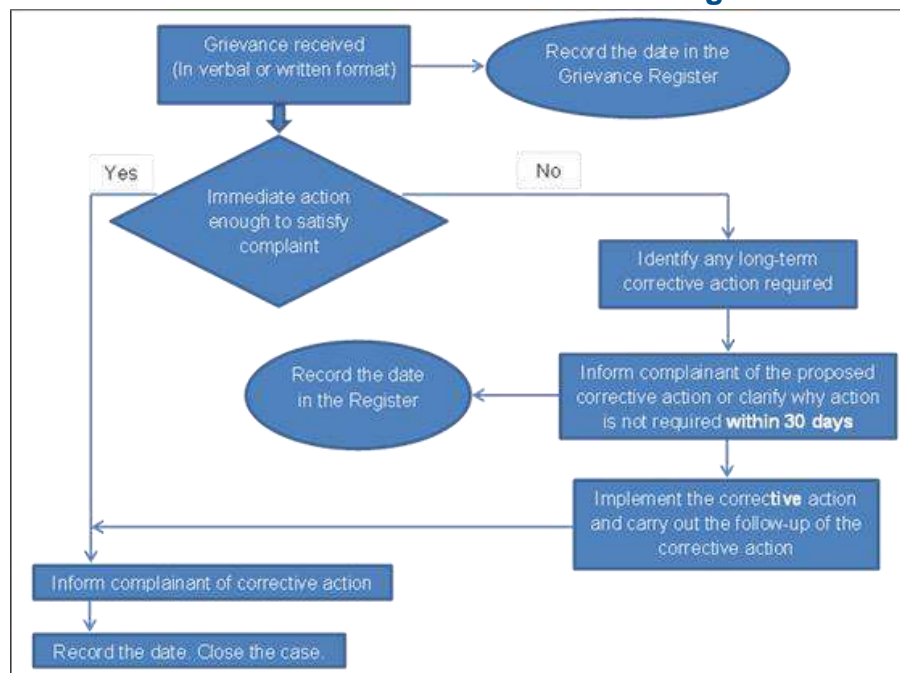
resolving or communicating proposed action on a grievance, to the complainant, shall be a maximum of thirty days, except for special cases.

3.2.4 Grievance Response Mechanism

When a grievance is received, the mechanism for dealing with communication of status of the grievance shall be

- grievance is received in verbal or written format;
- grievance is recorded in the Grievance/ complaints Register;
- in case of immediate action enough to satisfy the complaint, the complainant will be informed of corrective action
- implement corrective action, record the date and close case;
- for a long term corrective action, the complainant will be informed of proposed action; and Implement corrective action, record the date and close case.

Figure 3.3 Process flow of communication of status of grievance



Annexures

Annexure 1: Shows site photographs taken by the project team during the site visit.



Key Experts Site Visit



Forklift

Entrance to the Facility



Exisitng CA Chamber

Exisitng Grading & Packing

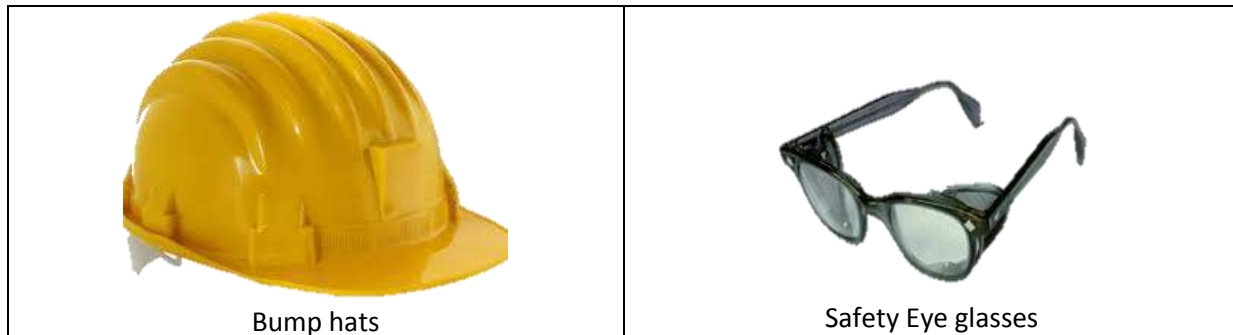
Equipment Details

- 1. Stack equipment/air filters/air scrubbers:** The stack emission is provided for air emission discharges generating from DG set and boiler operations. The particulate matter due to ash content in fuel burning is settles in bag or air filters and whereas scrubbers are provided to absorb and remove the gaseous pollutants like SO_2 , to the required standard levels. The setup comprises of a series of steps attached to the stacks to control air pollutants. The specifications are readily available with suppliers based on the sizes of DG sets and boiler capacities.
- 2. Odor control:** The odor control mechanism comprises of an exhaust blower fitted at a strategic location of the buildings in which the project activities are undertaken and all the air contaminated with odor released from the damaged fruits/vegetables will be passed through exhaust blowers. This contaminated odor air is passed through the eco-scrubber unit which will reuse odorous substances and cleaned air is discharged into the atmosphere. The setup consists of exhaust blowers and the eco-sorb bio-filters to be installed adjacent to the project activity buildings.
- 3. Rain water collection tank:** The rain water collected from all the project buildings surfaces were routed through a confined, dedicated drain to the collection tank of size 3mx3mx2.5m for recharging the ground water. This will be a purely civil structure with conventional construction materials.
- 4. Packed STP:** Packaged STP offers a pre-engineered and pre-fabricated method of treating domestic waste water with an aerobic process. The packaged STPs are most useful and economical for low flow rates and space constraints. Pre-engineered modular components such as diffused air blowers, flow equalisation tanks, clarifiers and disinfection units are to be sized specifically for the end use application. These package plants can be fabricated based on the flow rate, pollution load and to meet the regulatory discharge standards. The packaged STP plants utilises the biological intended aeration principal of operation with sufficient oxygen levels and agitation to allow for bio oxidation of the effluents to suitable levels for discharge. The advantages of packaged plants are
 - Pre-engineered, pre-fabricated structured results in lower cost
 - Unit is easily transported to the customers' project site.
 - Designs allows for quick turnaround time for delivery and installation
 - Treatment system is simple to operate and requires low man power

- Effected extended action principal
- User friendly low and easy maintenance
- Regulatory compliant
- Custom designed applications specific system
- Long service life

5. Organic Waste Converter: In addition to the composting through aerobic or anaerobic process, an effective organic waste management towards the Centralized Waste Management is offered through organic waste converters. The Organic Waste Converter (OWC) works on the principle of microbial decomposition of solid waste. Typical treatment cycle in the system is initiated through waste material load, where end is a valorized material posing beneficial characteristic that the input material did not. The conversion process holds various sequential phases. During the process, initially fed waste is first ground and pulverized to an unrecognizable mixture by a combination of fixed and actuated hardened steel blades. The mixture is then heated through the injection of steam and also by the heat generated by frictional forces of the grinding phase. The exact temperature required for pasteurizing, and in the subsequent phase to sterilize the waste, is maintained. In order to eliminate the required amount of microorganisms, a complete saturation of waste matter with superheated steam is required for a minimum amount of time. Various models are available and are designed to meet the physiological requirements of the bacterial growth. The cycle ends in a cooling phase, during which product continues to be dehydrated. Upon reaching temperature at which product is safe to handle, near ambient temperature, the cycle automatically shuts down. The end product is expelled into a tray that can then be hauled off for storage. The entire process and statistics are recorded and stored in computer memory for record keeping.

6. Personal Protective Equipment details:





Goggles



Earmuffs



Chemical and liquid resistant gloves



Boots

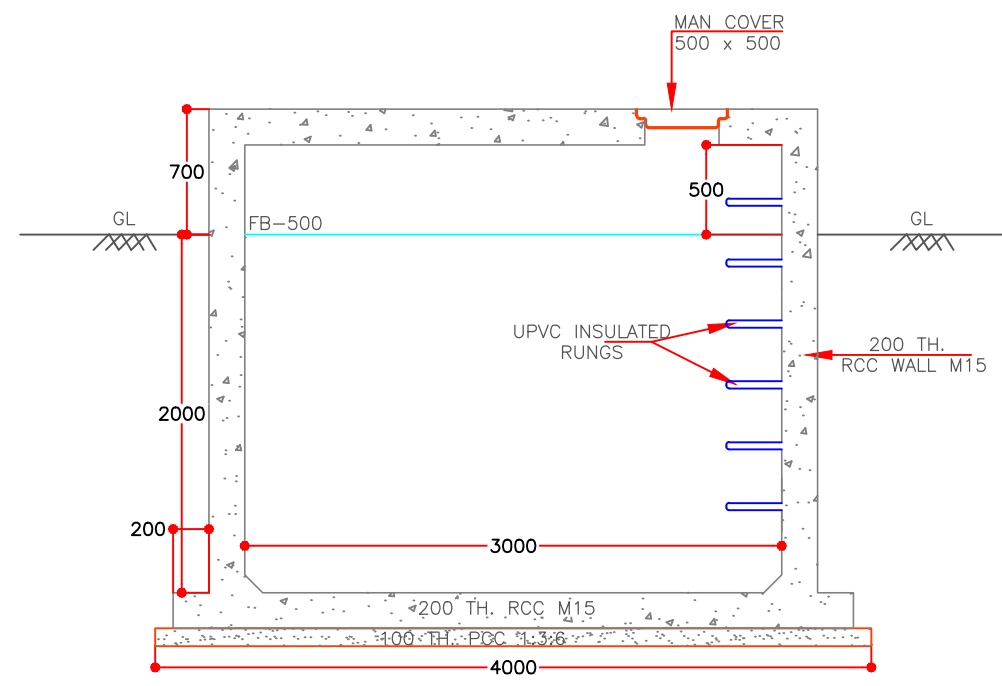


Clothing

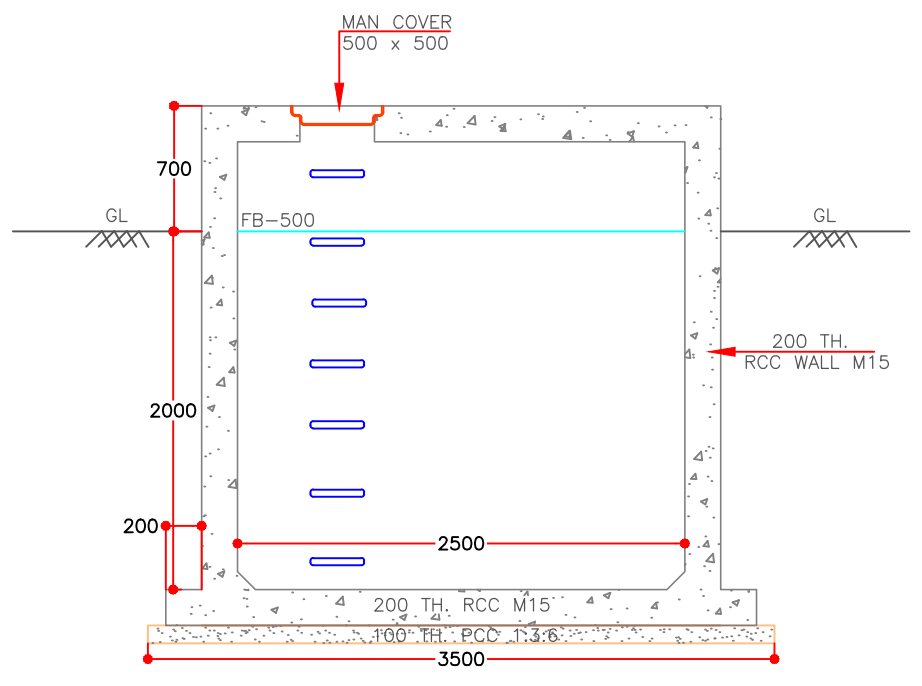


Self-contained Breathing Apparatus

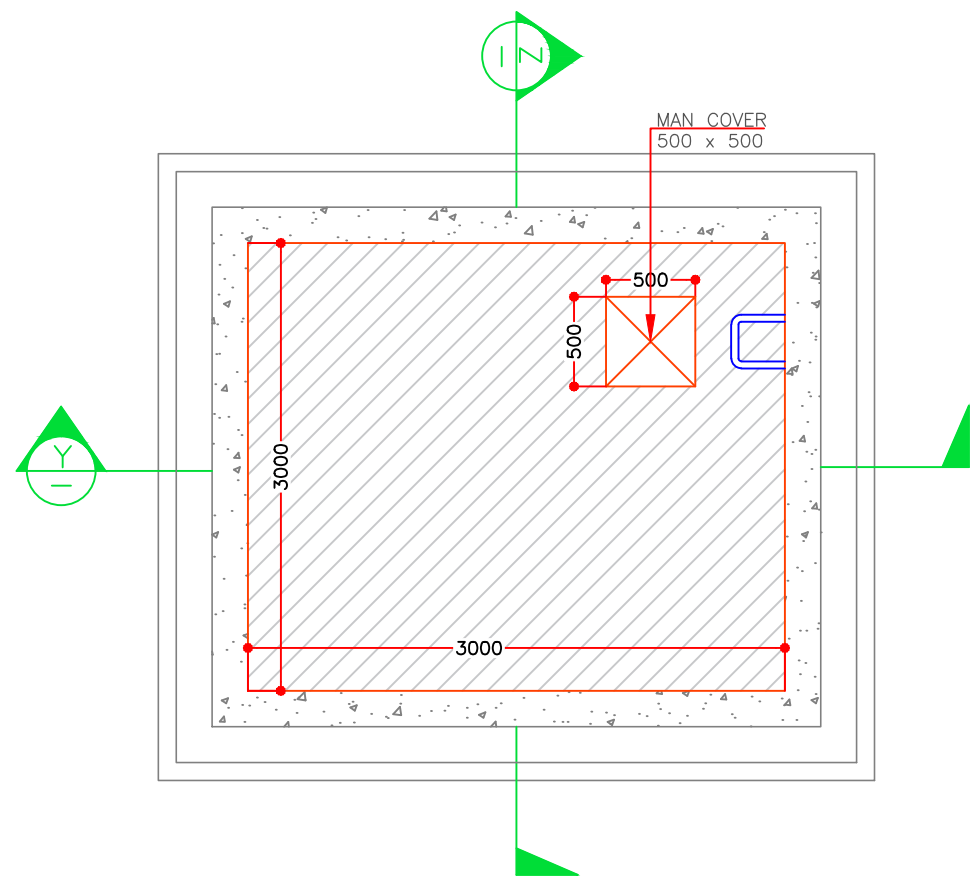
RAIN WATER COLLECTION TANK PLAN & SECTION -JAROL
TIKKAR-CA/GRADING & PACKING /CHERRY HYDRO COOLING



SECTION Y

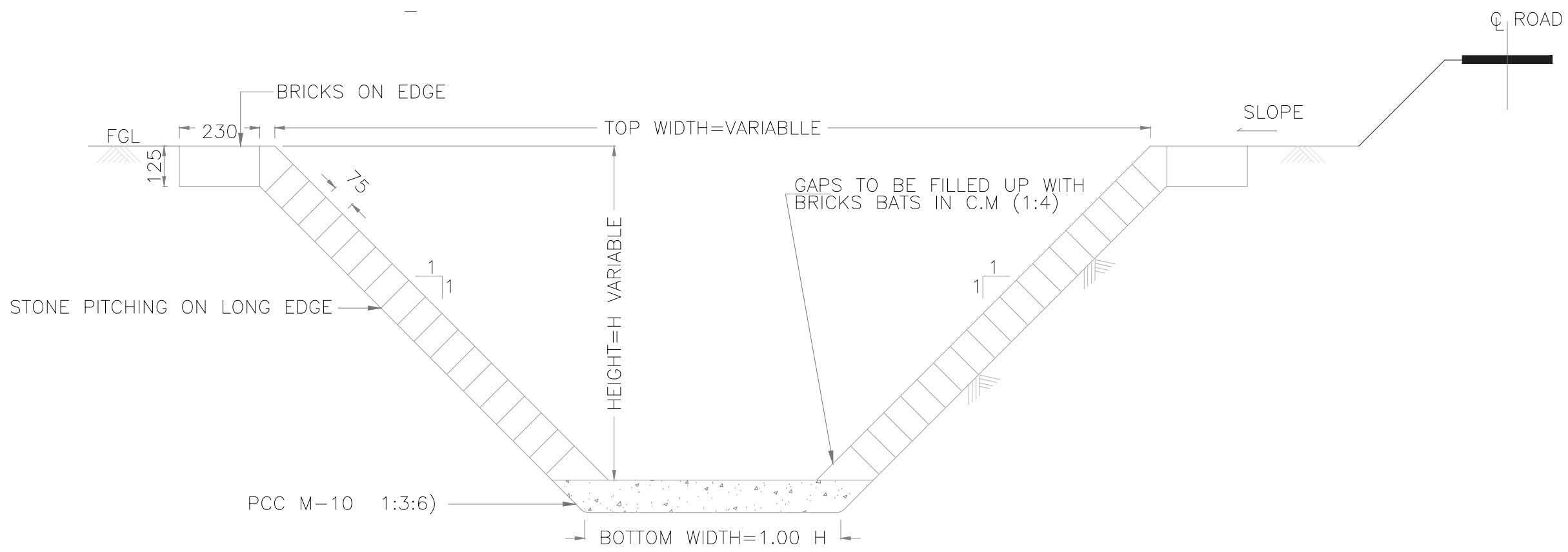


SECTION Z



PLAN

JAROL TIKKAR- CA/GRADING & PACKING /CHERRY HYDRO-COOLING



TRAPEZOIDAL STORM WATER DRAIN

Now, a compact, factory assembled
Sewage Treatment Plant... ready to work



Model - ET - 10

Treatment Capacity -
10,000 Litres per day

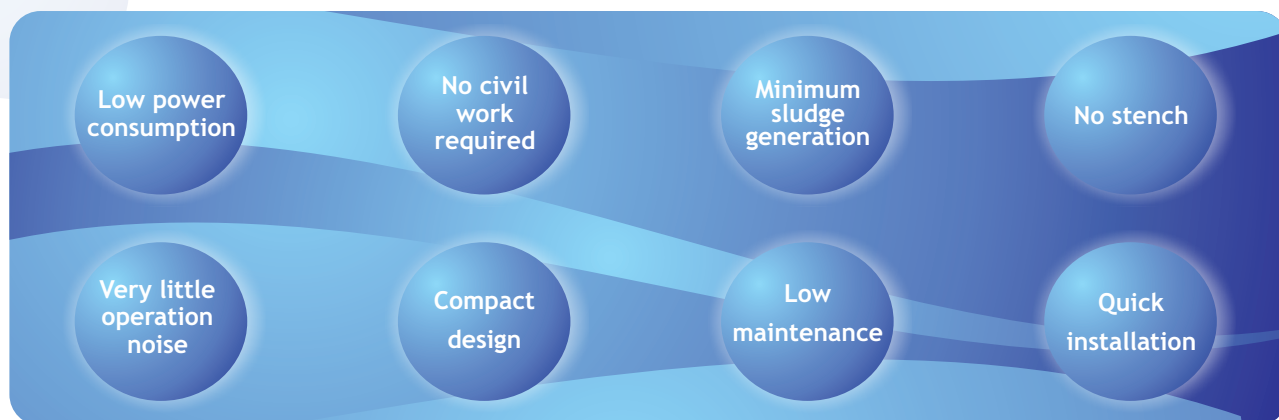


We know that 75% of the world's fresh water resources are contaminated. The remaining is fast disappearing. How well we live, will depend on, how well we conserve water. One of the most reliable ways to do that is by recycling water.

Now, we at Enzotech present you a reliable method to recycle water through our superior, pre-fabricated, packaged wastewater treatment plants. These plants have the capacity to treat and cleanse wastewater and make it suitable for Landscaping and Toilet Flushing.

The new Model, ET-10 has a treatment capacity of 10,000 litres per day. The plant is fully assembled in the factory and shipped ready for use. This plant uses a hybrid of Aerobic and Anaerobic Process. It uses only two chemicals, namely, Caustic Soda for pH correction and Sodium Hypochlorite for Disinfection. It also uses eco friendly bacteria to treat the Sewage. The treated water is passed through a Pre-Filter, Sand Filter and Carbon Filter to give you clean water, fit for re-use or safe discharge. The treated water meets the stringent Pollution Control Board norms

UNIQUE FEATURES



Raw Water Source	Sewage Water, Bath Water, Kitchen / Canteen Wash Water and Laundry Water			
Quality of Raw Effluent	COD < 2000	SS < 800	BOD < 800	pH - 4 to 9
Treated Water standard achieved by the process	COD < 200	SS < 30	BOD < 20	pH - 7.5 to 8

Enzotech Model	ET – 10
Treatment Capacity (m3/day)	10
Average Flow Rate (m3/hr)	0.42
Floor Area required for Plant Installation	4 m x 2 m
Volume of Raw Water Collection Sump suggested	5 m ³
Volume of Treated Water Collection Sump suggested	5 m ³
Power Consumption	1.75 hp

For more details, please contact:

ENZOTECH

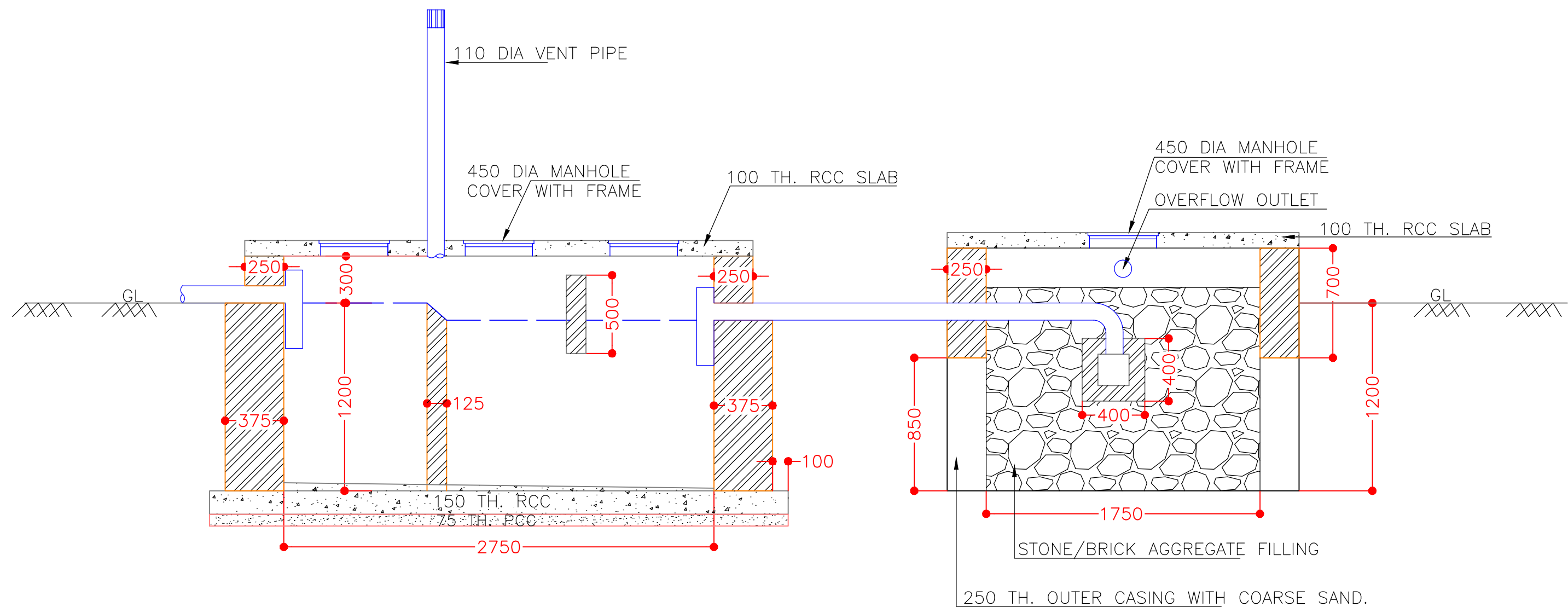
Enzotech Solutions Pvt. Ltd.

An ISO 9001:2000 Certified Company

Chaand Towers, G4-Ground Floor, 128, L.B. Road, Thiruvannamiyur, Chennai-600 041. India.

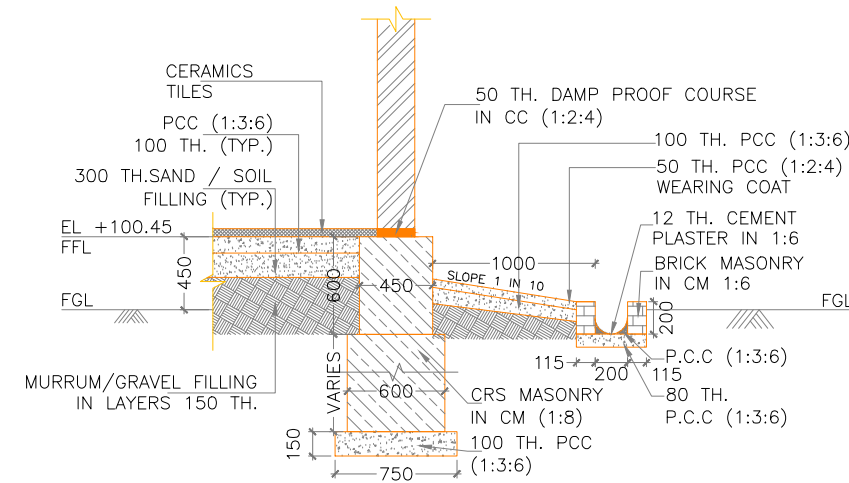
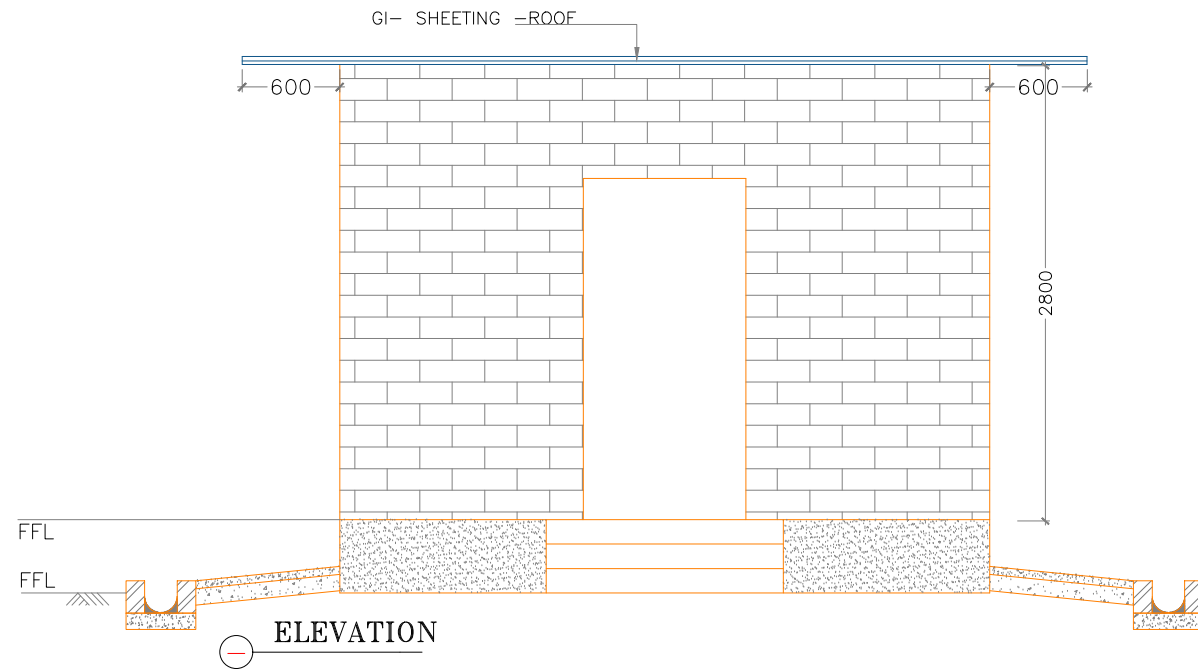
Tel : 2442 0466, 2442 0468 Fax : 2442 0465 E-mail : sales@enzotech.co.in Website : www.enzotech.co.in

PROPOSED SEPTIC TANK & SOAK PIT
JAROL TIKKAR CA/GRADING & PACKING /CHERRY HYDRO COOLING.

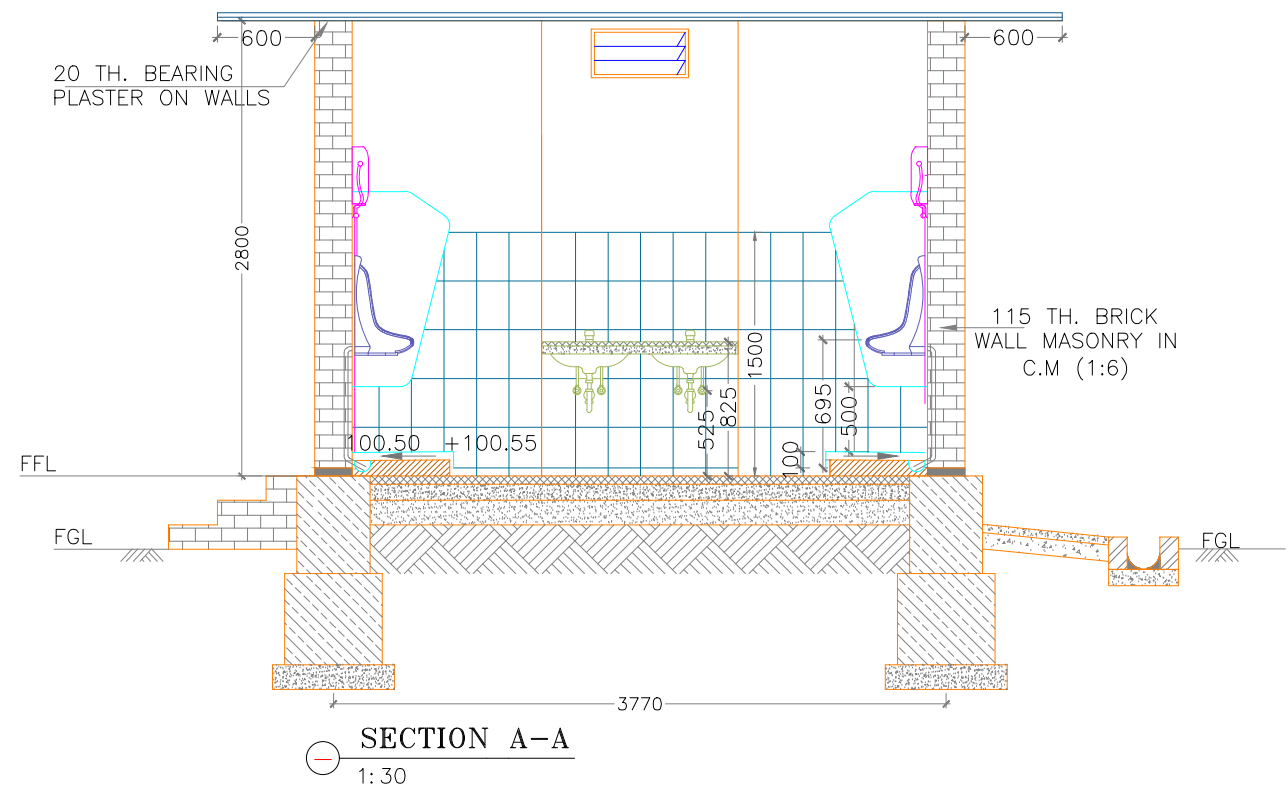
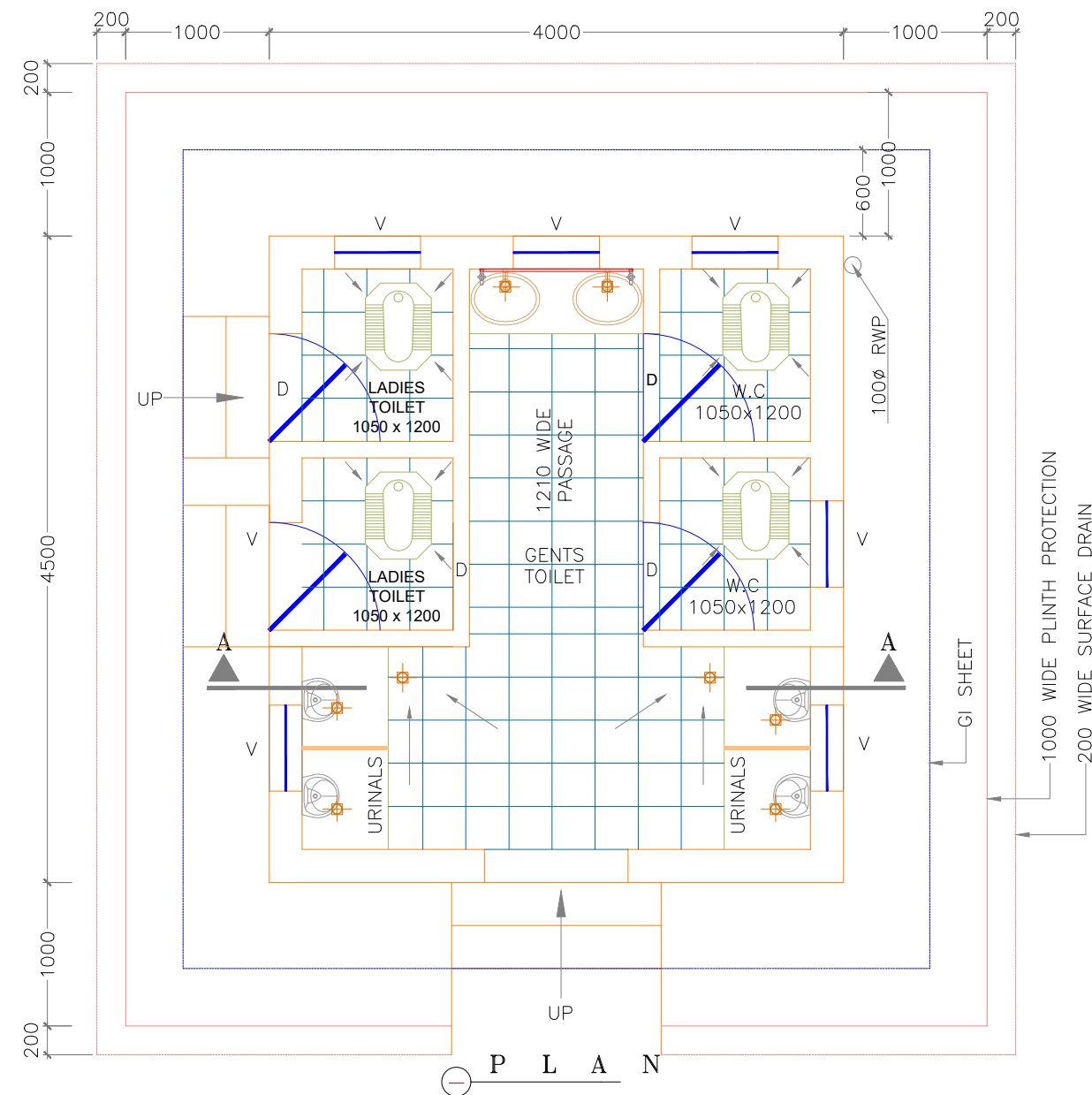
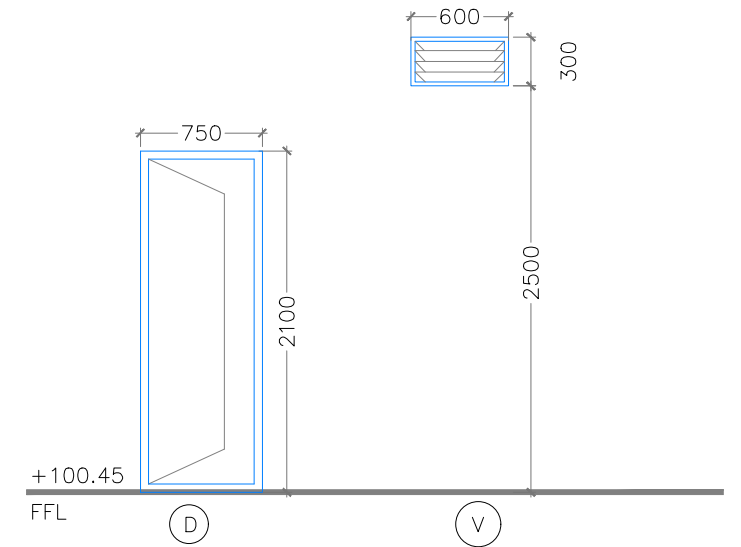


TYPICAL SECTION OF PROPOSED SEPTIC TANK & SOAK PIT

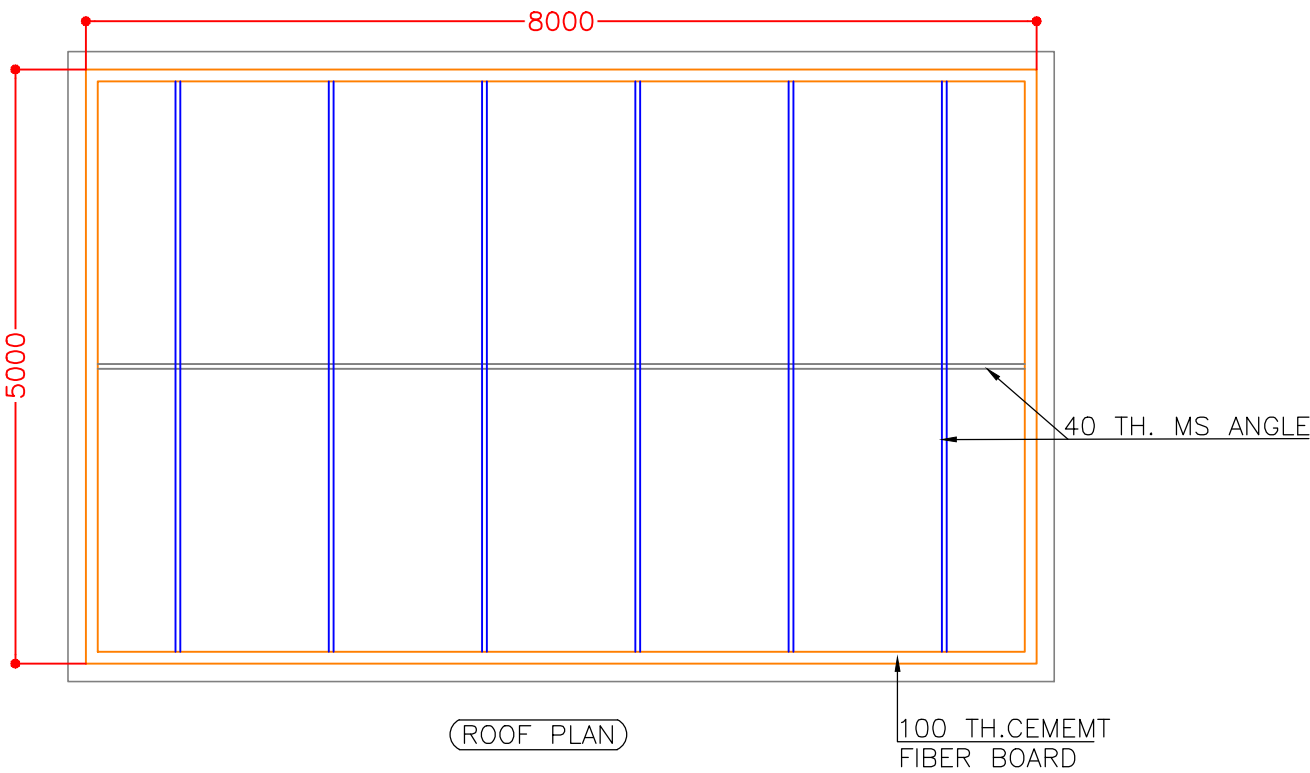
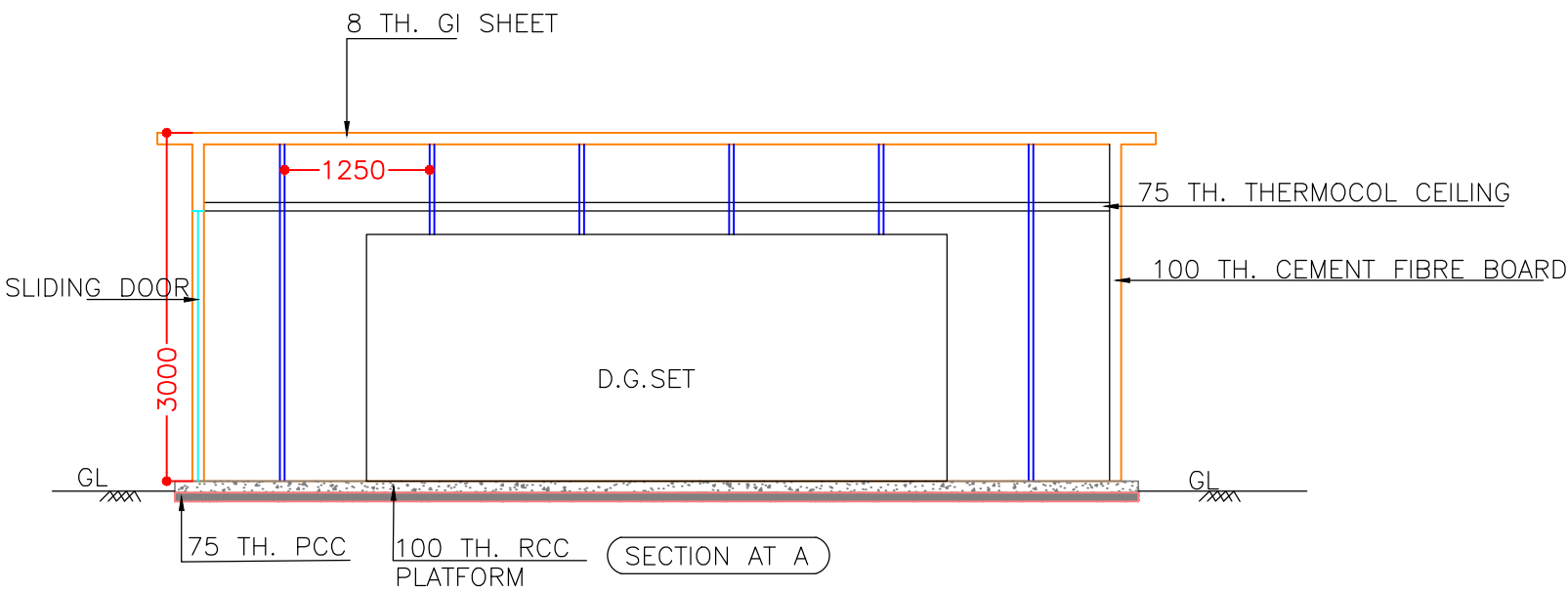
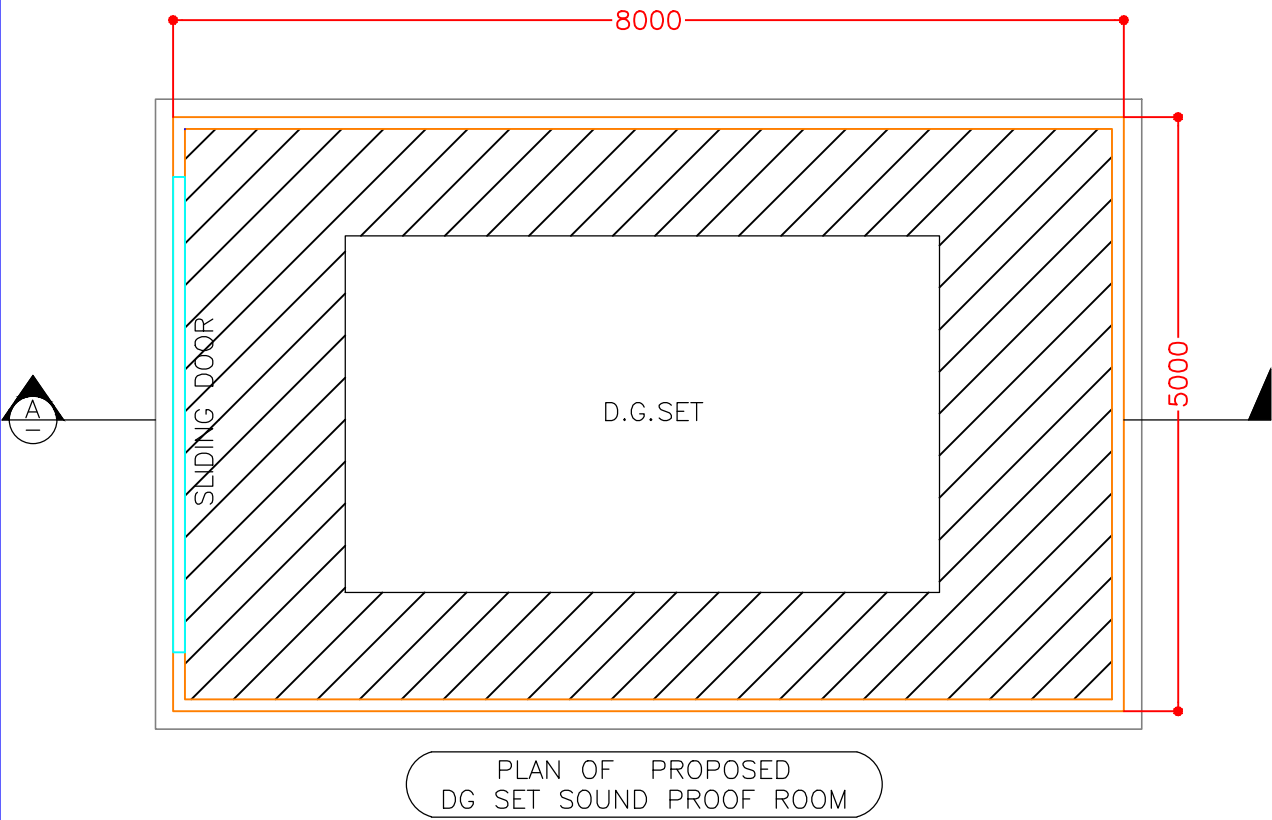
JAROL TIKKAR- CA/GRADING & PACKING /CHERRY HYDRO-COOLING TOILET BLOCK



FOUNDATION WALL & PLINTH PROTECTION DETAILS (TYP.)



PROPOSED DG SET SOUND PROOF ROOM
JAROL TIKKAR- CONTROLLED ATMOSPHERE A/GRADING
&PACKING/CHERRY HYDROCOOLING



About The Group

Smart Enviro Systems is a part of Shrikrishna Group, a well diversified engineering group from Pune. Shrikrishna Group is an OEM with an established infrastructure on the area of 40,000 sq.ft. in Pune. The Group has a varied product portfolio with established Dealer and Service network pan India. It is a set-up with skilled engineers and technicians, own R&D Center, modern machinery and futuristic management. The company believes in constantly evolving with new products and novel systems.

Smart Enviro Systems is a result of such endeavors; wherein we supply the complete tailor made system including the **SMART Composter and Curing System** to effectively treat the organic biodegradable waste to convert into rich compost.

We also manufacture Waste Shredders, De-watering Press, Briquetting Machines, Road Sweepers & Garbage Compactors.

Our Strength

- The only manufacturer of Rescue Equipments in India
- Winners of two National awards- National Quality Award & Vikas Ratan Award
- Winner of Hari Malini Joshi Award by MCCIA



Smart Composter

The composting machines consist of shredder & mixer for simultaneously mixing & shredding of waste for uniform size. The machine also mixes the composting culture & dry material such as dry leaves, saw dust etc. with the shredded waste for absorption of excess moisture.

- All the machine wetted parts are in SS 304.
- Geared motors are with energy efficient in line Helical Gearbox.
- Control panel with Automatic Microelectronic components with preset batch time.
- Machine with built in safety for stopping machine in case of lid open.
- Easy control panel access from rear side of machine.

Machine Matrix

Model	Batch size in Kgs	Process chamber volume liters	Mixer geared motor HP	No. of shredders	Shredder motor HP	Machine size L x W x Ht in Mtrs.
SMART 15	15	45	2	1	1	0.8 X 0.8 X 1.2
SMART 25	25	70	2	1	1	1.0 x 0.8 x 1.2
SMART 50	50	140	5	1	2	1.1 x 1.0 x 1.5
SMART 100	100	340	7.5	2	2	1.7 x 1.0 x 1.5
SMART 500	Continuous	500	7.5	4	1	2.4 x 1.0 x 1.5

Smart Curing Drum-

Curing drum is 1.35 mtr dia, in HDPE, mounted on skid made out of MS fabricated structural channel frame. Drum is driven by geared motor through drive rollers, rotating at one rotation per three hours. . The assembly is complete with inlet lid & outlet chute . The contents of the drum are aerated with blower and odor control system. The curing drum is provided with mist-foggers inside the drum for moisture control.



MODEL	CD-250	CD 500	CD 750	CD 1000
Input Capacity Raw Compost	250 Kgs/Day	500 Kgs/Day	750 Kgs/Day	1000 Kgs/Day
Overall Dimensions L X W in Mtrs.	2.0 X 3.5	2.0 X 7.2	2.0 x 10.5	2.0 x 13.5
Drive Motor HP	2	3	7.5	10
Ventilation Fan HP	0.5	0.5	1.0	1.0

Curing Bays-

Curing bays are made of shelves in MS & are coated with Epoxy paint. They are made with 4 levels, suitable for accommodating 10 plastic crates in one row with Irrigation system for moistening the compost during curing.

Models:

- 1- CB 100: Curing bay consisting of plastic crates with a 'shed-net' suitable for 25 Kgs. with capacity of 40 nos. in one bay of total capacity of 100 Kgs/day.
- 2- CB 200: Curing bay consisting of plastic crates with a 'shed net' suitable for 25 Kgs. with capacity of 80 nos. in one bay of total capacity of 200 Kgs/day.



Sr. No.	Model	Capacity	Floor space Mtrs.
1	CB 100	100 Kgs/Day	0.75 x 4.0
2	CB 200	200 Kgs/Day	1.50 X 4.0



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Dealer:



Secondary Waste Collection

FOOT OPERATED WHEELED WASTE BINS: SERIES "GBRW"

Sr. No.	Code No.	Capacity (Litres)	Overall Dimensions (mm)		
			Top	Bottom	Height
01	GBRW 06-12*	60	360x360	300x300	620

Standard Colours : White for Container, Military Green, Dark Blue, Bright Red, Yellow, Black for lid.

Standard packing : 3 nos per box. *Colours are same.



GBRW 06-12

WHEELED WASTE BINS: SERIES "GBRW-04" as per EN standard.

Sr. No.	Code No.	Capacity (Litres)
01	GBRW 12-04	120
02	GBRW 24-04	240
03	GBRW 66-04	660
04	GBRW 110-04	1100

Standard Colours: Green, Blue
Standard Packing : 3 nos. per bag



GBRW 12-04

GBRW 110-04

GAINT WHEELED WASTE BINS: SERIES "GBRW" (Community Bins)

Sr. No.	Code No.	Capacity (Litres)	Overall Dimensions (mm)		
			Top	Bottom	Height
01	GBRW 63-01	630	1237x778	1117x628	1200
02	GBRW 11-01	1100	1450x1020	1334x874	1200

Standard Colours : Aqua Marine Green.

Standard Packing : 1 no. per bag.



GBRW 63-01

GAINT WHEELED WASTE BINS: SERIES "GBRW" (Community Bins)

Sr. No.	Code No.	Capacity (Litres)	Overall Dimensions (mm)		
			Top	Bottom	Height
01	GBRW 63-02	630	1237x778	1117x628	1150
02	GBRW 110-02	1100	1455x1020	1330x870	1250
03	GBRW 63-021*	630	1237x778	1117x628	1150
04	GBRW 110-021*	1100	1455x1020	1330x870	1250

Standard Colours : Aqua Marine Green.

* With 2 windows.

Standard Packing : 1 no. per bag.



GBRW 110-02



GBRW 110-021

DOOR TO DOOR PEDAL DRIVEN CYCLE RICKSHAWS: SERIES "TR"

Sr. No.	Code No.	Overall Dimensions (mm)		
		Length	Width	Height
01	TRGBB 02-02*	1540	735	255
02	TRGBB 25-01	1520	1010	680

Standard Colours : Black

TRGBB 02-02 is without bins.

TRGBB 25-01 is with 2 bins. (Green & Blue Colours)



TRGBB 25-01



TRGBB 02-02



Pollution Control Equipment

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Products

[+ Solid Fuel Fired](#)[+ Fluidised Bed](#)[Cumbustion](#)[+ Coal Fired](#)[+ Wood / Bio Mass](#)[+ Husk Fired](#)[+ Oil / Gas Fired](#)[+ Small Industrial](#)[+ Thermic Fluid](#)[Heaters](#)

Shanti Air Handling (AH) Division was established in 2006 to serve the needs of industries requiring Air Pollution Control System. We manufacture Pollution Control Equipment's , right from Single cyclone dust collection systems, Multi Cone Cyclone Dust Collectors , Pulse Jet Bag filter, Reverse Air Bag House, Wet Settling Chambers, Wet Scrubber .We intend to be " One Stop Shop " our client's requirements right from Boilers to balance of plants including pollution control equipment, which in today's scenario is become utmost importance.

Types of Pollution Control Equipment:

- Pulse Jet bag Filters
- Multi Cone Dust Collectors
- Wet Scrubbers

Quick Enquiry

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-Type of Industry-	▼
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+ Hot Water**Generators****+ Pollution Control****+ Industrial Blowers****+ Heavy Fabrication****+ Energy****Conservation****Devices****Pulse Jet Bag Filter**

Shanti pulse jet bag filters are one of the most efficient and cost effective solution for pollution control emitting of Boilers . Its a online pulse jet bag filter, where the dust /ash from the industrial boilers gets trapped in specially installed high temperature bags through which flue gas is allowed to pass. Such dust and ash is cleaned row by row and this sequence is controlled through a controller. The dust particulars are deposited at the outer surface of the bag and are removed in a pre-timed cycle by a pulse jet of high pressure air sourced from an air compressor. This highly advanced process streamlines the dust particulars into the RAV with the help of hopper and ensures that only clean air moves out from the center of the bag & escapes out of flue gas outlet. Our bag filters are designed with optimal air to cloth ratio ensuring efficient performance.

Shanti uses superior raw materials like high temperature fiber glass bags for reliability and durability.



Pollution Control
Equipment

—>Pulse Jet Bag Filter

Single Cyclone Dust Collectors

Shanti Single Cyclone Dust Collectors are designed on Vertex separation science . The dust collectors are designed so to provide cyclonic and rotation effect to separate dense particulate matter in the flue gases . A high circulating air flow is allowed to travel in a helical pattern from the top of the dust collector . This creates higher inertia and follow tight curve this ideal rotation

effect will force the dense particulate matter to settle at the bottom of the cone, which in turn is removed manually or mechanically. Single Cone dust collectors are more suitable for biomass fuels like Wood, Briquettes only.



Pollution Control
Equipment

—>Single Cyclone Dust
Collectors



Pollution Control
Equipment

—>Mechanical Cyclone
Dust Collectors

Mechanical Cyclone Dust Collectors

English

Shanti Multi Cyclone Dust Collectors are designed on Vertex separation science . The dust collectors are designed so to provide cyclonic and rotation effect to separate dense particulate matter in the flue gases . A high circulating air flow is allowed to travel in a hellical partern from the top of the dust collector . This creates higher inertia and follow tight curve this ideal rotation effect will force the dense particulate mater to settle at the bottom of the cone , which in turn is removed manually or mechanically. Multi Cyclone Dust Collectors are more suitable for fuels like Coal , Wood etc., . It is more effective than Single cone dust collection systems.

Capacities

All Boiler capacities

Features

- Ideally sized ensures efficiency , reliability
- Use of Cast Iron Cones & Vanes for very long life for certain abrasive fuels
- Negligible maintenance downtime

How Efficient are Cyclone Collectors?

[English](#)

The particle collection efficiency of a cyclone depends on a number of factors, including the dimensions (Length and Diameter) of cyclone, the inlet gas velocity, the particle size and the dust concentration in the gas stream.

Collection efficiency tends to increase when inlet gas velocity increases and when particles size and dust concentration increases. Also, smaller cyclones are usually more efficient than are larger cyclones. Large-diameter cyclones are most effective in removing relatively large particles from a gas stream.

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OUR ENGINEERING SERVICES

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- ✓ Laundry Equipments

Bag filter & Baghouse dust collectors.



Product Description:

Bagfilter or Baghouse dust collector are a giant centralized industrial dust control equipment used for collection and filtration of harmful, nuisance dusts in various industries like cement plants, Fertilizer Industries, Woodworking & Glass manufacturing industries and other Manufacturing Industries. In general Bag house Dust collection system will have one or large number of hoods capturing dusts at different sources, Ducting connecting all hoods and transports the dust laden gas / air to centralized Bagfilter where the dusted air is made to pass through large array of filter bags. The dusts get deposited over bags and only clean air passes on other side. Blower creates the required suction pressure at hood (capturing), Ducts (Transportation) and across dustcollectors (Filtration) and a positive pressure in chimney to exhaust the cleaned air at a allowable altitude.

Mechanical shaker type Bagfilter, Reverse air & **Pulse jet Bag filters** are three types of commonly used Industrial baghouse collectors. All works on the same principle as above and the only difference between them is the method used for cleaning of filter bags. All of the above three, Pulse jet Bagfilter is the most commonly used Bagfilters because of its continuous duty and effective filter cleaning advantages. We are the leading manufacturer and supplier of Apzem branded Pulse jet Bagfilter / Baghouse dust collectors. **To read more about our pulsejet bagfilter click here.**



The other less common type is mechanical shaker type collectors. Here either

mechanical arrangement with a lever (in case of small Bagfilter) is provided or motorized arrangement is provided that when actuated shakes all **Filter bags** to remove dust cake build over or inside the bags. Here the system has to be stopped intermittently for cleaning, and applications permitting intermittent stops for bag cleaning and for small to medium dust collection application we recommend Apzem shaker type collectors. For continuous duty and Large dust collection applications we highly recommend Apzem Pulse jet collector type because of its superior performance.



Application:

- Bulk materials handling,
- conveying, screening, sieving, mixing, bin -silo venting
- Building materials manufacturing,
- Chemical, plastics and pharmaceutical powders
- Processes with light or medium dust loading etc..

Technical Specifications & Additional Information:

- [Specifications](#)
- [Accessories](#)
- [Certification](#)
- [Installation Photos](#)

- [Product Videos](#)
- [Downloads](#)
- [Warranty](#)
- [FAQ's?](#)

Air Flow: upto 30,000 CFM

Filtration : upto 5 microns

MOC: Mild Steel / SS 304 /SS316

Finish: Powder coated / Matt finish

Power option : 3 Phase.

Customization : Yes , customization available suiting your needs.

Industrial dusts are of different materials and have different physical and chemical properties. Some are abrasive in nature, some are highly combustible and explosive in nature, some are corrosive, and some are sticky and have high moisture content. Temperature, dust loading, grain size & Particle distribution also varies. One dustcollector will not fit for all. Any misconceptions or assumptions of process parameters or dusts will lead to complete failure of the entire dust collection system. Apzem had a strong team of experienced engineers and experts in designing industrial dust collection system. Our engineers will understand your process parameters, nature of dusts and considers all other parameters in designing a high efficient and economical bagfilters / Baghouse dustcollector system tailor made to your exact needs. All Apzem branded products are build with quality and efficiency complying to national & international quality and emission standards. We also manufactures hoods, ducts, scrubber, fume extractors etc..providing **complete solution for all your air pollution control problems.**

For enquiries or to know more feel free to contact us @ 9789066648 / 044-26580258 or email to sales@apzem.com



Technical Data Sheet

Ecosorb® 505G/606G

Page 1

Ecosorb® 505G and 606G are broad spectrum odor neutralizers that are diluted with water. The Ecosorb® family of odor control products have been used in industry for many years controlling odors while not covering them with masking fragrances. Industries emitting volatile fats and those processing liquid fatty waste and fatty greases presented a challenge to the standard broad spectrum Ecosorb 505 and 606 products. In response to the market needs these standard products have been modified to address broad spectrum needs while additionally targeting long chain fatty acids, volatile fat emissions, and the like.

The new Ecosorb 505G and 606G are extremely effective at eliminating the odors that accompany industries such as grease and residuals. Given their effective strength, dilution with water ranges from roughly 1 part in 25 of water to 1 part in 400 of water and even higher. These products are a blend of plant extracts, food grade surfactants, and purified water. They can be diluted with water and/or less polar solvents such as 2-propanol without expected reactions. When diluted with water, they form a stable but weak emulsion. Whether used neat or if diluted with water, the products are safe to handle and can be disposed of down the drain.

FEATURES

- True odor neutralizer
- Biodegradable and non-toxic
- Environmentally friendly
- No measurable flash point
- Scientifically proven

ADVANTAGES

- Absorbs, reacts, and removes odors without masking
- Usually no permits required
- Safe for employees and neighbors
- Safe for all environments
- It performs as advertised

PHYSICAL PROPERTIES

pH: ~ 6.0 (see note below)

Specific Gravity:

505G ~0.99

606G ~0.97

Boiling point: ~208° F

Appearance: milky white

Odor: slight citrus and floral

pH note: Ecosorb® 606 is made with purified water therefore having little ionic activity. Common pH instruments that measure ionic activity can give false low readings in the pH 4 range.

HMIS CLASSIFICATION

Health: 0

Flammability: 0

Reactivity: 0

Protective Equipment: B



Technical Data Sheet

Ecosorb® 505G/606G

Page 2

ALL INGREDIENTS CAN BE FOUND LISTED ON THE FOLLOWING CHEMICAL SUBSTANCE INVENTORIES:

United States:	TSCA
Canadian:	DSL
European:	EINECS
Australian:	AICS

HANDLING AND PACKAGING

Ecosorb® 505G and 606G are shipped in HDPE containers. It is recommended that the products be stored, even if diluted, in HDPE, polypropylene, or stainless steel containers. Storage containers should be kept tightly sealed, long term exposure to ambient air can affect the product and it will attract airborne particulates. During storage it should not be subjected to temperatures below 35°F or above 85°F. Allowing the product to freeze is especially damaging and will disrupt the emulsion. Extended exposure to higher temperatures may cause separation, but the emulsion can be restored through agitation or mixing. The product does not burn.

DISPOSAL AND CLEANUP

Wash with water or soap and water. The product is not hazardous to humans, animals or the environment and can be disposed of by flushing to the drain.

CONTAINERS

Ecosorb 505G and 606G are available in the following sizes:

- 5 Gallon Pails
- 55 Gallon Drums
- 275 Gallon Containers

Ecosorb® Remarkably effective. Surprisingly simple.



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