PREFEASIBILITY REPORT

FOR

SYNTHETIC ORGANIC CHEMICAL (PLOYACRYLAMIDE) MANUFACTURING PLANT

PROJECT PROPONENT:

SNF Flopam India Pvt Ltd

Survey No 141-1-2-N-142-1
National Highway 8A East, Varsana
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FEBRUARY 2017

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CHAPTER 1

1.1 Introduction to the Project and proponent

M/s. SNF Flopam India Pvt. Ltd., is subsidiary of SPCM SA France, holding company of SNF Floerger group; a Leader in manufacturing and processing water-soluble polymers, SNF has developed a range of more than 1000 products that help to preserve the natural resources, encourage recycling and improve efficiencies of industrial processes. The said polymers have several complementary functionalities: flocculation which enables solids to be separated from Liquids, viscosification and friction reduction.

The products are used in all the fields in which water present: drinking water production, wastewater treatment, sludge dewatering, oil and gas extraction, mining, agriculture, and the manufacture of paper, textiles and cosmetic preparation.

The company is backed by the support of hardworking professionals who hold immense experience and knowledge of the domain. They understand the varied industrial applications and adapt innovative approach to serve exact requirements of the clients/customers. The company have also constructed a modern infrastructure that forms the base of successful business growth. Apart from this, they have a widespread distribution network that helps to ensure prompt delivery schedules in the market.

The Indian subsidiary under consideration in this report, SNF FLOPAM is managed by Directors, Mr. Shital Bapu Khot, Mr. Pascal Remy and Mr. Arnaud Lefevre.

PolyAcrylamide has huge demand in manufacturing of water and wastewater treatment chemicals. Till now, this chemical is imported in India by water treatment chemical manufacturers. Now, SNF is coming forward to install a plant in Gujarat for manufacturing of PolyAcrylamide with the production capacity up to 2,58,000 MTPA. This project is being set up to cater Indian market as well as other clients in nearby countries.

CHAPTER 2
Project Description

2.1 Project Location

Location of the Project with Surroundings (within 500 m)

The project is being set up at Survey no. 141/1/2 and 142/1 of village: Varsana, Ta: Anjar, Dist: Kutch. The geographical location of the site is as follows:

Latitude: 23°10'10.03"N
Longitude 70°12'40.42"E

2.2 Criteria for Site selection

The project proponent wishes to install a large scale chemical manufacturing unit. Few Raw materials are to be imported from foreign countries and also the product has good potential in overseas market. Further, following are major forces which drove the decision of current location

- Vicinity of National highway
- Part of land already put to industrial purpose
- Availability of skilled and unskilled manpower
- Number of industries in surrounding area
- Residential zone is more than 2 km away
- Vicinity of environmental infrastructure; like CETP and CHWTF
- Vicinity of Kandla and Mundra ports
- The site is not covered in forest land, wildlife sanctuary and coastal zone.

2.3 Products & Raw Material Details

2.3.1 Product Details

As per given profile, Acrylamide, PolyAcrylamide Powder, Poly Acrylamide Liquid and Poly Acrylamide Emulsions would be manufactured. Total manufacturing capacity shall be 2,58,000 MT/Year (considering 300 working days a year, 860 MT/Day).

The Details of products are given in following table:

Name of Product	Total capacity
Acrylamide	120000 MT/Year
Poly Acrylamide Powder	60000 MT/Year
Poly Acrylamide Liquid	42000 MT/Year
Poly Acrylamide Emulsions	36000 MT/Year
Total	2,58,000 MT/Year

For said group of products, Acrylamide is basic Raw material, which is also consumed in manufacturing of other products.

2.3.2 Raw Material Details

2.3.2.1 DETAILS OF RAW MATERIALS WITH QUANTITY FOR PRODUCT

Sr. No.	Name of Proposed Product	Name of Raw Materials	Raw Materials Quantity in MT/Year
1.	Acrylamide	Acrylonitrile	44,924
		Acrylic Acid	130
		Caustic Soda	130
		Demineralized Water	74,473
2.	Poly Acrylamide Powder	Acrylic Acid	14074
		Caustic Soda	14074
		Acrylamide	74940
		Process water	89462
3.	Poly Acrylamide Liquid	Acrylic Acid	9600
		Caustic Soda	5850
		Acrylamide	12600
		Process water	26750
4.	Poly Acrylamide Emulsions	Acrylic Acid	10800
		Caustic Soda	1800
		Acrylamide	9000
		Process water	26750
		Oil	6800

2.3.2.2 Raw Material Properties

Raw material spec.	Acrylonitrile	Acrylic Acid	Caustic Soda	Oil
Chemical name	Acrylonitrile	Acrylic Acid	Sodium Hydroxide solution	
Synonyms	Vinyl Cyanide, Propenitrile	Propenoic Acid Ethylenecarboxylic Acid	Lye, Sodium Hydrate, White Caustic, Caustic Soda, Soda Lye, Soda	

			Ash, Ascarite	
Molecular weight (gm/mole)	53.06	72.06	40.01	
Molecular formula	C_3H_3N	$C_3H_40_2$	NaOH	
Physical form	Liquid	Liquid	Solid	
Colour	Colour less	Colour less	White pellets	
Solubility	Soluble in diethyl ether acetone. Very slightly soluble in cold water, hot water.	Soluble in cold water. Very slightly soluble in acetone. Insoluble in diethyl ether	Soluble in water	
Melting point, ^oC	-82	14	318	
Boiling point, ^oC	77.3	111	140	
Specific gravity	0.806	1.05	2.13 at 20 ^oC	

2.3.3 Source, Transportation and Storage of raw materials:

The Raw materials are procured from different manufactures/vendors across the world. All raw materials are transported to site in truck load by Road transport. At site, dedicated storage facility is provided for storage of raw materials.

Name of chemical	Source country / City	Mode of transport up to site	Mode of storage
Acrylonitrile	Overseas	Ship/Truck	Tank Farm: 2 tanks of 450 m^3 each at atmospheric pressure/temp
Acrylic Acid	Overseas	Ship /Truck	Tank Farm: 6 tanks of 250 m^3 each at 23 ^oC
Caustic Soda	Gujarat	Truck	Shed: 2 tanks of 360 m^3 each at atmospheric pressure
Oil	Overseas	Ship/Truck	Shed: 1 tank of 350 m^3

2.4 Manufacturing Process:

2.4.1 Acrylamide production

SNF has patented in 1977 with the High School of Agriculture of Montpellier (ENSAM) the first bacteria with a Nitrilasic group for the production of Acrylamide from Acrylonitrile. A licence has been given to Nitto (Japan) in 1982 and a co-operation established with this company from this date. The process SNF will use in China is a continuous fixed bacteria process giving the highest quality of Acrylamide necessary for the production of very high molecular weight, very high solubility polymers necessary for paper production, sugar production, EOR.

This process gives a far better industrial quality than:
- Copper process (by reactions at high temperature)
- Non fixed bacteria's (dissolution of bacteria cells interfering with the polymerisation)

Raw Materials used for production

The raw materials needed are the following:
Acrylonitrile: commercially available, ordinary grade (Oxazole : less than 5 ppm),

Water: Demineralized, specific conductivity < 1 µ S/cm,
Acrylic Acid: commercially available
Caustic Soda: commercially available in 50% concentration;
Catalyst: Procured from overseas
A production line is designed for 60,000 T per year of dry product or 1,20,000 T per year of 50 % purity.

Product Name	Annual production (MT)	Daily production (MT)
AM 50%	1,20,000	360

Following raw materials are consumed for a production of above product

RawMaterials	MT/year
Acrylonitrile	44 924
DM Water	74 473
Caustic Soda	130
Acrylic Acid	130

Process Descriptions

- The main technologies and processes descriptions are given below for each product to be manufactured in proposed plant.
- The production line has a production capacity of 60,000 MT of dry Acrylamide per year.
- Acrylamide is stored in a day storage tank before being transfer to PAM production lines.
- Acrylamide is the product of the reaction between water and Acrylonitrile using a biocatalyst:

$$Acrylonitrile + Water \xrightarrow{Catalyst} Acrylamide$$

RAW MATERIALS

Raw materials coming by pipe are from the storage area are:

- Caustic Soda 50%
- Acrylic Acid 90%
- Acrylonitrile

Raw material coming by drums from cold room storage is:

- Bio-catalyst stored at 2 °C (1 – 4°C)

Sodium Acrylate is used to Ensure the stability of the catalyst and the conductivity in the reactors.

- Stabilize the Acrylamide produced to avoid polymerisation trouble in storage tanks.

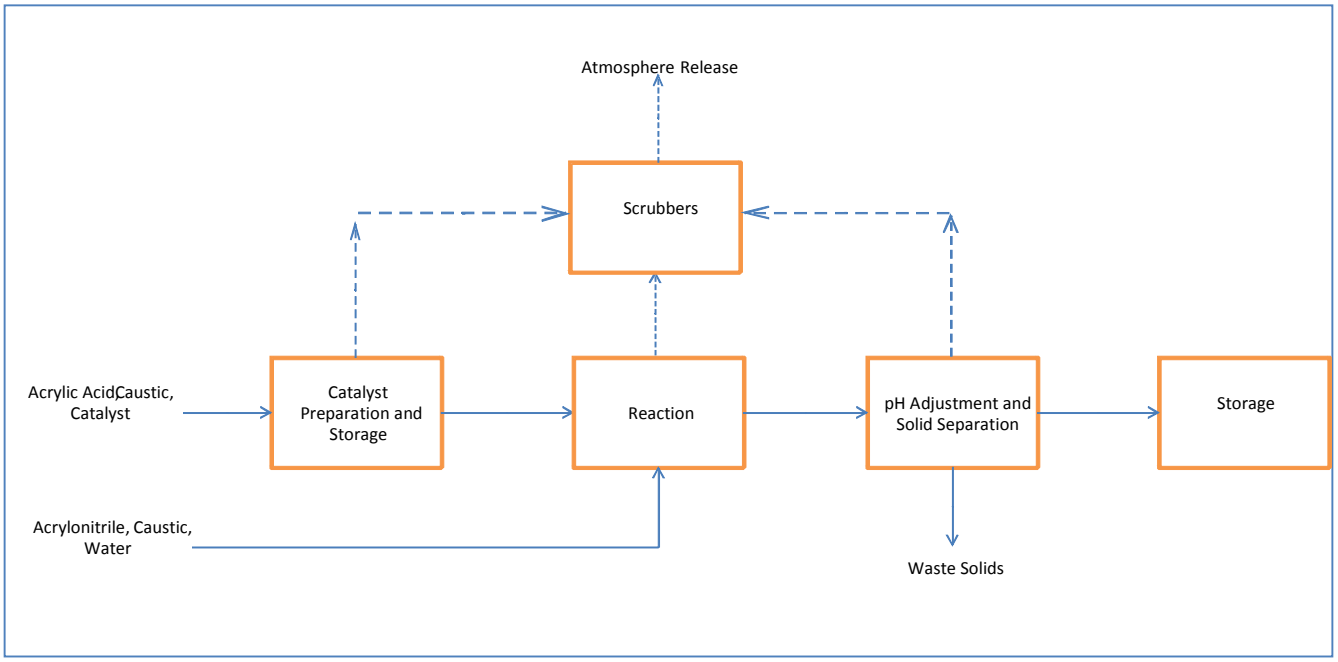
Sodium acetate is transferred to sodium Acrylate preparation tank by compressed air. Preparation of sodium acetate procedure is done to have sodium Acrylate solution preparation tank.
Acrylic acid solution is used to adjust the pH in pH adjustment tank.
Transfer from the drum to the tank is done with 20 L drums and adjustment is done by a dosing pump regulated by a pH-meter installed on the recirculation loop of the pH adjustment tank. One day tank of AA 90% may be installed to prepare 10% AA solution by dilution with demineralised water.
NaOH tank is used to maintain pH in reactors (in order to increase the catalyst activity). One day tank of 50% caustic soda may be installed to prepare the 2% NaOH solution by dilution with demineralised water

Reaction

Production of Acrylamide 50% is done in 4 reactors. All flowrates (Acrylonitrile, process water, catalyst, NaOH and AaNa + AcNa) and all reaction conditions (temperature and pH) have to be set accordingly to the operating conditions reported in relevant procedures.
Concentration in Acrylonitrile in reactors should not exceed specified limits to avoid catalyst deactivation.
Reaction is followed by 2 finishing tanks in order to convert all Acrylonitrile into Acrylamide and reach specification (C_{AN}< 100 ppm).
Sodium Acrylate and sodium acetate are added to stabilize the catalyst and the Acrylamide produced.
Caustic soda solution is used to control the pH.
Nitrogen can be injected on top of the reactors in case of fire.

It has been decided cool down the temperature to reduce polymerisation trouble risk.
To remove the heat of reaction and reach the specified temperatures, reactors are equipped with an inner coil. On reactors 1 and 2, external tubular heat exchangers have been put to improve cooling.

Block Diagram: The diagram below describes the Acrylamide production process.



POLYACRYLAMIDE POLYMERS

SNF is worldwide leader for the manufacture of PolyAcrylamides.
The know-how necessary for high quantity production is difficult to achieve in this field and the extrapolation lab - industrial production needs a lot of expertise obtained in nearly 50 years (1968-2016) of production in SNF.

2.4.2 PolyAcrylamide powder

RAW MATERIALS

A workshop will be designed to produce either 30 000 tons per year of copolymer anionic product or 20 000 tons per year of post hydrolyzed product.

- Copolymer product

Main raw materials needed to produce anionic polyAcrylamide are the following:

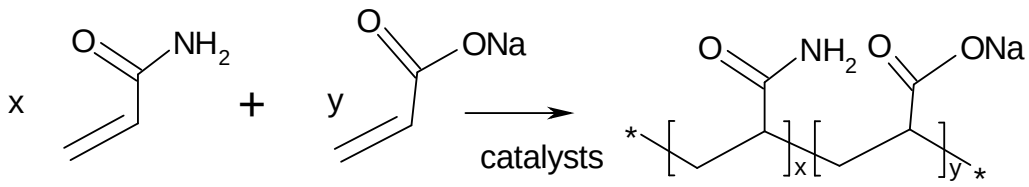
The production line is designed for 30,000 T/year for this product. Here below is the consumption for two powder workshops:

Rawmaterials	MT/yearly
Acrylamide	74940
Acrylic acid	14074
Caustic soda	14074
Process water	89462

Reaction

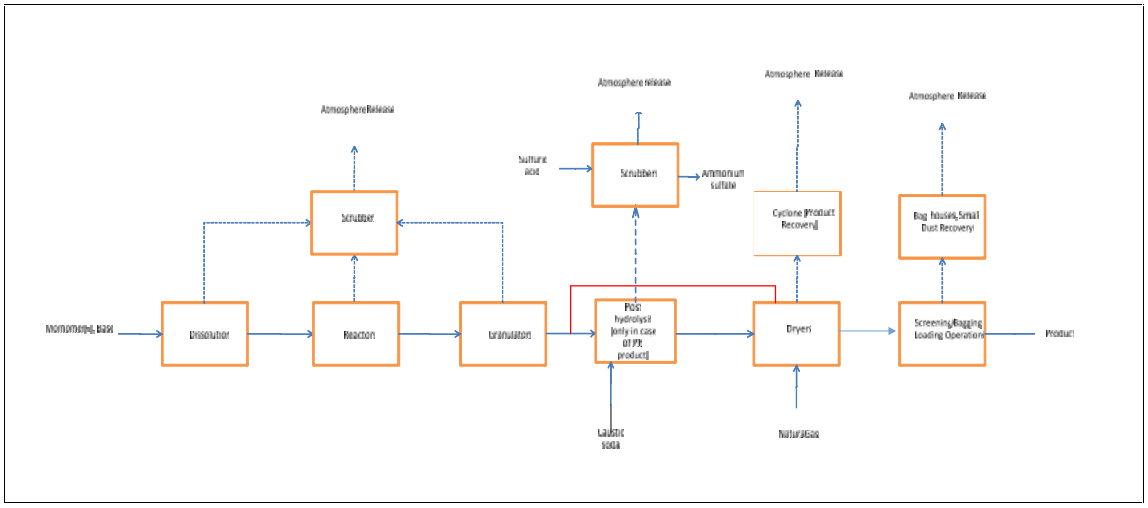
The solution is transferred into the reactor; it is then sparged with high purity nitrogen to remove oxygen (which is an inhibitor of the polymerisation).
Catalysts are added and the reaction starts.At the end of the reaction, the temperature is around 90°C; due to the exothermicity of the reaction (each percent of concentration of Acrylamide increases the temperature of 3°C).

Then, the gel is aged during 3 hours and after transferred into the granulator. Anionic polyAcrylamides are produced by copolymerisation of Acrylamide and acrylic acid sodium salt.



Block diagram

PolyAcrylamide Powder Process Block Diagram is schematized below:



2.4.3 PolyAcrylamide liquid

RAW MATERIALS

Main raw materials needed to produce polyAcrylamide are the following:

The production line is designed for 42,000 T/year for this product.
Here below is the consumption for one Liquid workshops:

Rawmaterials	T/yearly
Acrylamide	12 600
Acrylic acid	9 600
Caustic soda	5 850
Process water	26 750

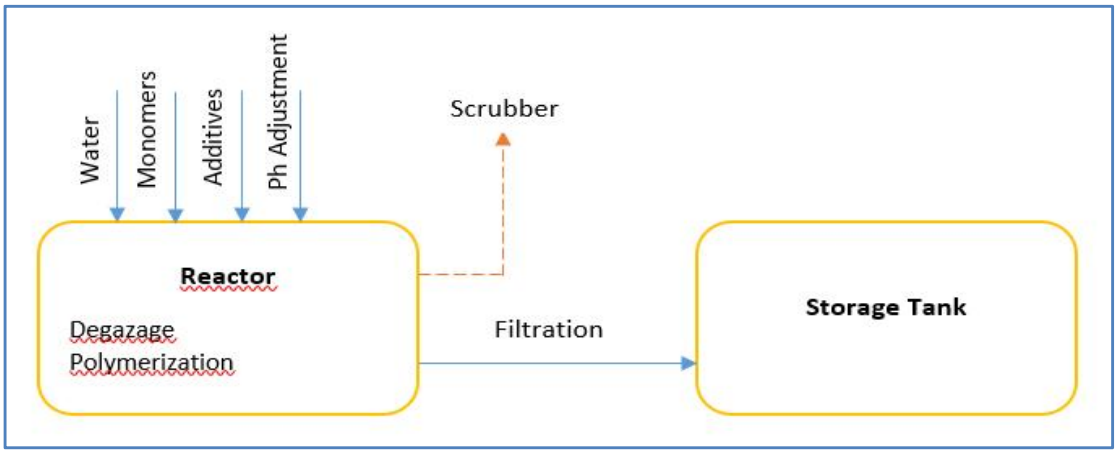
Reaction

Liquid PolyAcrylamide is manufactured by adding Acrylamic Acid and Acrylamide while stirring. After checking set pH and temperature, Nitrogen degassing is done from the bottom of the reactor. At the end of degassing, catalyst is added to start the polymerization. Nitrogen blanketing is maintained. Mass is allowed to cool after the reaction under stirring. After sampling and analysis, filtration is done and filled into containers.

Dispersants are manufactures by addition of Acrylic Acid into polymerization reactor and stirred. Sample is checked and blanked with Nitrogen. To start the reaction, catalysts are added into the reactor. When the reaction is over, mass is cooled and sample is taken and filtered before conditioning.

Block diagram

PolyAcrylamide Liquid Process Block Diagram is schematized below:



2.4.4 PolyAcrylamide emulsion

RAW MATERIALS

Main raw materials needed to are the following:

The production line is designed for 36,000 T/year for this product.
Here below is the consumption for three emulsion workshops:

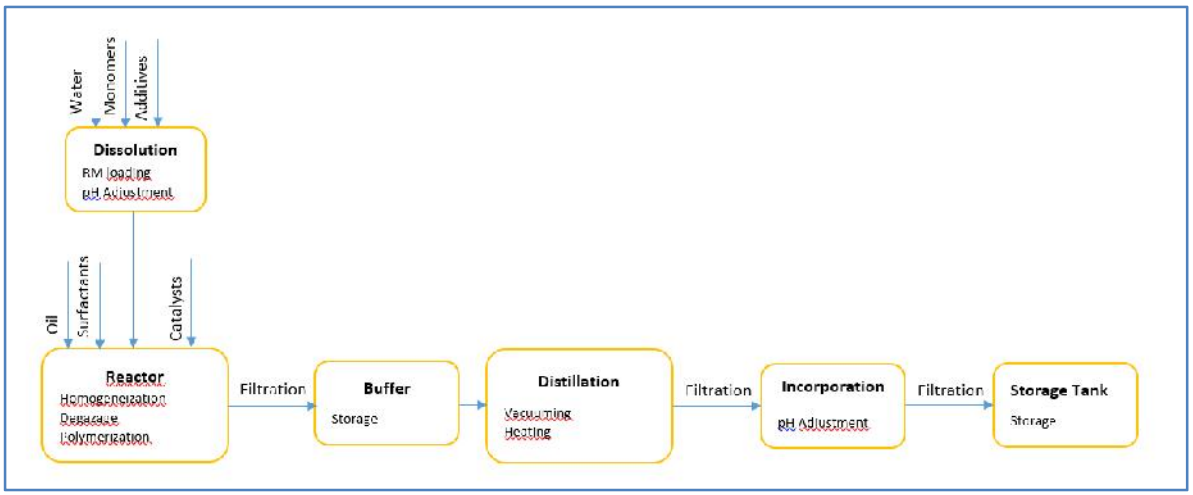
Rawmaterials	MT/yearly
Acrylamide	9 000
Acrylic acid	10 800
Caustic soda	1 800
Process water	12 600
Oil	6 800

Reaction

The solution is transferred into the reactor to make water suspension in the solvent. The suspension in homogenized through a rotator to get the right viscosity. Nitrogen degassing is done to remove Oxygen in the system which may inhibit the reaction.
Catalysts are added and the reaction starts. When the temperature reached is around 40°C; due to the exothermicity of the reaction. The temperature is maintained around 40°C by cooling.
Nitrogen degassing and Catalyst addition are continuous.
At the end of the reaction, Hydrophilic surfactant is introduced to the product soluble in water. PolyAcrylamide emulsions are filtered and packed.
In case of Distilled Emulsions:
The Emulsion base is manufactured as above and fed into an evaporator heated with steam. Distilled Emulsions are collected and conditioned. Solvent is recycled in the process.

Block Diagram

PolyAcrylamide Emulsion Process Block Diagram is schematized below:



2.5 Utilities Requirement

All utilities required for the project would be developed in the existing facility and the utility requirements are as under.

Sr. No.	Particulars	Consumption	Source
1	Power Consumption	16300 kW	PGVCL
2	Proposed total fresh water Requirement	1482 KL/day	GWIL
3	Natural Gas	2200 Nm^3/Hr	Local supply

2.6 List of machinery

2.6.1 Powder Plant

For 2 powder lines

Item	Specification	Material	Quantity
Dissolution tank	30 m^3	SS304L	8
Reactor	15 MT	SS304L	16
Knife granulator	12 T/hr		4
Paddle dryer	5 m	SS304L	2
Cyclone	2240 mm diameter	SS304L	4
Fluidized bed dryer	17m^2	SS304L	4
Cyclone	1600 mm diameter	SS304L	20
Powder hopper	9 m^3	SS304L	12
Roll grinder			4
Vibrated sifter			4
Blender	3 MT	SS304L	4
Bagging machine			2
Bulk bags machine			2

2.6.2 Acrylamide Plant:

Per line

Item	Specification	Material	Quantity
Reactors	24 m^3	SS304L	4
Finishing Tank	24 m^3	SS304L	2
Product Liquid Receiver Tank	30 m^3	SS304L	1
Day Tank + Off-spec	200 m^3	SS304L	3 + 1
Reactor pump	120 m^3/h		2
Finishing tank pump	20 m^3/h		1
Reactor stirrer		SS304L	6

2.6.3 Liquids Plant:

Per line

Item	Specification	Material	Quantity
Reactors	30 T	SS304L	2
Reactors	20 T	SS304L	1

2.6.4 Emulsions Plant

Per line

Item	Specification	Material	Quantity
Dissolution Reactors	20 T	SS304L	3
Reactors	20 T	SS304L	3
Buffers	40 T	SS304L	3
Distillation Reactors	20 T	SS304L	3
Incorporation Rectors	27 T		3

2.7Air Pollution Sources

2.7.1 Details of Proposed Air Pollution Sources

FLUE GAS EMISSION				
Sr. No.	Type of Emission	Fuel	APCM	Details of Stack
1.	Boiler / Heater	Natural Gas	None	12 m

Note: Natural gas is a clean fuel therefore; there is no requirement of APCM.

FLUE GAS EMISSION			
Sr. No.	Type of Emission	APCM	Details of Stack (m)
1.	Powder dissolution Vessels	Scrubber	12 m
2.	Powder Reaction Vessels	Scrubber	12 m
3.	Powder Dryers	Scrubber	12 m
4.	Finish goods Tank – 1	None	12 m
5.	Finish goods Tank – 2	None	12 m

FLUE GAS EMISSION			
Sr. No.	Type of Emission	APCM	Details of Stack (m)
6.	Emulsion product line	Scrubber	12 m
7.	Liquid production line	Scrubber	12 m

2.8 Water balance

(Category-wise water consumption and wastewater generation)

Sr. No.	Source	Water Consumption (KL/Day)	Wastewater Generation(KL/Day)
		Proposed Quantity	**Proposed Quantity**
A	Industrial		
1.	Process	1095	17
2.	Boiler	5	1
3.	Cooling	240	80
4.	Washing	133	133
	Industrial Total	1473	231
B	**DomesticTotal**	9	8
	Total	1482	239

2.9 Manpower Requirement

Required specialized man power & talent would be recruited / hired locally and supporting services would be made available from our existing plant. Approximately 125 people will be employed on company pay-roll. Further, for ancillary activities and supporting services, approx. 125 more people would get direct employment. In addition, there would be indirect employment in various other activities.

CHAPTER 3
Site Analysis

3.1 Connectivity

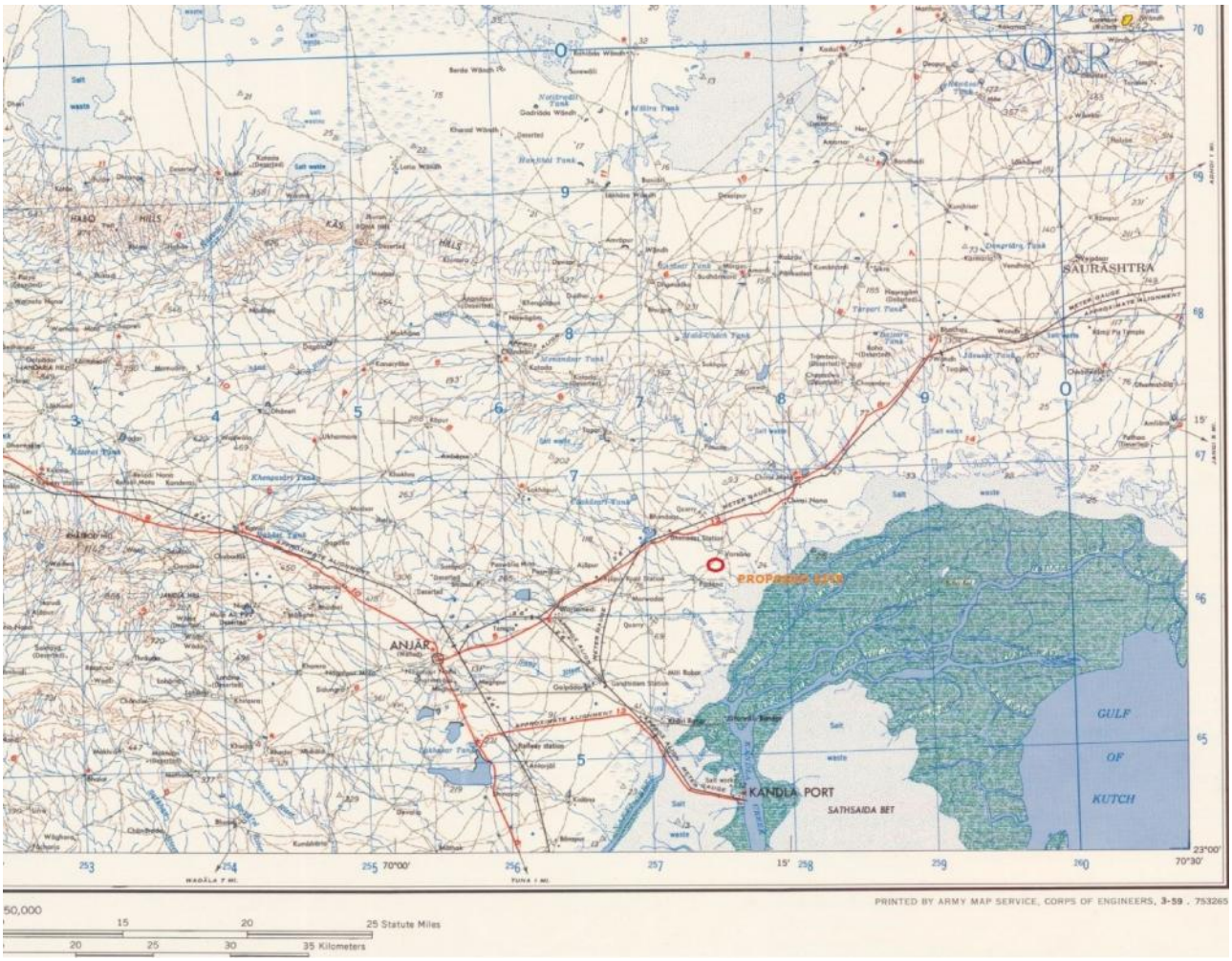
The site is only 1 km away from National Highway 8A connecting Bhachau to Gandhidham. Nearest Airport is Bhuj, which is approximately 55 km away from site. Nearest railway station is Bhachau, which is approximately 12 km away from site. Nearest port is Kandla, which is approximately 25 km away from site.

3.2 Existing Land Use Pattern

Currently the land (42.02 Acres) is occupied by Project Proponent. No agricultural activities are done on this land. Further, adjoining land of 28.31 Acres have been occupied and will be converted to industrial land as per prevailing norms. The same shall be merged in layout for final utilization.

3.3 Topography

The area is flat in nature. It is a build up plot. The average elevation above mean sea level is 12 m. Toposheet of the area covering site is as follows:



3.4 Social Infrastructure Available:

The social infrastructure available at Gandhidham is listed below.

- Housing colonies
- Public School
- ITI center
- Healthcare Centre
- Children's Park
- Community Centers
- Pharmacy
- Market
- And all very well developed urban facilities

3.5 Detail of CSR activity

It will be ensured that the unit contributes to the locally arranged Social welfare activities.

The land has been recently procured by client and hence it is too early to plan CSR activity. However, during the EIA study and based on baseline study, required gap analysis would be carried out and appropriate CSR activity will be carried out.

3.6 Emergency management services

Logistic facility /Tel Nos.	Destination	Distance km.
Nearest Hospital	Rambaug Government Hospital, Gandhidham	16 KM
Fire Brigade (101)	Gandhidham fire Brigade	15 KM
Nearest Police Station (100)	Gandhidham Police Station	16 KM

The unit will establish Emergency response team to take care of emergency. Periodical mock-drills will be arranged and people will be trained. Assembly points will be defined on layout map and awareness on this will be created.

3.7 Rehabilitation & Resettlement Plan

The land is already in the possession of the project proponent. The NA permission will be obtained for additional land. There is no human settlement on newly proposed land. Therefore, resettlement and rehabilitation is not involved.

3.8 Land Use Breakup

This plant will be located in Survey No 141-1-2-N-142-1, having an area of 42.02 +28.31 acres.

The land currently procured is already been developed as an industrial unit with some infrastructure ready to use. Newly procured land will be developed for future expansion after getting necessary permission.

In all the cases, minimum 33 % land will be allocated for development of green belt.

Particular	**Detail**
Manufacturing facility	34,726 m^2
Staff Quarter & Canteen	8646 m^2
Storage Area	5670 m^2
Electrical Sub Stations	4552 m^2
Admin building	600 m^2
Green belt (33 %)	56,000 m^2
Kept for future expansion	1,74,421 m^2
Total Land sq. m	2,84,615 m^2

CHAPTER 4

Proposed Environmental Infrastructure

The company will take into account all environmental aspects for expansion also so that no pollution hazard is ever created in and around the plant. Every effort is being made to keep zero air pollution as well as water pollution. In addition to the above, care has been taken to provide green belt around the plant.

4.1 Management of Domestic Waste Water

The domestic effluent (8000 Liter/day) shall be disposed through septic tank/ soak pit.

4.2 Management of INDUSTRIAL WASTE Water

The industrial effluent generation is 158 m^3/day; out of which approximately 133 m^3/day effluent from washing activity and other is from ancillary activities like cooling tower and boiler blow downs. Total effluent shall be treated at inhouse ETP and it(meeting GPCB norms) will be either re-used for suitable purposes or would be used for plantation within premises.

The product-wise quantity of water consumption and wastewater generation is as follows:

Acrylamide

Waste Description	Classification	Treatment	Quantity (MT/d)	Composition
Sanitary	-	Sanitary waste water treatment	4	COD 650 mg/l TSS 585 mg/l
Floor cleaning		sent to sewage after pH adjustment		
Cooling tower tower blowdonw			156	COD** 48.7 mg/l TDS** 150 mg/L
Reverse osmosis concentrate	-	sent to sewage after pH adjustment	50.4	**
Cross flow filter cleaning	-	sent to sewage after pH adjustment	10.75*	TOC : 180 ppm (AM 260 ppm) NaOH 0,8% Catalyst cell 0,3 %
AM DIATOMITE FILTRATION			0	

Liquid

Waste Description	COD	Treatment	Quantity (T/y)
Waste Water from process	2000 - 3000 mg/l		8400
Floor cleaning + Sanitary	< 2000 mg/l	sent to sewage	2800
Cooling tower tower blowdown	300 mg/l		2800
Waste water after reactor cleaning	2000 mg/l	To Water Treatment Station	10000

Powder

Waste Description	COD	Treatment	Quantity (T/d)
Floor cleaning + Sanitary	2000 mg/l	sent to sewage	1
Cooling tower tower blowdown			0
Waste water after reactor cleaning	-	To Water Treatment Station	Not Applicable

Emulsion

Waste Description	COD	Treatment	Quantity (T/y)
Waste Water from process + reactor cleaning	15000 mg/l		18000
Floor cleaning + Sanitary	< 2000 mg/l	sent to sewage	6000
Cooling tower tower blowdown	300 mg/l		6000

Description of Effluent Treatment process

The incoming effluent will be collected in equalization tank for homogenization of different effluent streams. After equalization it will go to flash mixer by gravity, where chemicals dosing takes place and physico-chemical treatment is given. After flash mixer, effluent is taken to flocculation tank fitted with Flocculator. Here, coagulation & flocculation will take place. The sludge generated during chemical treatment shall be removed in primary settling tank. In primary settling tank, settlement of effluent takes place and generated sludge shall be disposed to sludge drying bed.

The supernatant from primary settling tank shall flow to aeration tank for further biological treatment. The supernatant from aeration tank will go to secondary settling tank by gravity for settling. From the secondary settling tank, the supernatant shall be collected in treated water tank. The sludge from second settling tank will also be sent to sludge drying bed, where sludge gets dried.

For polishing treatment, the treated effluent shall be pumped to pressure sand filter & carbon Filter for removal of suspended solids & residual organics. The outlet from filters shall be sent for final disposal.

Sr. No	Description	Nos	Capacity, m^3
1	Equalization Tank	1	150
2	Flash Mixer	1	10
3	Flocculator	1	10
4	Primary Settling Tank	1	20
5	Aeration Tank	1	150
6	Secondary Settling Tank	1	20
7	Treated Water Tank	1	100
8	Pressure Sand/Carbon Filter	1+1	1.0 m dia each
9	Sludge Drying Beds	4	1. 5 X1.5 X 4 nos.

The schematic flow diagram is represented in Annexure.

4.3 Air Quality Management:

The source of air pollution is Boiler/Heater, which will consumes natural gas (2200 Nm3/Hr). Plant area has well ventilated, cross air flow and exhaust fans have been provided for extra air flow.

4.4 Solid & Hazardous Waste Management

The details of hazardous wastes generation from the proposed project & its management & Handling are listed in the following tables. All the requirements of hazardous waste rules shall be complied with.

Details of Hazardous & Other Waste Rule as per 2016

Detail of Hazardous Waste	Category	Total Quantity
Bag filter ash	35.1	20.5 MT/Yr
Catalyst empty bags	33.1	2 MT/Yr
Glass contaminated Lab equipment	23.1	2.75 MT/Yr
ETP Sludge	35.3	60 MT/year

4.5 **Hazardous Chemicals Details**

TABLE of MSDS properties for RM

Trade Name	*Common Chemical name*	*IUPAC nomenclature*	*Physical State*	*M (g/mol)*	*Boiling point (°C)*	*Fusion point (°C)*	*Density kg/m3*	*Viscosity (mPa.s)*	*Vapour Pressure (kPa)*	*Flash Point (°C)*	*LEL %vol*	*HEL %vol*	*SEL 30 min(ppm)*	*SEL 1h(ppm)*	*DL50 Oral (rat) mg/kg*	*OES/TWA/ VME (ppm)*
Acrylamide 50%	Acrylamide	Prop-2-enamide	Liquid	71.08	98.8-104.4	12-14 (Crystallization)	1040	2,7	2,93 at 25°C	NA					490-565	0,1
Acrylic Acid Glacial	Acrylic Acid	Prop-2-enoic acid	Liquid	72.06	141	13	1049	1,149	0,529 at 25 °C		3,9	19,8		750	617-1405	2
Acrylic Acid 90% in water	Acrylic Acid	Prop-2-enoic acid	Liquid	72.06	111	2	1060	2,2	16 at 20°C	72°C	3,9	19,8		750	617-1405	2
Acrylic Acid 30% in water	Acrylic Acid	Prop-2-enoic acid	Liquid	72.06	111	2	1060	2,2	16 at 20°C	72°C	3,9	19,8		750	617-1405	2
Acrylic Acid 10% in water	Acrylic Acid	Prop-2-enoic acid	Liquid	72.06	111	2	1060	2,2	16 at 20°C	72°C	3,9	19,8		750	617-1405	2

Trade Name	*Common Chemical name*	*IUPAC nomenclature*	*Physical State*	*M (g/mol)*	*Boiling point (°C)*	*Fusion point (°C)*	*Density kg/m3*	*Viscosity (mPa.s)*	*Vapour Pressure (kPa)*	*Flash Point (°C)*	*LEL %vol*	*HEL %vol*	*SEL 30 min(ppm)*	*SEL 1h(ppm)*	*DL50 Oral (rat) mg/kg*	*OES/TWA/ VME (ppm)*
Acrylonitrile	Acrylonitrile	Prop-2-enenitrile	Liquid	53.06	77,3	-83,55	806	0,34	11,5 at 20°C	-1	3	17	36	139	81	4,5
Ammonia	Ammoniac	Azane	Solution	17.03	-33	-77,7	0,007	Not Applicable	860 at 20°C	NA					350	25
Ammonium Chloride	Ammonium Chloride	Ammonium Chloride	Solid	53	/	335	1530	NA	0,13 at 30°C	/					1650	10
Catalyst for AM	Dead microbial	/	Liquid	/	NA	NA	1050	/	/	/					>63000	/
Caustic Soda 50%	Sodium Hydroxyde in water	Sodium Hydroxyde solution	Liquid	/	140	/	1530	/	1,33 at 55 °C	/					>90	1,35
Caustic Soda 10%	Sodium Hydroxyde in water	Sodium Hydroxyde solution	Liquid	/	140	/	1530	/	1,33 at 55 °C	/					>90	1,35

Trade Name	*Common Chemical name*	*IUPAC nomenclature*	*Physical State*	*M (g/mol)*	*Boiling point (°C)*	*Fusion point (°C)*	*Density kg/m3*	*Viscosity (mPa.s)*	*Vapour Pressure (kPa)*	*Flash Point (°C)*	*LEL %vol*	*HEL %vol*	*SEL 30 min(ppm)*	*SEL 1h(ppm)*	*DL50 Oral (rat) mg/kg*	*OES/TWA/ VME (ppm)*
Caustic Soda 2%	Sodium Hydroxyde in water	Sodium Hydroxyde solution	Liquid	/	99,9	-0,1	1020	/	0,39 at 37°C	/					90	2
ExxsolD120	Distillates (Petroleum), Hydrotreated Light	C14-C18, n-alkanes	Liquid	220	255/320	NA	832	3-15	0 - 0,006 at 50 °C	120	0,6	7			>5000	66
Sulfuric Acid	Sulfuric Acid	Sulfuric Acid	Liquid	98	290	10	1840	21	0,13 at 146°C	188 to 207					2140	1
Water (Process)	Water	Water	Liquid	18	100	0	1000	1	/	/					/	NA

Waste Minimization Measures

- Metering and control of quantities of active ingredients to minimize waste.
- Reuse of by-products from the process as raw materials or as raw material substitutes in other processes.
- Use of automated filling to minimize spillage.
- Use of Close Feed system into batch reactors.
- Venting equipment through vapour recovery system.
- Use of high pressure hoses for equipment clearing to reduce wastewater generation for reuse.

CHAPTER 5
PROJECT SCHEDULE & COST ESTIMATES

5.1 Proposed Schedule

The industry seeks Environmental Clearance (EC) and intends to start production activities from .

Sr. No.	Activity	Schedule
1	Application for Environmental Clearance	Feb 2017
2	TOR Meeting	Apr 2017
3	Baseline study for EIA	Mar-May 2017
4	Draft report for public hearing	Jul 2017
5	Public hearing	Jul 2017
6	Application for appraisal	Sep 2017
7	Appraisal meeting	Nov 2017
8	Avail Environmental Clearance (and CtE if required)	Dec 2017
9	Procure CtO	Feb 2018
10	Start Production Activities	Apr 2018

5.2 Cost estimates

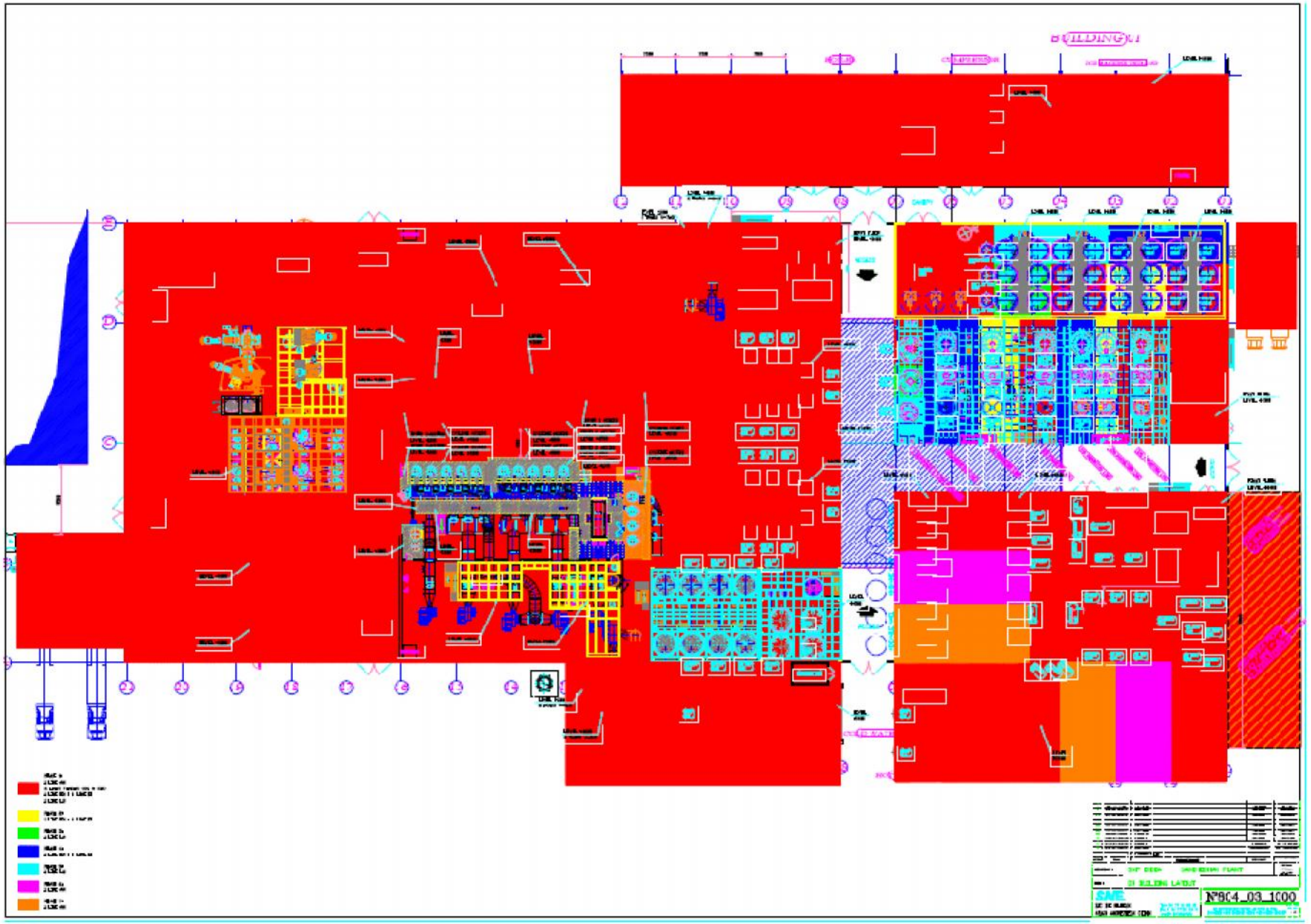
As the proposed expansion is to be carried out in existing infrastructure, there would not be any requirement of new land of building.

Estimated expenditure would be approximately Rs. 400 Crores (Proposed) to be incurred from captive funds.

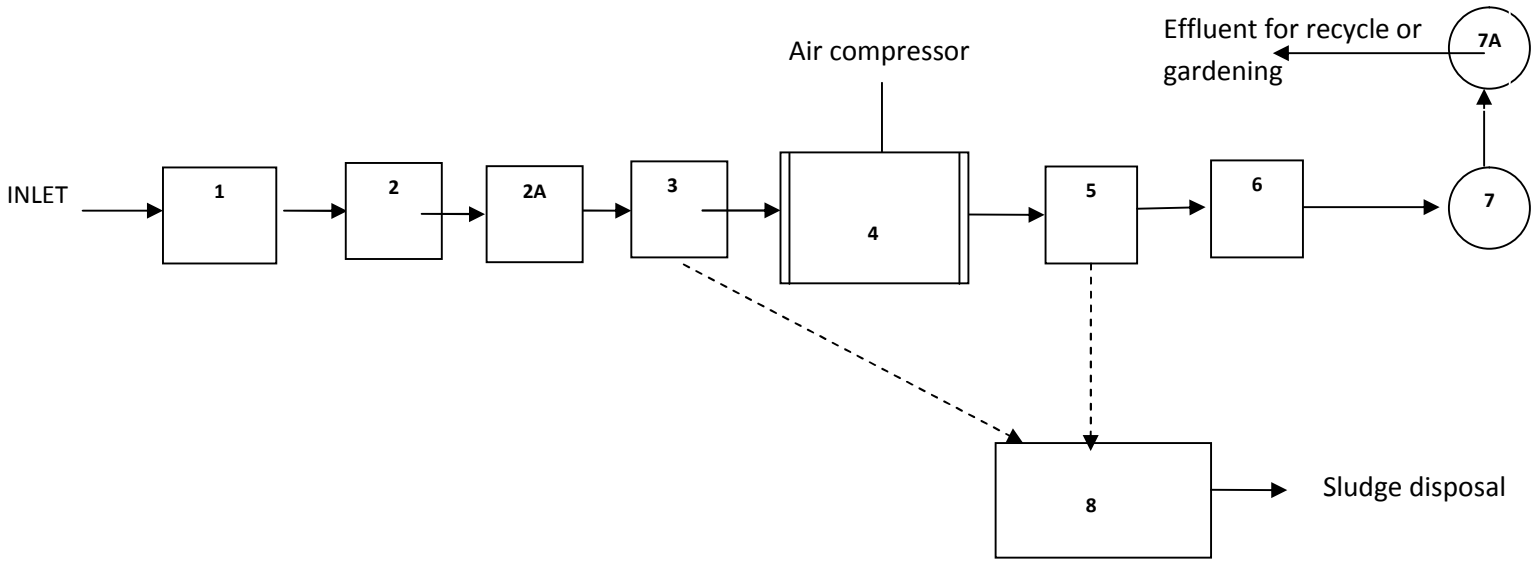
Cost of Environment management system shall be around Rs. 1 Crore.

PROJECT WITH SURROUNDING 10 km RADIUS AREA

PLANT LAYOUT



Line Diagram Of Effluent Treatment Plant



Note: All Dimensions are in meter		
8	Sludge drying beds	1.5 X 1.5 X 4 nos
7/7A	Pressure sand / Carbon Filter	1.0 m dia each
6	Treated Water Tank	100
5	Secondary Settling Tank	20
4	Aeration tank	150
3	Primary Settling Tank	20
2A	Flocculator	10
2	Flash mixer	10
1	Equalization Tank	150
Sr.No.	Description of unit	Capacity

Unit:	SNF Flopam India Pvt ltd, Kutch, Gujarat		
Project:	Conceptual Design of Effluent Treatment Plant		
Drawing:	Flow diagram of Effluent Treatment Plant		
Date: 24/02/2017	Chkd: M.N.JAIN	Drawn	Drg. No. EET/New/2017/02