

M/s. AdaniHazira Port Private Limited



Prefeasibility Report

for

EC Amendment for Handling of  
Proposed Butadiene Storage Facility at  
M/s. Adani Hazira Port Private Limited,  
Hazira

SEPTEMBER2014



**Kadam**

Environmental Consultants  
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Environment *for* Development

## ADANI HAZIRA PORT PRIVATE LIMITED

# Prefeasibility Report for EC Amendment for Handling of Proposed Butadiene Storage Facility at M/s. Adani Hazira Port, Hazira

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<b>Prepared &amp; Managed By</b>	Jitixa Upadhyay		<b>Released By</b>		Sangram Kadam		
CONTACT DETAILS							
<b>Vadodara (Head Office)</b>							
871/B/3, GIDC Makarpura, Vadodara, India – 390 010. E: <a href="mailto:kadamenviro@kadamenviro.com">kadamenviro@kadamenviro.com</a> ; T: +91-265-3001000; F: +91 265 300106							
<b>Delhi / NCR</b>							
SPACE IT PARK, Unit no. 1124, 11th Floor, Tower B 3, Sector 49, Near Omaxe City Centre mall, Sohna Road, Gurgaon -122 002 (Haryana) E: <a href="mailto:delhi@kadamenviro.com">delhi@kadamenviro.com</a> ; T: 0124-4242430; M: +91-98998-04300							
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# 1 EXECUTIVE SUMMARY

## 1.1 Plant Features and Production Capacity

AHPPL has already obtained Environment & CRZ clearance for setting up liquid storage terminal to handle various POL and Chemical products as per Class A, B & C. Total capacity will be 7,25,500 KL which will be created through various storage tanks (more than 250 nos.) ranging from 500 KL to 16000 KL. AHPPL is now relocating of two tanks each of capacity 3000 KL each for the handling and storage of Butadiene. Butadiene will be first transported through road tankers from the source to storage terminal of AHPPL and then again transfer from storage tanks to vessel at liquid berth via dedicated pipeline.

Existing Liquid berth and pipeline corridor will be used for the proposed relocation of tanks.

## 1.2 Environment

### 1.2.1 Water

Water is sourced from irrigation department through M/s. Shell.

Water consumption quantity remains same as EC received i.e. 7500 KLD (Domestic + Industrial). No additional water is required to relocation of the tanks.

### Wastewater Generation

EC quantity of domestic wastewater is 85 KLD which remain same after relocation of tanks for butadiene.

Existing industrial wastewater generation: 1190 KLD. No industrial waste water will be generated due to proposed relocation activity.

STP & ETP will be developed in modular phase as per EC granted earlier.

### 1.2.2 Power Requirement

Electricity sourced from Gujarat Electricity Board.

During Construction Phase 1000 kW will be required. During Operation Phase 1500 kVA will required.

### 1.2.3 Air Emissions

### Flue Gas Stacks

Only one DG Set of 1250 kVA will installed for relocation of butadiene storage.

### Process Vents

There will be no process vent.

### 1.2.4 Hazardous Waste Generation and Disposal

Due to proposed relocation of storage tanks only used spent oil waste will increase. No other waste will be generated.

## 2 INTRODUCTION

### 2.1 Identification of Project and Project Proponent

Adani Group has established port and related backup infrastructure facilities at Hazira to cater the need of hinterland cargos like coal, bulk, break bulk and liquid by providing dedicated as well as multipurpose berths. Liquid cargo handling facilities along with piping and storage infrastructure facilities are already under operation. All the activities are managed by Adani Hazira Port Private Limited (AHPPL) which is subsidiary of Adani Group of companies.

AHPPL being a project proponent has got potential to accommodate various consumers to satisfy their specific requirement to handle and store the liquid cargo. Already number of chemicals are handled by AHPPL as per EC granted.

### 2.2 Brief Description of Nature of the Project

AHPPL has already obtained EC & CRZ clearance for handling and storage of 7,25,500 KL of various Chemicals under Class A, B & C. Various tanks will be created for storage ranging from 500 KL to 16000 KL for the handling and storage of various chemicals based on the market requirements. Approximately more than 250 tanks are proposed to meet with the requirement.

AHPPL is now proposing relocation of two tanks each of capacity 3000 KL for the handling and storage of Butadiene. Butadiene will be first transported through road tankers from the source to storage terminal of AHPPL and then again transfer from storage tanks to vessel at liquid berth via dedicated pipeline.

Liquid berth and existing pipeline corridor will be used for the proposed project.

### 2.3 Need for the project and it's importance to the country and or region

Many companies are under discussion with Adani Hazira Port Private Limited (AHPPL), for its export oriented handling & storage requirement of butadiene. This requirement need to be addressed with special / customized infrastructure to be created at port / liquid terminal, which can then be offered to them with a techno- commercial feasibility of the investment so carried out by AHPPL.

### 2.4 Demand Supply Gap

Present Demand

Demand Supply Scenario Year 2011-12		
Demand (KTA)	Capacity (KTA)	Surplus/ (Gap)
124	266	142

Source: 12<sup>th</sup> Plan, sub group report on petrochemicals, planning commission Gol

### 2.5 Import vs. Indigenous Production

Data pertains to 2011-12

Imports- Nil

Production- 266 KT

## 2.6 Export Possibility

Estimated demand supply scenario by 2017

Demand		Capacity		Surplus /(Gap)	
2011-12	2016-17	2011-12	2016-17	2011-12	2016-17
124	470	295	528	171	58

## 2.7 Domestic Market

Butadiene finds its application in production of synthetic rubbers and engineering plastics. These products are widely used in automotive, consumer durables and electronics appliances. The expected growths in these industries within the country boost the domestic demand.

It is expected that synthetic rubbers demand may reach 721 KT by 2017 from the present levels of 500KT.

## 2.8 Global Market

The world market for butadiene is largely driven by demand for elastomers due to their extensive use in manufacture of tyres. The major consumers of butadiene are regions such as China, Europe and U.S. These regions have the highest demand for elastomers, which account for 68% of the global butadiene market demand. Apart from demand from elastomers in the tyre industry, the other downstream applications of butadiene include elastomers demand from industries such as carpet backing, footwear, mechanical belts, nitrile rubber hoses, and so on.

The existing global demand for butadiene is around 10 MT. China & Asian demand is estimated to grow by 6% and 3% respectively in the coming years.

## 2.9 Employment Generation (Direct and Indirect) due to the project

During construction phase~ 200 personnel will be employed (for typically for few months only when construction takes place). And during operation Phase~40 employees will be working for the relocation of Butadiene storage facility.

### 3 PROJECT DESCRIPTION

#### 3.1 Type of Project including interlinked and interdependent projects, if any

There are no interlinked/inter dependent projects with this proposed relocation of tanks.

#### 3.2 Location (map showing general location, specific location and project boundary & project lay out) with coordinates

Relocation of Butadiene facility will be located at Adani Hazira Port's existing premises. Relocation area for butadiene Storage plot area is 5.1 Ha which is part of total plot area of 873.27 Ha of M/s. AHPPL.

*Figure 3-1: Site Location on Google*



*Table 3-1: Latitude and Longitude of Site Boundary*

Point	Latitude	Longitude
N	21° 5' 13.015"	72° 38' 38.635"
E	21° 5' 10.023"	72° 38' 42.247"
S	21° 5' 03.946"	72° 38' 39.476"
W	21° 5' 10.147"	72° 38' 32.009"

#### 3.3 Details of alternate sites considered and the basis of selecting the proposed site, particularly the environmental considerations gone into should be highlighted

The plot for development of butadiene facility has been selected near the main gate of port. Considering the safety requirement of butadiene facility, OISD has recommended 90m safety zone from the butadiene sphere wherein no activity not related to butadiene facility is permitted.

However within the 90m safety zone, all those activities which are directly related to butadiene handling are permitted. Thus the activities such as pump house, road, weigh bridge, tankerloading/unloading facility, electrical sub-station, control room, fire water tanks & pump house, utility room housing compressors, chillers etc. are allowed within the 90m safety zone. From the butadiene plot location, the docklines will be laid upto jetty for ship handling.

### 3.4 Size or Magnitude of Operation

Total Approved Tank Capacities as per Environmental Clearance:

Type of Cargo	Enclosure No. & Capacity	Configurations of Storage Tanks Proposed			Configurations of Storage Tanks Executed
		No. Of Tanks	Capacity (KL)	Total (KL)	
Chemical (Acetone, Acrylonitrile, Benzene, Ethanol, Ethylene, Methanol, Motor Spirit/ Naptha, N Hexane, Diesel / Kerosene, Styrene, Toluene, Xylene, Aniline, Ethylene Acetate, Methyl Isobutyl Ketone, Acetic Acid) / Petrochemicals / Base Oils / POL Products / Edible Oil / Non- Classified Oils	1-29,500 KL	19	500	9,500	7
	2-38,000 KL	46	1,000	46,000	15
	3-27,000 KL				
	4A-28,800 KL	36	1,500	54,000	14
	4B-43,200 KL	43	2,000	86,000	15
	4C-27,000 KL				
	5-15,500 KL	54	3,000	162,000	24
	6-24,500 KL	40	5,000	200,000	4
	7-16,500 KL				
	8-40,000KL	10	7,200	72,000	4
	9-40,000KL				
	10-29500KL	6	16,000	96,000	
	11-42,000KL				
	12-27,000KL				
	13-60,000KL				
	14-60,000KL				
	15-20,500KL				
	16-23,500KL				
	17-23,500KL				
18-48,000KL					
19-48,000KL					
<b>Total</b>			<b>7,25,500 KL</b>		

Out of sanctioned capacities for setting up of tanks of 3000KL as per table above, **only two tanks of 3000 KL each will be relocated** for the storage and handling of butadiene as per PESO guidelines. So there will not be any addition in the volumes or tanks which are already approved as per environmental clearance dated 03<sup>rd</sup> May 2013.

### 3.5 Process Description with Process Details

Petrochemical industries are setting up a dual feed cracker to produce various building blocks for downstream petrochemical processing industry.

Butadiene is one of the products and required to be exported. Therefore companies have approached AHPPL to create facility at Adani Hazira Port, to handle & storage of Butadiene and facilitate its exports.

After catering to the local demand surplus is to be exported from AHPPL facility.

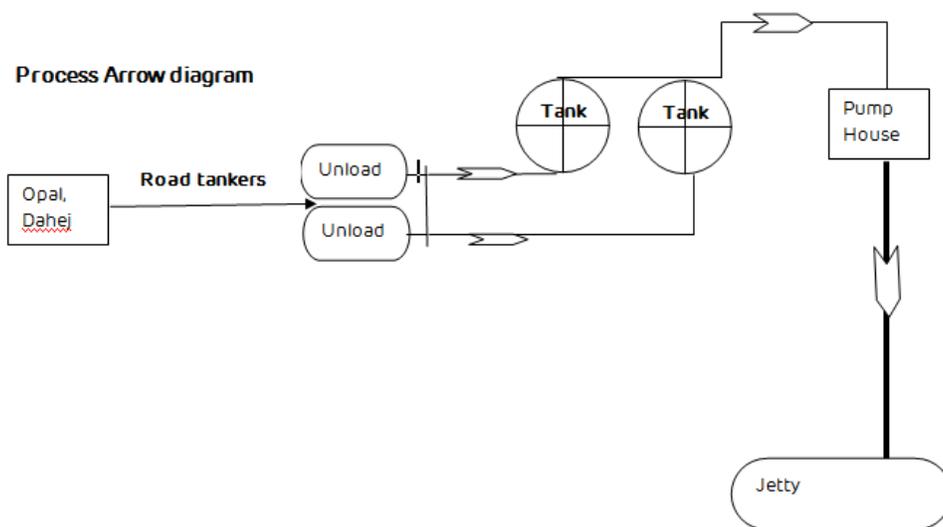
The road tankers carries around 15-20 Tonnes of Butadiene and hence it is expected that port may receive 20 to 25 road tankers on daily basis. The road tankers are then unloaded and the material is transferred to the storage tanks thru pipelines connecting the unloading bays and the storage tanks.

Butadiene will be stored under refrigeration.

The aggregation of 10-15 days quantities will then be shipped or loaded on to the export vessels/ ships. Till such time butadiene is stored in the suitably designed tanks at AHPPL's Hazira Port.

The storage tanks are connected to the pumps which are required to pump the material (Butadiene) thru a pipeline connected to the manifold at the jetty.

**Figure 2: Process Flow Diagram**



**3.6 Raw material required along with estimated quantity, likely source, marketing area of final products, mode of transport of raw material and finished product.**

**3.6.1 Market & Transportation details of Finished Products**

*Details of Final Products, Market and Transportation Details*

The principal activity of this proposed relocation is limited to storage of various types of liquid chemicals, hazardous such as; petroleum products, Oils, fuels and their dispatch through road tankers to the customers, thus there is no raw material anticipated for the process. Routes of connectivity are given as following:

**Table 3-2: Routes of Connectivity to the Proposed Site**

S.No.	Place	Distance	Direction
1	National Highway (NH-06)		Adjacent

**3.7 Resource optimization/ recycling and reuse envisaged in the project, if any, should be briefly outlined.**

Domestic wastewater will be treated through STP and finally used for Horticulture purposes in the premises.

**3.8 Availability of water its source, energy/power requirement and source should be given**

**3.8.1 Water consumption**

Water requirement as per EC received is 7500 KLD and after proposed relocation of tanks no additional water will be required. So water requirement quantity remains same as 7500 KLD.

**Table 3-3: Water Consumption Details**

S. No.	Area of Consumption	Water Consumption in KLD		Remarks
		EC Received for	After Relocation	
I	Domestic	100	100	No Change as only relocation of tank.
II	Industrial			
a	Fire fighting	2000	2000	
b	Washing activities	1400	1400	
c	Dust Suppression system	4000	4000	
<b>Total</b>		<b>7500</b>	<b>7500</b>	

**3.8.2 Power Requirement**

Power is sourced from Gujarat Electricity Board.

Existing requirement of power: 4400 kVA

Proposed requirement of power: 1500kVA

Total power requirement after proposed relocation of tanks: 5900 kVA

**Table 3-4: Fuel Consumption**

S. No.	Stack Attached to	Capacity	Stack Nos.	Type of Fuel used	Fuel consumption
<b>Existing</b>					
1	Hot Water Plant	400000 KCAL/ HR	1	Furnace Oil/ HSD	46 lit/ hr
2	Hot Water Plant	400000 KCAL/ HR		Furnace Oil/ HSD	46 lit/ hr
3	DG Set (3 Nos.)	1500 kVA	3	HSD	5166 lit /Day of each
4	DG Set	325 kVA	1	HSD	1632 lit/Day
5	DG Set	100 kVA	1	HSD	528 lit/Day
6	DG Set	652 kVA	1	HSD	3600 lit /Day
7	DG Set	380 kVA	1	HSD	2376 lit /Day
8	DG Set	200 kVA	1	HSD	1200 lit /Day
<b>Proposed</b>					
1	DG Set	1250 kVA	1	HSD	5000 lit /Day

### 3.9 Quantity of waste to be generated (liquid and solid) and scheme for their management /disposal

#### 3.9.1 Waste Water Generation, Treatment and Disposal

Wastewater generation will be remains same 1275 KLD. As proposed relocation of storage tank will not generate additional wastewater.

**Table 3-5: Details of Waste Water Generation**

S. No.	Area of Consumption	Wastewater Generation in KLD		Treatment and Disposal	Remarks
		EC Received for	After Relocation		
I	Domestic	85	85	Used for horticulture purpose after treated in STP	No Change as only relocation of tank.
II	Industrial				
a	Fire fighting	0	0		
b	Washing activities	1190	1190	Recycled back after treated in ETP	
c	Dust Suppression system	0	0		
<b>Total</b>		<b>1275</b>	<b>1275</b>		

#### 3.9.2 Effluent Treatment Plant – 50 KLD

##### Effluent Treatment Scheme for Existing Unit

##### Collection Tank cum Oil Water Separator

The incoming effluent from the tank pumped at the rate of 10 cum/hr and stored here prior to pretreatment. This is done to meet hydraulic requirement and consistency of flow for further continuous treatment. Here Primary oil removal facility i.e. mechanical belt type oil skimmer with baffle is provided. The oil content being considerably high it is further pumped to TPI unit.

##### Tilted Plate Interceptor

The oily effluent from the collection tank transferred to TPI unit where oil floating at the top is removed by pipe type skimmer. The effluent is passed through tube pack, where oily water flows from the top of the pack and then over an effluent weir into the treated water chamber the oil droplet coalesces into large droplets and float at the top. This oil is removed by means of pipe type skimmer & will be stored in oil collection tank. The sludge from the TPI unit is feed to chemical sludge drying beds for dewatering.

##### Equalization Tank

The aqueous layer with whatever dissolved chemicals and some carryover oil and grease will overflow to equalization tank. Here aeration is provided to avoid the settlement of any solids and ensure uniform mixing. Domestic sewage also will be added in this tank by gravity. This provision is made considering future expansion. Then the effluent from equalization Tank is pumped to Flash mixing Tank.

### **Flash Mixer for Lime**

The overflow from the equalization tank is pumped to Flash mixing Tank, Where lime and PAC dosing system is provided for coagulation. Here, the flash mixing is done to ensure the uniform mixing with the chemicals. From ET pumping main, there is 1 bypass provision to collection tank to remove the traces of oil and grease present if any.

### **Flash Mixer for Alum/Neutralization tank**

In this tank the effluent is neutralized by means of pH correction dosing system using Alum. Overflow from flash mixing tank is collected in flocculation tank.

### **Flocculation Tank**

Overflow from the flax mixing tank is collected in the flocculation tank, where floc formation is aided by addition of polyelectrolyte dosing & slow mixing.

### **Primary Tube Settler**

The primary Tube Settler is proposed to settle out the sludge solids. The flocs formed in flocculation tank are allowed to settle in primary tube settler for separation of solids and liquids. The sludge from the primary tube settler is fed to sludge drying beds for dewatering. The dried sludge disposed of as hazardous waste and sludge filtrate will be returned to equalization tank. The overflow from primary tube settler will be fed to FAB/MBBR Tank for biological treatment.

### **FAB/MBBR Tank**

The biological treatment is designed on FAB/MBBR process for optimum utilization of space. The FAB consist of tank filled with special media. These media are made of specially developed material of controlled density such that they can be fluidized using an aeration device. A bio film develops on the media which moves along the effluent in the reactor. The movement within the rector is generated by providing diffused aeration with the help of diffusers placed at the bottom of the reactor. The thin bio film on the media enables the bacteria to act upon the biodegradable matter in the effluent and reduce BOD/ COD content in the presence of oxygen that is used for fluidization. Urea/ DAP system is provided for nutrient supplement in FAB Tank.

### **Secondary Tube Settler**

The biologically treated effluent from MBBR tank is collected in secondary Tube settler for separation of solids and liquids. The settled sludge fed to sludge drying beds and supernant will overflow to chlorine contact tank for disinfection.

### **Chlorine Contact Tank**

The overflow of secondary tube settler is collected into chlorine contact tank. For disinfection of water sodium hypo chloride solution is fed from sodium hypo tank by means of electrical metering pump, which doses proportionately to the inflow of water. Then disinfected effluent further pumped through dual media filter for tertiary treatment.

### **Dual Media Filter**

The objective of Dual Media Filter is to remove suspended solids free chlorine, organic matter, odour and color from water. Activated carbon filters are very effective and produce best quality water when operated properly. The filter media consists of gravel bed support at bottom and activated carbon media at top. The treated effluent then collected in treated water storage tank.

### Treated Water Storage Tank

The tertiary treated effluent is stored into this tank prior to disposal of the effluent by means of transfer pumps.

### Sludge Drying Bed (Chemical)

The sludge from the primary tube settler and TPI is fed by gravity under hydrostatic head to sludge drying beds for dewatering. The filtrate is returned back to Equalization tank and sludge is disposed of as hazardous waste.

### Sludge Drying Bed (Biological)

The part of sludge from secondary tube settler is pumped to FAB/ MBBR tank to maintain desired MLSS concentration in FAB/ MBBR tank as return sludge (Optional) while excess sludge will be fed to Sludge Drying Beds for dewatering and the dried sludge can be removed intermittently for disposal. Sludge filtrate returned to equalization tank.

**Table 3-6: ETP Units with Sizing**

Sr. No.	Units	Nos.	L (mm)	B (mm)	LD (mm)	TD (mm)	MOC
1	Collection Tank	1	2500	2000	2000	2500	MS,FRP
2	Tilted Plate Interceptor	1	5000	600	2700	3000	MS,FRP
3	Equalization Tank	1	5000	4200	2500	3000	RCC
4	Flash Mixer	1	500	500	1000	1500	MS,FRP
5	Flocculation Tank	1	1100	1000	1200	1700	MS,FRP
6	Neutralization Tank	1	500	500	1000	1500	MS,FRP
7	Primary tube Settler	1	1600	1600	2700	3000	MS,FRP
8	Moving Bed Bio Reactor	1	7000	2400	2700	3000	MS,FRP
9	Secondary Tube Settler	1	1600	1600	2600	3000	MS,FRP
10	Chlorine Contact Tank	1	1600	1400	2300	2700	MS,FRP
11	Treated Water Storage Tank	1	9000	2000	2700	3000	RCC
12	Sludge Drying Bed (Chemical)	3	5000	4300	350	1200	Brick Masonary
13	Sludge Drying Bed (Biological)	2	5000	1000	300	1200	Brick Masonary

## Sewage Treatment Plant-25 KLD

### Screen Chamber: 1 No.

The sewage will be conveyed through the Sewage Network pipeline into Screen Chamber. Screen Chamber is provided to remove the bigger size solid particles from the sewage. Screen is proposed in the screen chamber. From this Screen Chamber Sewage will be transferred to the sewage collection sump. The capacity of screen chamber is 1 m<sup>3</sup>.

### **Sewage Collection Sump**

The sewage water after passing through the screen chamber is sent to the sewage collection sump. The collection sump helps to have a consistent flow of sewerage for STP plant. This sump is kept aerated by coarse air diffuser to avoid the foul smell. Then the sewage water will be pumped to the biological treatment i.e. inlet to MBBR reactor. The capacity of Sludge collection sump is 30 m<sup>3</sup>.

### **MBBR-I & II**

The sewage water from Collection cum pumping sump will be passed to the MBBR I and II serially for biological treatment with the help of Pumps. As it is a biological system it has to be operated continuously all 24 hours and there by constant feed of sewage is required.

The MBBR has been provided with number of air diffusers of suitable capacity to provide necessary dissolved oxygen mixed to the sewage and it also helps in fluidization of Media. The MBBR Reactor is also provided with plastic media for the microbial growth. This helps in efficient BOD removal. Air Blowers for oxidation, provides the aeration. If required, Nutrients in the form of Nitrogen & Phosphate are added for biological growth. The MBBR is able to achieve 90-95 % reduction in the BOD level. The MBBR tank I & II provided with size 1.5m x 1.15 m x 2.7 m each.

### **Secondary Tube Settler**

The Secondary Tube Settler tank is proposed to settle out the sludge solids. The tank is provided with size 1.1m x 1.5m x1.9 m and retention time of 3.0 hour. Biologically treated sewage transferred to Secondary tube settler tank. A steep slope is provided in the secondary settling tank to eliminate the need of scrapper mechanism. A part of the sludge from the Tube Settler will be recirculated to MBBR to maintain MLSS levels and a part will be drained to the sludgedrying beds. Secondary Tube Settler is provided with the Tube Settler Media for increasing the surface area to increasing the settling time. The clear effluent from top of media will be transferred to intermediate collection tank.

### **Intermediate Collection Tank**

An intermediate tank is proposed to store secondary treated sewage for tertiary disinfection treatment. The clarified sewage from Secondary Tube Settler Tank collected in a intermediate collection tank. In this tank liquid chlorine in form of Sodium Hypochlorite (NaOCl) dosing is carried out for disinfection. The sewage is then pumped to dual media filter and softener for tertiary treatment.

### **Pressure Sand Filter**

A pressure sand filter is provided as a form of tertiary treatment for removal of suspended solids. The dia. of PSF is 400 mm. The filter consists of different gradations of gravel and sand bed for filtration of suspended solids. The filter is provided with necessary valve arrangements for inflow and outflow and backwashing of the system. The backwash water of the system shall be taken to the Sewage collection sump.

### **Activated Carbon Filter**

An Activated carbon filter is provided as a form of tertiary treatment for removal of residual organics like color, odor etc. The dia. of ACF is 400 mm. The filter consists of different gradations of gravel and sand bed as base over which activated carbon granular porous media having high iodine value is proposed to be provided. The filter is provided with necessary valve arrangements

for inflow and outflow and backwashing of the system. The backwash water of the system shall be taken to the sewage collection sump.

#### **Final Collection Tank**

Outlet of Activated Carbon Filter is collected in a Final Collection Tanks, where the treated sewage is stored. From this tank the treated sewage is reused for onland irrigation.

#### **Sludge Drying Bed**

The Sludge from the Secondary Tube Settler is pumped by Sludge Recycling Pump to the Sludge Drying Beds. The Beds consist of Gravel, stones, sands to filter the water sludge. The sludge remains on the bed & is dried under the sun while the water passes through the media to the slotted pipe from where it is taken back to the sewage collection tank.

Figure 3-3: Flow and Hydraulic diagram of 50 KLD ETP

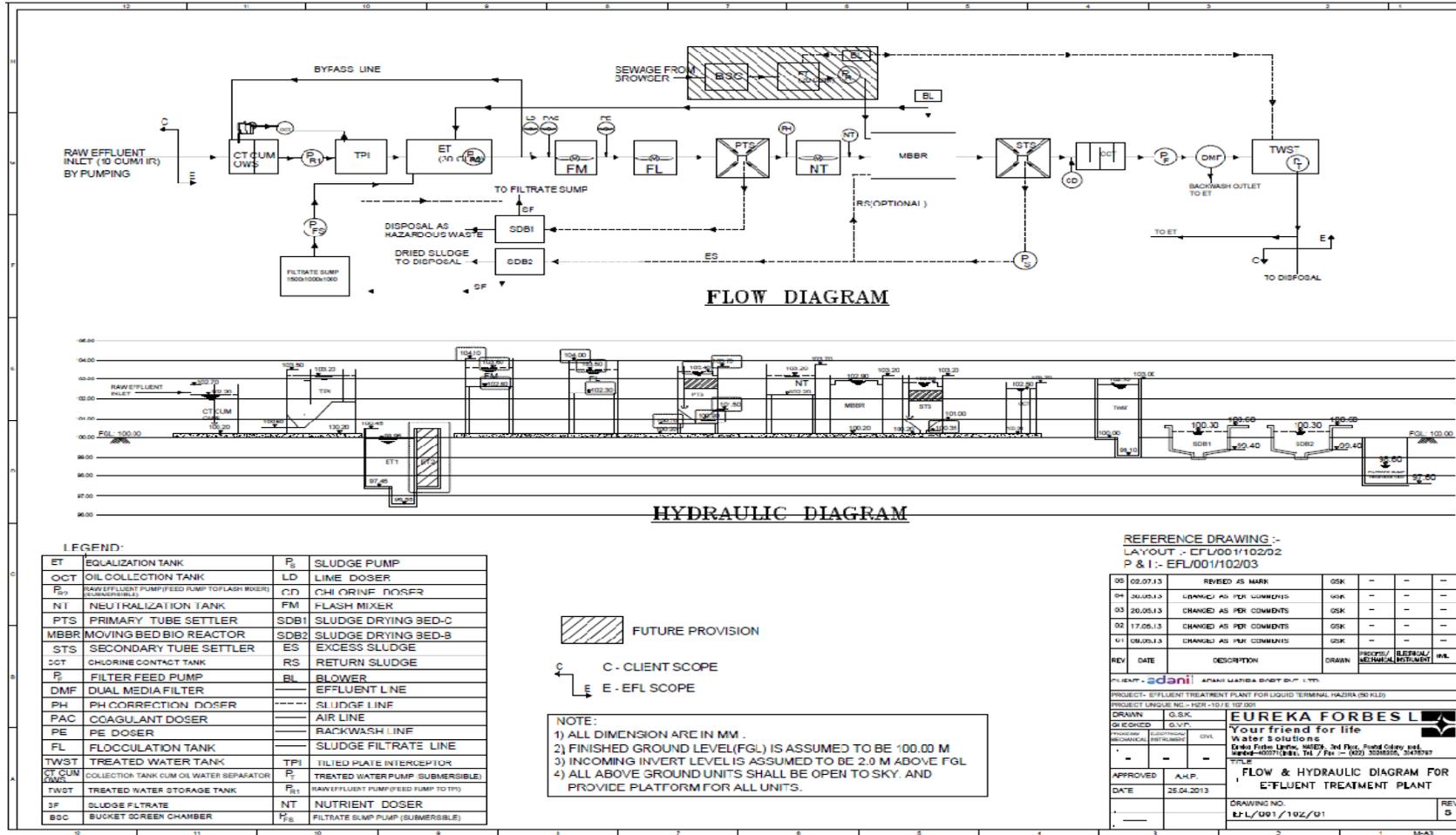
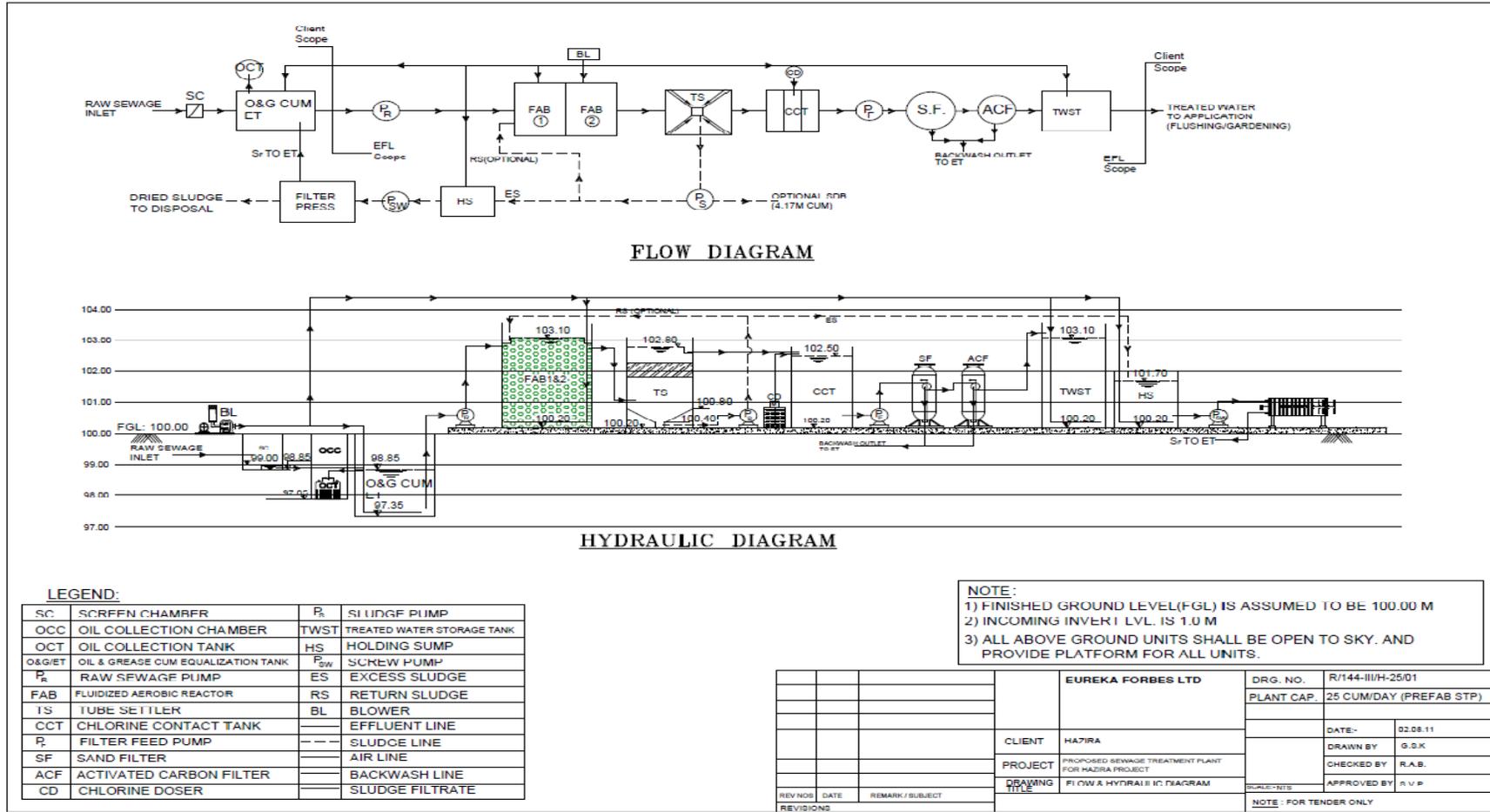


Figure 3-4: Flow and Hydraulic diagram of 25 KLD STP

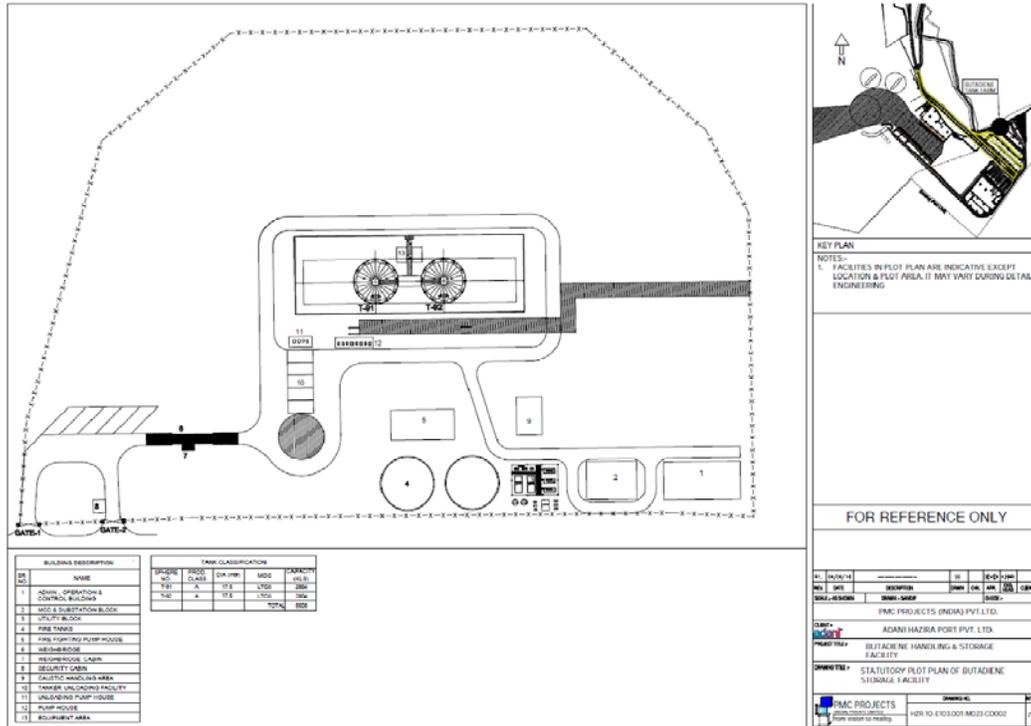


3.9.3 Air Emission

Table 3-7: Flue Gas Stacks Details

S. No.	Stack Attached to	Capacity	Stack Nos.	Stack Height, m	Stack Top Dia, m
<b>Existing</b>					
1	Hot Water Plant	400000 KCAL/ HR	1	30	0.4
2	Hot Water Plant	400000 KCAL/ HR			
3	DG Set (3 Nos.)	1500 kVA	3	30	0.4
4	DG Set	325 kVA	1	11	0.1
5	DG Set	100 kVA	1	11	0.1
6	DG Set	652 kVA	1	11	0.1
7	DG Set	380 kVA	1	11	0.1
8	DG Set	200 kVA	1	11	0.1
<b>Proposed</b>					
1	DG Set	1250 kVA	1	30	0.4

3.10 Schematic representations of the feasibility drawing which give information of EIA Purpose



**Table 3-8: Area Break up at Site**

S. No.	Title	Area in Hector (Ha)			% of Total Area
		Existing	Proposed	Total	
1	Container Freight Station Area	90.82	0	90.82	10.40
2	Coal Stack yard Area	112.44	0	112.44	12.88
3	Warehouse Area/CFS Area	68.49	0	68.49	7.84
4	Automobile PDI Area	32.61	0	32.61	3.73
5	Steel Yard Area	13	0	13	1.49
6	Liquid/Bulk Cargo Storage Area	51.26	5.1	56.36	6.45
7	Container Back-up Area	61.87	0	61.87	7.08
8	Dry Cargo Go-downs Area	14.53	0	14.53	1.66
9	Road Area	94.25	0	94.25	10.79
10	Railway Area	81.82	0	81.82	9.37
11	Port Workers Amenity Centre Area	20.51	0	20.51	2.35
12	Steel and Project Cargo Assembling Area	13	0	13	1.49
13	Truck Parking Area	28.3	0	28.3	3.24
14	Green Belt	81.27	0	81.27	9.31
15	Land for Future Development for SHELL	20	0	20	2.29
16	Port back up area for handling various types of cargo	84	0	84	9.62
	<b>Total</b>	<b>868.17</b>	<b>5.1</b>	<b>873.27</b>	<b>100</b>

*Note: 5.1 ha area proposed for Butadiene storage is already part of 873.27 ha of existing area of AHPPL.*

## 4 SITE ANALYSIS

### 4.1 Connectivity

AHPPL is situated in the west coast of India and located at a distance of 25km from the Surat City in the State of Gujarat and at 130 nautical miles north of Mumbai. Surat Railway Station is major rail network junction located at a distance of 25 km and NH-6 connected to AHPPL (connecting Visarwadi, Gujarat and Deori, Chhattisgarh). Hazira village is the nearest habitation located at a distance of 2.0 km towards North direction from the port area.

The nearest airport, Surat Airport is located at a distance of 40 km by road and 13 km by aerial distance from the port.

### 4.2 Land Form, Land Use and Land ownership

The total area of the unit is 873.27 Ha. As the relocation of tanks will be carried out on existing land so the land use of the site is industrial.

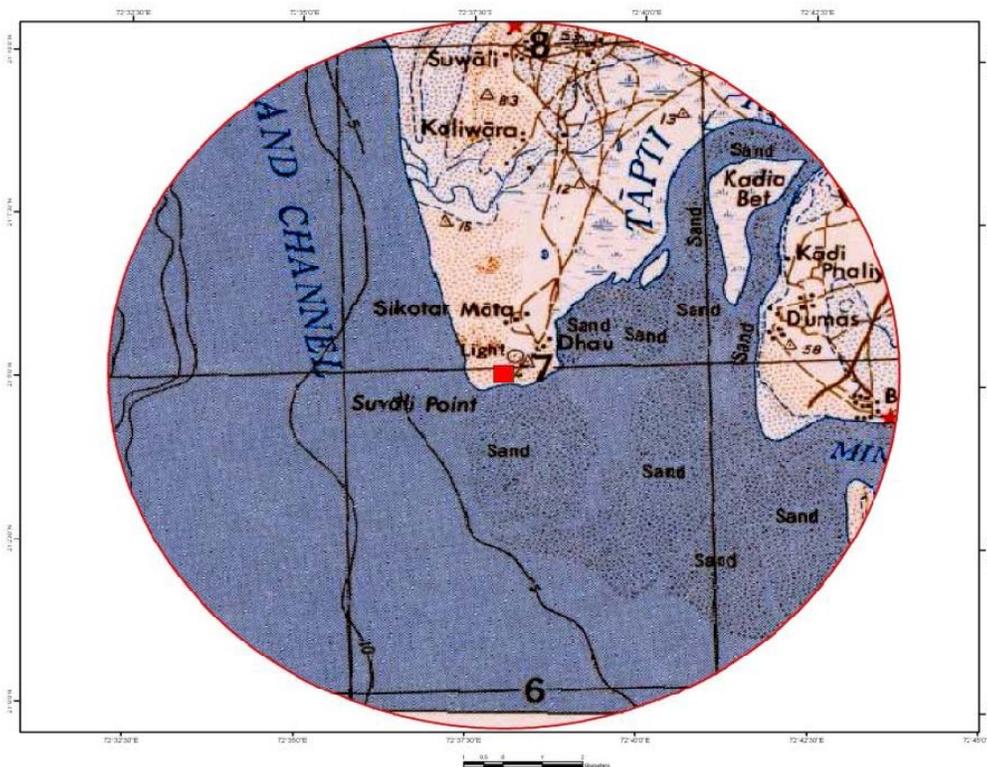
### 4.3 Topography (along with map)

Predominantly the topography is deltaic coastal plain and hot humid agro-ecological region. Tapti Estuary and Hazira Peninsula are forms part of the study region. Hazira peninsula consists of four islands of Hazira, Junagam, Suwali and Mora, which are surrounded by extensive mud flats. The area is drained by perennial River Tapti. The coastline is highly indented and sandy. Inland development of sandy-ridges parallel to the coast, points to past high sea level.

Geo-morphologically, the area comprises of alluvium soil and mud flats. The earth of mouth of Tapti is broad and riddled with numerous tidal channels. South of this river, the coast is more or less straight up to village Umbergaon with a narrow sandy-ridge all along. The intertidal zone is made up of basaltic platform with a thin veneer of mud.

Towards the inland side, a Reserved/Protected forest is located adjacent to the project sitedominated by 5 year old plantations of *Prosopisjuliflora* and few palms (*Borassusflabellifer*). Villages such as Mora and Suwali are located in the northern direction of theproject site. The topography of study area is placed below.

**Figure 4-1: Map showing Topography of the area**



Source: Toposheet No. NF 43-9, series U502, printed by Army Map Service, Corps of Engineers

**4.4 Existing land use pattern (agriculture, non-agriculture, forest, water bodies (including area under CRZ)), shortest distances from the periphery of the project to periphery of the forests, national park, wild life sanctuary, etc sensitive areas, water bodies (distance from the HFL of the river), CRZ. In case of notified industrial area, a copy of the Gazette notification should be given.**

Land use pattern: Industrial

**Table 4-1: Distance of Project Site from Sensitive Areas**

Area	Distance in km	Direction
Mangrove	1.2	SE

**Table 4-2: Distance of Project site from Water Bodies**

Water body	Distance in km	Direction
Tapi Estuary	1.4	E
Arabian Sea	1.7	W

**4.5 Existing Infrastructure**

As on date 5 berths are developed and under operation of which 3 berths are for handling multipurpose cargo including liquid and 2 for container cargo along with port back up area for handling of coal, container, steel, liquids and other cargos including areas for parking, CFS, Go-

downs and other related utilities and amenities. ETP of 50 KLD & STP of 25 KLD is already functional.

#### 4.6 Soil classification

Soli analysis report is given in Annexure 6 in Form-1

#### 4.7 Climatic data from secondary sources

The climate of the study area is from the most recent published long-term Climatological Tables (1961 – 1990) by Indian Meteorological Department (IMD) for Surat District, Gujarat.

##### 4.7.1 Temperature

The mean highest temperature and mean daily maximum temperature recorded are 42.1°C and 37.3°C respectively in the month of April. The highest temperature recorded was 45.6°C on 15th April, 1952, 1st May, 1956 and 10th June, 1901.

January is generally the coldest month, with mean daily minimum temperature of 14.4°C. The period from December to February seems to be the coolest season for a particular calendar year. The lowest temperature recorded was 4.4°C on 31st January, 1929.

##### 4.7.2 Wind

Long term wind direction data is presented in Table 4-3. Overall for the whole year, first predominant wind directions is from South – West (21.9%), second predominant wind direction is from North – West Direction (19.2%) and third predominant wind direction is from West Direction (17.8 %).

During winter period, i.e. from December to February, first predominant wind direction is from North – East Direction (30%), second predominant wind directions are from North and North – West Directions (25% each) and third predominant wind direction is from South West Direction (10%).

**Table 4-3: Predominant Wind Direction IMD Surat**

Month	Predominant Wind					
	First		Second		Third	
	Morning	Evening	Morning	Evening	Morning	Evening
January	NE	NW	N	NE	NW	N / SW
February	NE	NW	N	SW	SE / NW	NE
March	NE	NW	SE	SW	NW	W
April	SW	SW	NW	NW	SE	W
May	SW	SW	W	W	S / NW	S
June	SW	SW	W	S	SE / S	W
July	SW	SW	W	W	S / CALM	S
August	SW	SW	W	W	CALM	S
September	SW	67	W	W / NW	NW	S
October	SE	SW	NE	NW	E / CALM	NE / W
November	NE	NW	SE	NE	E	N / E
December	NE	NW	E	NE	N	N

#### **4.7.3 Rainfall**

The distribution of rainfall in the region, which includes the study area, is uneven. Average mean rainfall in the region is 1172.8 mm.

Distribution of rainfall by season is 2.5 mm in winter (December, January, February), 8.5 mm in summer (March, April, May), 1,127.5 mm in monsoons (June, July, August, September) and 34.3 mm in post-monsoons (October – November). About 96 percent of the annual rainfall in the region is received during the southwest monsoon months i.e. June to September. July is the rainiest month.

Maximum rainfall in any one month was recorded in the month of July in year 1941 which was about 459.2 mm. July is having maximum number of rainy days i.e. 14.6.

#### **4.7.4 Cloud Cover**

The area remains cloudy between June - September, which is the active period of the monsoon season. Generally cloud cover ranges from 2.3 to 6.8 OKTAS during monsoon season.

In the winter season cloud cover ranges from 0.2 to 1.4 OKTAS range.

#### **4.7.5 Humidity**

Most humid conditions are found in the monsoons, followed by post-monsoons, summer and winter in order. Mornings are more humid than evenings and relative humidity ranges from a high of 69 – 87% in monsoons to a low of 34 – 65% in winter.

During winter season, in morning relative humidity remains between 62 – 65% and in the evening it remains between 34 – 43%.

#### **4.8 Social infrastructure available**

There are school, dispensaries, places of worship, market in the nearby localities.

## **5 PLANNING BRIEF**

### **5.1 Planning Concept (type of industries, facilities, transportation etc) Town and Country Planning/ Development authority Classification**

Hazira is now well developed industrial zone which consists of various ports and industries on the coast as well as nearby areas. AHPPL has already developed port and related back infrastructure facilities to handle various types of cargos. The said area is well suited for industrial development because of existing infrastructure availability and connectivity in terms of road to the national approaches.

### **5.2 Population Projection**

Relocation of tanks will generate additional employment of ~40 during operation phase and ~ 400 + during construction phase.

### **5.3 Land use planning (breakup along with green belt etc).**

Land use is industrial. Additional land will not be requiring set up relocation of tanks. Break up of land use is given in Annexure 4 of Form-1. Total plot area is 873.27 Ha. From that greenbelt will be ~9% of total plot area.

### **5.4 Assessment of Infrastructure Demand (Physical & Social)**

No additional load will come on the infrastructure already available

### **5.5 Amenities/ Facilities**

Existing Amenities/ Facilities will be sufficient to meet demand of relocation of tanks.

## 6 PROPOSED INFRASTRUCTURE

### 6.1 Industrial Area (processing area)

This is relocation of tanks within the existing premises; hence no additional land is required.

### 6.2 Residential Area (non-processing area)

No residential area.

### 6.3 Green belt

~9% of total plot area will be developed as greenbelt.

### 6.4 Social Infrastructure

Not applicable

### 6.5 Connectivity (Traffic and transportation road/ rail/metro/water ways etc)

AHPPL is located on the west coast of India in well-developed Hazira Industrial area near Surat, Gujarat state. Surat is district headquarter as well as second largest city of Gujarat. Site is located at an aerial distance of about ~12.0km and by road about ~25 km via Ichchapur towards WSW direction from Surat city. Hazira village is the nearest habitation located at an aerial distance of ~1.0 km towards North direction from the port area.

#### 6.5.1 By Road

Site is easily accessible through NH-06 which has starting point from Hazira (Surat) in Gujarat state and connecting to Kolkata in West Bengal state in the eastern part of the country passing through major cities like Dhule and Nagpur in Maharashtra state and Raipur in Chhattisgarh state.

State Transport buses and private vehicles are easily available from Adajan and Surat railway station to reach Hazira.

#### 6.5.2 By Rail

Nearest railway station located at Surat an aerial distance of ~ 24 km towards NE direction from site. Surat is a Major railway station on western railways busiest Mumbai - Ahmadabad/Delhi route. Surat has also link to central and eastern India through nearest Udhna Junction.

#### 6.5.3 By Air

Nearest Domestic airport is located at Dumas road Surat, which at an aerial distance of ~11.0 km and by road via Ichchapur, at ~28 km towards ENE direction from project site.

Nearest International airports are located at Mumbai and Ahmadabad. Mumbai CSIA is at an aerial distance of ~221 km towards S direction and Ahmadabad SVPIA ~221 km towards N direction from project site.

#### **6.5.4 Water Ways**

Site is located on West coast in South Gujarat, at a distance of ~130 nautical miles North of Mumbai.

#### **6.6 Drinking water management (source & supply of water)**

Water is sourced from nearby source through tankers during construction phase and during operation phase packed drinking water will be sourced.

#### **6.7 Sewage system**

Unit has sewage treatment plant at site of 25 KLD at site. After treatment, treated water is used for gardening and fire fighting. After achieving full load modular plants are installed to meet the future requirements as environmental clearance has been received for 2000 KLD.

#### **6.8 Industrial waste management**

Existing ETP of 50 KLD also will be up-graded by modular plant to meet the full capacity as environmental clearance has been received for 2500 KLD.

#### **6.9 Solid waste management**

The hazardous waste is stored in a demarcated area & disposed of to the nearest authorized TSDF Site.

#### **6.10 Power requirement & supply/ source**

Source of Power Supply: Gujarat Electricity Board

Existing requirement: 4400 kVA

Additional requirement: 1500 kVA

After proposed relocation of tanks total requirement: 5900 kVA

## **7 REHABILITATION AND RESETTLEMENTS (R& R) PLAN**

### **7.1 Policy to be adopted (central/state) in respect of the project affected persons including home oustees, land oustees and landless labourers (a brief outline to be given)**

No Rehabilitation & Resettlement required as plan is to expand the capacity within the existing premises.

## 8 PROJECT SCHEDULE AND COST ESTIMATE

### 8.1 Likely date of start of construction and likely data of completion (time schedule for the project to be given)

The overall project schedule for setting up butadiene facilities is 15 months for construction and commissioning of Butadiene facility including pipeline connectivity from tankfarm to jetty.

### 8.2 Estimated project cost along with analysis in terms of economic viability of the project.

The estimated cost of project is envisaged as follows:

S.No	Particular	Estimated Cost (Rs Cr)
1	Site development	2.5
2	Spheres with insulation	11.0
3	Truck unloading sheds, weigh bridge, roads, fencing & gate	10.0
4	Pipeline from jetty including utility line & support infrastructure	28.0
5	Fire-fighting, instrumentation & equipment	32.5
6	Design & Engineering	3.5
7	Financing charges & IDC	8.0
8	Sub Total	95.5
9	Contingency & Escalation	
10	Cost implication due to change in plot location	8.53
11	Cost implication due to change in Client's requirements	5.65
12	Unforeseen contingency during detail engg stage	5.32
	<b>Total</b>	<b>115.0</b>

The above cost is based on basic design. Upon detailing, the cost may undergo revision to an extent of 10%.

## 9 ANALYSIS OF PROPOSAL

### 9.1 Financial and social benefits with special emphasis on the benefit to the local people including tribal population, if any, in the area

The project is part of existing project area of AHPPL. Due to proposed project employment opportunities will be generated during construction and operation phase.

Project will also lead to generation of opportunities in transport sector as raw materials will be transported through road.



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