Pre-feasibility report for

New synthetic organic chemical manufacturing unit

By

M/s. Vinati Organics Limited

PROJECT TERMED UNDER SCHEDULE 5 (f) (SYNTHETIC ORGANIC CHEMICALS)

CATEGORY - B

Prepared By

M/s Vinati Organics Ltd
Plot No. L-2/1, L-2/2, Additional MIDC, Mahad
Dist: Raigad – 402 309
Maharashtra, India
Web: vinatiorganics.com

Chapter 1 Executive Summary

Company Profile

Vinati Organics Limited was established in 1989 and is a specialty chemical company producing aromatics, monomers, polymers and other specialty products.

The company started operations in its first plant in Mahad in 1992, with its focus on Isobutyl Benzene (IBB). A decade later, in 2002, it started commercial production in its second plant in Lote, producing 2-Acrylamido-2-methyl propane Sulphonic acid. Vinati Organics Limited (VOL) has enhanced the scope of its facilities and now also produces organic intermediates and aromatics.

IBB, a specialty organic intermediary, is used as a raw material for the manufacture of Ibuprofen, an anti-inflammatory analgesic bulk drug.

2-Acrylamido-2-methylpropane Sulphonic acid, a specialty monomer finds several applications in oil-field recovery, water treatment, acrylic fibre manufacturing, adhesives, personal care products, medical hydrogel, mining industry, coatings and as dispersing and flocculating agents.

Vinati Organics Limited is the world's largest manufacturer of both 2-acrylamido-2-methylpropane Sulphonic acid and IBB.

In June 2010, the company started producing Isobutylene (IB), one of the key components used to manufacture 2-Acrylamido-2-methyl propane sulphonic acid. Apart from being used internally, IB is also sold to agrochemical and antioxidant industry.

Vinati Organics Limited (VOL) has always strived for excellence through adopting the best and clean route for manufacturing chemicals. VOL has R & D facilities at both of its plant locations which deal with synthesizing new molecules and optimizing the process promoters. VOL has always emphasized on developing green and cost effective manufacturing techniques for specialty chemicals which have the potential of developing into large scale products in the future. VOL has collaborations with global technology providers like InstitutFrancais du Petrole (IFP) France, Saipem SpA, Italy, etc . VOL has been closely associated with National Chemical Laboratories (NCL), Indian Institute of Technology, Hyderabad (IICT) for developing cutting edge technologies for commercially manufacturing specialty chemicals. VOL has successfully demonstrated technology absorption from these research organizations in the past.

Vinati Organics limited now proposes to establish a new manufacturing facility of synthetic organic chemical (Para amino phenol a precursor of Paracetamol) at plot no- L-2/1, L-2/2, Additional Mahad MIDC, Dist Raigad.

Plot plan possession receipt / plot possession letter is at **Annexure I**

The google image of the plot site is at **Annexure – II**

Proposed Layout Plan for new establishment is attached as **Annexure–III**.

Prior Environmental Clearance is mandated by Ministry of Environment and Forests, as vide EIA Notification SO 1533, dated September 14, 2006 and its amendments for Synthetic Organic chemicals manufacturing units. This project falls under category 'B' and schedule item no. 5(f): Synthetic organic chemicals.

The project brief is summarized in the table below

Project summary at a glance

Sr No	Particulars	Details
1	Name of Company	Vinati Organics Limited
2	Products	Para amino phenol and its by products
3	Location	Plot no L-2/1 & L-2/2, Additional Mahad MIDC area, Dist Raigad Pin 402 309 Maharashtra.
4	Name of the project	Manufacture of Para amino phenol (30,000 MTPA) and its by products
5	Total land area of the plot	100,054 sq m (~24.72 Acres)
6	Total proposed built up area	100,031 sq m
7	Major raw material	Refer chapter 3
8	Water	Total fresh water requirement shall be approximately 1000 CMD. It will be source from MIDC.
9	Power	Total power requirement is 5,000 KVA. It will be sourced from MSEDCL.
10	Proposed manpower	150 No (permanent 75 & Contract 75)
11	Waste water quantity (estimate)	Trade effluent 99 cmd Domestic effluent 10 cmd Total effluent generation 109 cmd
12	Air emissions	The air emissions will be from boiler, Thermic fluid heater and DG set. DG set shall act as stand by source of electricity for the site. Adequate stack height as per statutory norms will be provided to Boiler/TFH/DG sets.
13	Solid Waste	Refer chapter 3
14	Project cost estimate	554 Crores

The Land shall be used as "Industrial" land thus there shall be no change in land use.

This industrial plot is allotted by MIDC to Vinati Organics limited.
(Plot allotment letter / plot possession letter is at **Annexure I).**

MIDC has provided all basic infrastructures like Electrical Power, water supply, the internal road network, external approach road and networking with CHWSTDF (Common Hazardous Waste Storage Treatment and Disposal Facility).

There is no sensitive establishment in the vicinity such as health resort, hospital, archaeological monuments, sanctuaries, etc.

The land and infrastructure is made available by MIDC and the raw material is easily available through the easy transport via road connectivity by local suppliers as well as imported one.

Chapter 2 Introduction of the Project

2.1 Identification of the project and Project Proponent

This is a new project for the manufacturer of Synthetic organic chemical (Para amino phenol) by well-known business group "Vinati Organics Limited" (VOL).

Some of the recent achievements of VOL are:

- Listed consecutively in Forbes Asia's 200 Best Under A Billion companies for 2010 and 2011
- Ranked amongst Top 10 Fastest Growing Companies in India for 2009 & 2010 by The Economic Times.
- Ranked among the Top 30 Fastest Growing Companies by Outlook Business in 2013
- In recognition of exemplary growth VOL was awarded Inc 500 Certificate of Excellence in 2012 & 2011 by 99Media
- VOL was accorded SILVER by EcoVadis towards Corporate Social Responsibility Rating

Vinati Organics limited are the major manufacturer of variety of specialty chemicals, pharmaceutical intermediates and chemicals / additives with expertise in the field of synthetic organic chemicals.

2.2 Need of project with description for region and country

Para amino phenol or 4-aminophenol (pAP) is one of the most widely used intermediate in the pharmaceutical industry. Primarily, pAP is used in the manufacture of paracetamol, a widely used over-the-counter analgesic (pain reliever) and antipyretic (fever reducer).

More than 80% of para amino phenol worldwide is used for manufacturing paracetamol. the pharmaceutical sector while 7 % is used as rubber antioxidant and 5% is used in dyes and miscellaneous purposes.

Indian PAP Scenario

India is one of the major users of p-amino phenol and is the second largest market for this product after China.

The following are the important users of PAP in India:

Users of PAP	**Plant Location**	**PAP Demand**
Granules India/ Triton Labs	Telangana	8650
Meghmani Organics	Dahej, Gujarat	5400
Farmsons	Nandesari, Gujarat	14400
Vamsi Laboratories	Solapur, MH	850
ShriKrishna Pharma	Vijayada, Telangana	4500
Pan Drugs	Gujarat	500

Para Products	Ghaziabad, UP	2500
Bharat Chemicals	Tarapur	1700

Out of the above, Meghmani Organics, Farmsons and Bharat Chemicals are captive users of para amino phenol.
The demand of PAP in India based on paracetamol capacity that exists is close to 38,500 TPA. However, all the PAP and paracetamol capacity is currently not being utilized. Easy availability of competitive PAP from China, pollution and credit terms are the major reasons for the imports.
India currently imports close to 21000 TPA of PAP. All the imports of PAP happen from China.

Global PAP market and past trends:
PAP was prepared firstly by Bayer and Caro in 1874, with p-nitrosophenol as the raw material, by reducing p-nitrosophenol in acid agent (HCL) with tin as the reducer. Gradually, other routes were explored and now the nitrobenzene and the para nitrochloro benzene route are the two routes commercially followed worldwide.
Since paracetamol accounts for more than 80% use of PAP, we focus on the global paracetamol business to understand the demand of PAP.
In the past the western world had three major users of PAP:

- Hoest Celanese, Texas
- Mallinkrodt
- Rhone-Poulenc (Rhodia)

Later on, the product came to be manufactured in Japan, China, India and other countries. Since the synthesis technology was easy to replicate. The Chinese and Indians gradually have mastered production of chemicals such as paracetamol.
As a result, the above three companies and their businesses of paracetamol underwent a lot of consolidation and changes. The pharmaceutical business of Rhone-Poulenc was hived off to form Rhodia. Paracetamol unit of Hoest-Celanese was first taken over by BASF (Bishop), which later divested the paracetamol business to Rhodia. In spite of consolidation, Rhodia couldn't withstand the Chinese competition and their paracetamol business had to be shut down. Rhodia shut its last European paracetamol unit in 2008. Rhodia has another unit in China operational though.

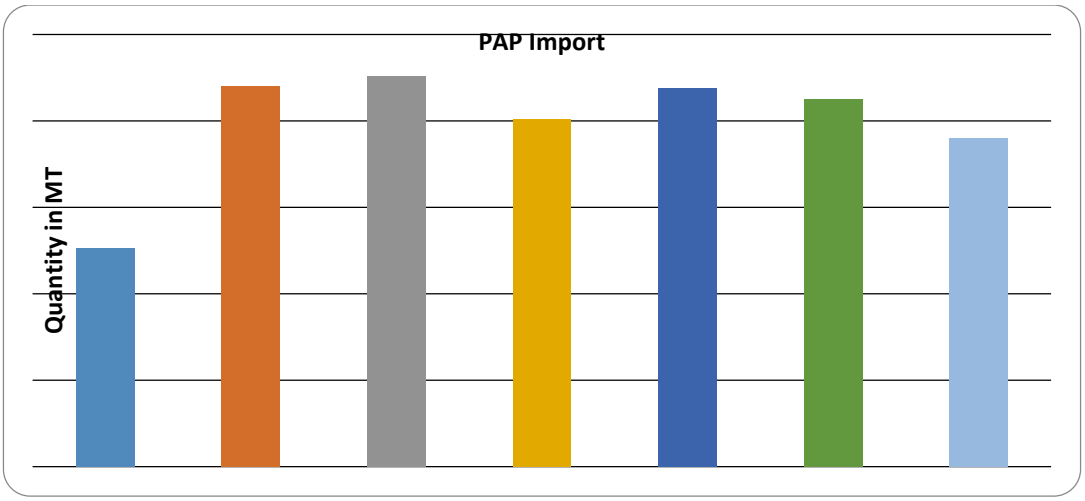
Recently, a French company Novacyl acquired the paracetamol business of Rhodia and acquired the units in France and Wuxi to restart paracetamol production. The paracetamol capacity in France is around 8000 TPA and 7000 TPA in China. This capacity is used not only for pharmaceuticals use but also for use in cosmetics (hair dyes).
The paracetamol division of Mallinkrodt continued till 2007 after which the business was divested to the US based Covidien. Currently, Covidien Ltd., the world's largest paracetamol maker with an estimated 30,000-ton annual production capacity, is the only Western manufacturer remaining in the game. Covidien, based in Mansfield, Massachusetts, is the medical-instruments maker spun off from Tyco International Ltd. All the other paracetamol

manufacturing companies came to be located in emerging nations of China and India. The two emerging countries produced about 1,00,000 tons of paracetamol per year in 2013, more than 70 percent of global capacity. According to the pharmaceuticals data, China produced close to 65000 TPA of paracetamol in 2013.

China has a lot of manufacturers of PAP and paracetamol. However, the notable ones which are large and established are the following p-aminophenol producers:

- Taixing Yangzi – 35000 TPA
- Liaoning Shixing – 40000 TPA
- Anuhi Bayi Chemical – 60000 TPA
- Anqiu Luan Pharma – 10000 TPA

Out of the above producers, only Anuhi Bayi Chemical uses the nitrobenzene hydrogenation route. The other producers use PNCB route.



2.3 Brief Description of Project

Size: It is proposed to produce following products at the new site.

The proposed products are summarized below

Sr. No	Product / By product	Proposed production capacity (MTPA)
	Product	
1	Para Amino Phenol	30,000
2	Nitrobenzene	50,000
3	Hydrogen	3,200 Nm^3/hr
	By Products	
1	Ammonium Sulphate	29,220
2	Aniline	3,480
3	Ortho amino phenol	720

2.4 Export Possibility

In 2010, the consumption of paracetamol in Asia was 65000 TPA and that in Europe it was around 25000 TPA. The global demand for paracetamol stands between 145000 to 160000 TPA. Hence, to cater the global demand, the present project has high potential for export. 80% of our products are exported to various countries. Thus our organization is adding value to our nation's Global business & also benefiting the economy. Thereby the establishment of the proposed project is very well beneficial & justified.

2.5 Domestic / Export Markets

According to CCN reports, the Chinese capacity for para amino phenol is close to 110000 TPA. In addition to paracetamol, PAP is also used as an ingredient for hair dye (Reddish brown hair dye). The main producers of this kind of dye are Rohm & Haas and a few Chinese players. It is known that close to 5000 TPA of PAP is the Chinese demand of PAP in hair dyes.
In short,

	Demand	**Capacity**
PAP China demand for paracetamol	49000	110000
PAP India demands for paracetamol	25000-30000	28000*(installed Capacity)
PAP Malinkrodt for paracetamol	23000	23000
PAP Novacyl for paracetamol	11000	11000 (Utilization is low)
PAP global demand for paracetamol	120000	160000
PAP global demand for hair dyes	5000+	N.A
PAP others (pharma, rubber antioxidant)	5000	5000

*While India does have installed capacity of PAP, most of the Indian demand for PAP is met through imports since the Chinese producers are cost competitive.

Thus, on a conservative side, we can estimate that the total demand for PAP globally is 130000-150000 TPA.

2.6 Employment Generation due to Project (Direct and indirect)

The proposed establishment of plant at plot L-2/1 & L-2/2 will certainly lead to increase in employment generation. We will have employment generation for operation, maintenance, Packaging, Dispatch, administration etc. Also there is great potential for employment in the downstream industries.

Chapter 3 Project Description

3.1 Type of Project:

The project is for manufacture of Synthetic organic chemical (Para amino phenol) as follows:

Sr. No	Product / By product	Proposed production capacity (MTPA)
	Product	
1	Para Amino Phenol	30,000
2	Nitrobenzene	50,000
3	Hydrogen gas	3,200 Nm^3/hr
	By Products	
1	Ammonium Sulphate	29,220
2	Aniline	3,480
3	Ortho amino phenol	720

3.2 Location of the Project

Details of Nearest Infrastructure Facilities

Sr. No	Destination	App. Distance of Project Site
01	Nearest Town	
	Mahad	7 km
02	Nearest National Highway (Mumbai Goa)	
	NH-66	7 km
03	Nearest Airport	
	Mumbai	177 km
04	Nearest Railway Station	
	Karanjadi	17 km
05	Nearest Port	
	JNPT	190 km

The project is proposed at Plot No L-2/1, L-2/2, Additional Mahad MIDC, Dist. Raigad Maharashtra.
The Geographical Location of this plot is at 18^0 6’ 51” N (18.114314 N) Latitude and 73^0 31’ 18” E (73.521528 E) Longitude with an elevation of 16 meter above sea level MSL.

Site coordinates are as follows:

Direction	Longitude	Latitude
North east corner	18°06'51.6"N	73 31' 25.3"E
North west corner	18°06'55.4"N	73 31' 21.0"E
South east corner	18°06'44.5"N	73°31'17.8"E

South west corner	18°06'44.3"N	73°31'18.3"E

This site is in premises of MIDC Estate which is meant for these types of Industries.

GPS Location on Google Imagery of the proposed site is attached as **Annexure I**.

Land Form: Land is on plain contour, it is flat terrain.

Land Ownership: Land ownership is with project proponents (Vinati Organics limited)

Existing Land use Pattern: The Land is reserved for Industrial use & the proposed project shall be at the same plot.

Existing Infrastructure: Presently there is an existing Infrastructure around the site. Infrastructure like water, electricity, telephone facility, roads already available. Other Infrastructure like, hospital, school, housing, entertainment, daily needs are available easily at Mahad Town (Which is at distance of about 7 km)

Additional Mahad MIDC provides many basic facilities like uninterrupted water supply, power and Road Network. When various sites were seen, this site appeared to be environmentally best as also from the business angle and therefore this option was finally adopted. This site is inside the campus of the MIDC and means safe transportation, less need of Utilities, less constructing buildings and roads, less fuel, less water with optimization of infrastructure.

There is no sensitive establishment in the vicinity such as health resort, hospital, archaeological monuments.

The location justification for the project is as under

a. Availability of required land and infrastructure for locating the establishment for the synthetic organic chemical manufacturing.
b. Suitability of land from topography & geological aspects, synergy and business point of view
c. Proximity to rail / road to facilitate transport of equipment / materials/ product
d. Availability of adequate quantity of water to meet water requirements.

Lay-Out

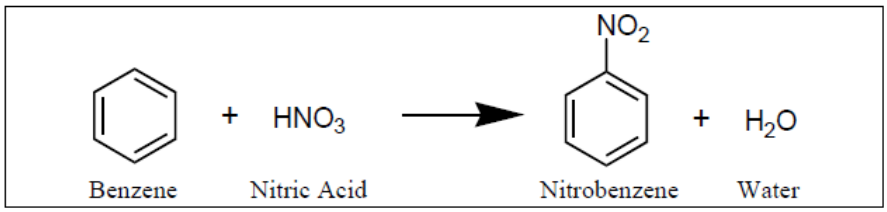
Refer **Annexure III** for the proposed plant site layout plan.

3.3 Project Description with Processes Details:

Manufacturing Process: Broad manufacturing process of the chemical (Para amino phenol) is described and depicted below.

In our novel route, **Para Amino Phenol** is manufactured directly from **Nitrobenzene** and **Hydrogen** in presence of aqueous Sulphuric acid. Nitrobenzene is in-house produced by Nitration of **Benzene** using conc. Nitric acid. Hydrogen is manufactured from **Methanol** and **Water**.

Reaction scheme for Nitrobenzene from Benzene



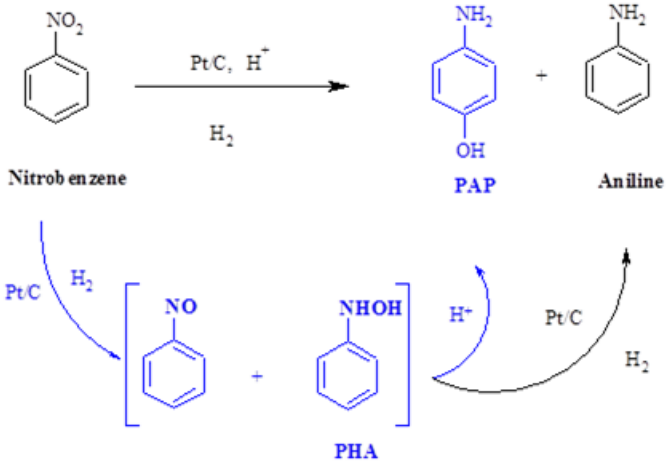
Reaction scheme for Hydrogen from Methanol

Methanol and Steam react at high temperature in presence of catalyst to produce Hydrogen, Carbon Monoxide and Carbon dioxide by following reaction

CH_3OH	=	$CO + 2H_2$ (decomposition)
$CO + H_2O$	=	$CO_2 + H_2$ (shift)

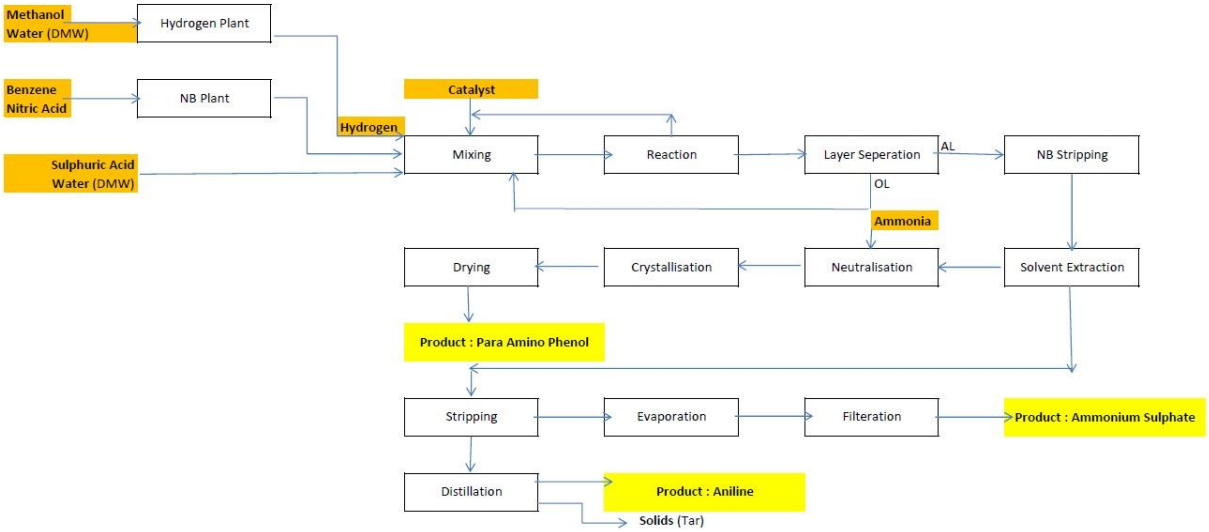
The hydrogen gas is further purified by using hydrogen purification system i.e. by Pressure swing absorber (PSA)

Reaction scheme for para Amino Phenol from Nitrobenzene



Nitrobenzene undergoes continuous hydrogenation to give an intermediate phenyl hydroxyl amine, which in presence of sulfuric acid undergo rearrangement to product p-aminophenol (pAP) and Aniline as by-product. The sulfuric acid present is neutralized using Anhydrous Ammonia to produce by product Ammonium Sulphate. The impurities in product pAP are removed by continuous extraction with different solvents. Extracted solvents are recycled by distilling the spent solvent.

Process block diagram for the manufacturer of Para amino phenol



3.4 Raw Material for finished Product:

Raw Materials:
The basic raw material for the proposed production capacity is submitted herein below.

Source for Raw Material Procurement: Raw Material is easily available in the local market.

Mode of Transport of Raw Materials: Few of the raw materials will be transported locally and few will be imported from the International Market. Mode of transport to site is by road truck/tankers.

List of Major Raw Material & Storage

Sr. No.	Raw Material	Unit	Total consumption (proposed)
1	Benzene	TPA	32,500
2	Nitric acid	TPA	40,000
3	Methanol	TPA	21,850
4	Sulphuric acid	TPA	170
5	Anhydrous Ammonia	TPA	7,530
6	Toluene	TPA	3,960
6	Solvent	TPA	720

Proposed major bulk storages at site are as follow:

Sr. No	Raw material	Physical state (Liquid/solid)	No. of tanks	Proposed liquid storage capacity of tank (KL)	Proposed liquid storage capacity (KL)
1	Benzene	Liquid	2	700	595

2	Nitric acid	Liquid	2	500	425
3	Methanol	Liquid	2	500	425
4	Sulphuric acid	Liquid	2	500	425
5	Anhydrous Ammonia	Liquid	2	365	300
6	Toluene	Liquid	2	100	80

3.5 Resource Optimization:

Vinati Organics limited are desirous to establish the manufacturing facilities for the product indicated above. The resource optimization shall be carried out at the site and with other Vinati organic sites in order to reduce wastage and minimum transport needs.

3.6 Availability of Resources (Water, Energy/Power Requirement):

Power: The proposed power requirement for the facility is 5,000 KVA which will be source from MSEDCL grid.

It is proposed to install 2 Nos of DG sets of 750 KVA capacity based on HSD as fuel as emergency backup in case of power outage.

Water: The total water requirement is about 1000 cmd for domestic, process, Boiler/cooling and gardening purpose. It will be source from MIDC water works.

Fresh water intake

No.	Description	Proposed water input (cmd)
1	Domestic	12
2	Industrial cooling/boilers	760
3.	Processing whereby water gets polluted and pollutants are easily biodegradable	220
4.	Gardening	8
	Total	**1,000**

Manpower: Expected manpower requirement for the establishment shall be as follows:

Description	Proposed, No (approx.)
Permanent	75
Contract	75
Total	**150**

Steam / Process heat Requirement: The steam requirement and process heat requirement for the proposed set up shall be met from the steam generator and Thermic fluid heater respectively.

The fuel requirement shall be as follows

Sr No	Capacity	Nos	Fuel requirement
1	Thermopac (15 lackcal/hr)	02	Coal: 175 MTPD
2	Steam generator (25 MT/hr)	01	FO: 8.5 MTPD

Stacks of requisite heights for above shall be provided as per statutory norms.

DG Set:

02 DG sets of total 750 KVA capacity are proposed to be installed at this site.

Their fuel requirement (only in case of emergency) shall be as follows:

Sr No	Capacity	Nos	Fuel requirement
1	750 KVA *(emergency use only)*	2	150 lit/hr (HSD)

3.7 Wastewater & solid Waste (Generation, Treatment & Disposal)

I. Waste water

No.	Description	Proposed generation (cmd)	Disposal
1.	**Trade effluent**	99	Trade effluent shall be treated and sent to CETP Mahad
2.	**Domestic effluent**	10	Domestic effluent shall be treated at STP and treated effluent shall be used for green belt within premise.
	Total	**109**	-

II. Solid Waste

(a) Non Hazardous Solid Waste:

Sr No	Type of Waste	Quantity	UOM	Mode of Disposal
1	Fly Ash	50	MTPD	Sale to offsite recycling brick making or for landfill
2	Rubber, Hand gloves, PVC shoes, Tarpaulin, Hose pipes	2	MTPA	Sale for offsite recycling/ CHWTSDF
3	Insulating material	1	MTPA	Sale to authorized vendor/ CHWTSDF
4	Iron scrap, Glass, Paper, Plastic bottles etc	5	MTPA	Sold to scrap dealer for recycle

(b) Hazardous Waste:

The quantification of hazardous solid waste generated from present activity and proposed activities is presented as follows*:*

Sr No	Category	Type of Waste	Quantity*	UOM	Mode of Disposal
1	5.1	Used/ Spent Oil	1	KLPA	CHWTSDF/ Sale to Authorized party approved by MOEF/CPCB/MPCB
2	15.2	Discarded Asbestos (AC sheets) (one time generation)	2	MTPA	CHWTSDF
3	34.3	Chemical sludge from waste water treatment	100	MTPA	CHWTSDF
4	33.3	Discarded Drums, carbuoys etc	1000	Nos/annum	Authorized MPCB Drum Recycler
5	21.1	Paint cans, brush etc	1	MTPA	CHWTSDF

***** Estimate, Quantity shall be worked out during EIA stage.

Chapter 4 Site Analysis

4.1 Connectivity:

This proposed Vinati Organic's new facility shall be located at Plot L-2/1 & L-2/2, Additional Mahad MIDC in Raigad district, Maharashtra. The Site is 7 km from Mahad.

The land and infrastructure is made available by MIDC and the raw material is easily available through the easy transport via road connectivity.

4.2 Land form, Land use and Land ownership:

Land Form: Land is on plain contour, it is flat terrain.

Land Ownership: Land ownership is with project proponents (Vinati Organics limited)

4.3 Topography:

The district has physiographic divisions i.e. Central zone covers about 1/3 rd of the district, consisting of fertile land in low lying area (iii) Hilly zone in the eastern part highly uneven in altitude and covered with forest. This hill range is characterized by ruggedness and uneven topography, with crestline of peaks and saddles forming the eastern horizon. Kundalika River is the main river in central part whereas in the southern part Savitri River is the main river.

The soils in the district are formed from the Deccan Trap which is predominating rock formation with small out crops of Laterite at a few places in the Poladpur taluka and Matheran hill. The soils are grouped as Forest, Varkas, Rice, Khar or Saline, Coastal Alluvium and Laterite as per the location and topographical situation.

4.4 Existing land use pattern:

Vacant MIDC plot

4.5 Existing Infrastructure:

Vacant MIDC plot. Infrastructure is provided by additional Mahad MIDC.

4.6 Soil Classification:

SOILS:

The soils of the district are formed from the Deccan trap which is the predominating rock formation of this district with small out-crops of laterite at a few places in the Poladpur taluka. Various types of these soils are marked out as per topographical situation and location. They are generally grouped as forest, *varkas,* rice, *khar* or salt, coastal alluvial and laterite soils.

Forest soils:

These soils are not used for agricultural purposes but yield valuable forest products such as teak-wood, *hirda* (myrobalan), *beheda,* pepper, etc. However, these soils are heavily eroded due to grazing and cutting of the forest trees.

Varkas soils:

These soils are located just below the forest soils all along the steeper slopes. They are shallow in depth, which varies only between a foot and a foot and a half, heavily eroded and sandy in texture and yellowish red to yellowish grey in colour with acidic reaction.

Rice soils.

The district is the second largest producer of rice in the Maharashtra State. The region is peculiarly terraced and, though the small strips in between the two terraces are levelled, it is difficult to get even a few *gunthas* of land in one piece in a levelled condition. The depth varies between two and six feet. They are loamy in texture, yellowish or reddish grey in colour, neutral in reaction and almost devoid of lime. They are formed from the trap rock from the Sahyadri ranges under heavy rainfall and humid climatic conditions.

Khar soils.

These soils are situated on the flat, levelled land near the sea at the point of creeks formed due to the rivers. They are flat clay to clay loam in texture and reddish or yellowish grey in colour. These soils contain hardly more than one per cent of soluble salts. These soils are formed due to the deposition of salts by the sea or from lands reclaimed from the sea.

Coastal alluvium soils.

These soils are found all along the coast and at places where there are no creeks. They are deep soils developed on flat land and loamy in texture with reddish grey colour. They are devoid of clay fraction or humus and are open in nature. The profile is difficult to differentiate and is excessively drained. Calcium carbonate is found in abundance throughout the profile but calcium has not entered the clay complex.

Laterite soils.

Out-crops of laterite rock are observed amongst the Sahyadri ranges amidst the trap rock mainly at Matheran and in the Poladpur taluka. These soils mostly occur on the mountain peaks. They are coarser in texture, wherever there are no forests. They are yellowish-red in colour and shallow in depth and yield coarse millets and niger. The heavy rains in the mountainous regions thoroughly leach the soils turning them acidic in reaction and devoid of calcium carbonate. They are rich in sesquioxides, the ratio of silica to sesquioxides being less than two. But they are generally poor in exchangeable bases or in fertility constituents. However, the soils from the forest region are well-supplied with nitrogen and organic matter.

4.7 Climate data from secondary sources:

Climate:

Mahad comes in Raigad district of Maharashtra. The climate of this district is typical of that on the west coast of India, with plentiful and regular seasonable rainfall, oppressive weather in the hot months and high humidities throughout the year. The summer season from March to May is followed by the south-west monsoon season from June to September. October and November form the post-monsoon or the retreating monsoon season. The period from December to February is the cold season.

Rainfall:

The district has a network of eleven rain gauge stations with records extending to 82 years for most of the stations. The south-west monsoon commences by about the first week of June and the rains continue till about the beginning of October. The average annual rainfall for the district as a whole is 3,028.9 mm. The rainfall increases rapidly from the coast Howards the Western Ghats on the eastern border of the district. In the coastal strip the annual rainfall decreases from south to north. Nearly 95 per cent, of the annual rainfall is received during the south-west monsoon months, and the rainfall in October forms the major portion of the rest. July is the month with the heaviest rainfall, the same being 38 per cent of the annual rainfall.

Temperature:

The period from March to May is one of increasing temperatures. May is the hottest month with a mean daily maximum temperature at 31.7°C (89.1°F) and the mean daily minimum temperature at 26.4°C (79.5°F). The onset of the south-west monsoon early in June brings down the temperatures slightly. After the withdrawal of the south-west monsoon by the end of September the day temperatures increase slightly and the weather in October and November is almost like the summer months. In the period from December to February the weather is cooler than in the post-monsoon months.

Humidity:

The air is humid throughout the year. Relative humidity is on an average over 80 per cent during the south-west monsoon season. In the rest of the year the relative humidity is between 65 per cent and 75 per cent.

Winds:

Winds are very strong and blow from west or south-west during monsoon season. During the period from October to December winds are generally moderate but sometimes strong in October and blow from directions between north-east and south-east. In the three months from January to March the winds continue to be moderate and are predominantly from directions between north and east. In April while there is a slight strengthening of wind, the direction is variable. In May there is a further strengthening of winds and the directions are between south-west and north-west.

Chapter 5 Planning Brief

5.1 Planning Concept:

- Plot is at well-established Additional Mahad MIDC area
- Purified Water supply from MIDC
- Well-developed roads and connectivity.
- Infrastructure facilities available established MIDC site
- Integration with the existing nearby Vinati organics manufacturing facility

5.2 Population Projection:

In 2011, Raigad district had population of 2,634,200 of which male and female were 1,344,345 and 1,289,855 respectively. In 2001 census, Raigad had a population of 2,207,929 of which males were 1,117,628 and remaining 1,090,301 were females. Raigad District population constituted 2.34 percent of total Maharashtra population.

The initial provisional data released by census India 2011, shows that density of Raigad district for 2011 is 368 people per sq. km. In 2001, Raigad district density was at 309 people per sq. km. Raigad district administers 7,152 square kilometers of areas.

5.3 Assessment of Infrastructure Demand (Physical and Social):

No major infrastructure demand is envisaged as the proposed site is in well-developed MIDC area.

Chapter 6 Proposed Infrastructure

Since the establishment is planned at new site in developed industrial area, no special/specific development is anticipated. Company will have to do site development only. Company has not planned any residential area at the proposed site as MIDC has already existing Residential areas earmarked for housing colonies. Company has already housing colony in that area. For additional essential manpower company may decide at later date about building additional colony building.

6.1 Industrial area:

Vinati Organic Ltd., Plot no L-2/1, L-2/2, Additional Mahad proposes to set up plant for manufacture of synthetic organic chemical (para amino phenol) based on demand and market projection.

6.2 Residential Area:

No Residential area has been proposed within the plant site.

6.3 Green Belt:

Green belt of adequate area within and around the project site shall be carried out as per industries norms and requirement.

6.4 Social Infrastructure:

Local people will be given preference wherever found suitable for all the jobs in the plant, direct as well as indirect. Thus the project shall have a positive impact on the employment pattern of the region. Economic status of the local population will improve due to increased ancillary/business opportunities, thereby making positive impact. Educational, medical & housing facilities will improve due to the proposed project.

6.5 Connectivity:

This proposed project facility shall be located at Additional Mahad MIDC area, in Raigad district, Maharashtra. The Site is 7 km from Mahad town and 17 km from nearest railway Station. The land and infrastructure is made available by MIDC and the raw material is easily available through the easy transport via road connectivity.

6.6 Water Management:

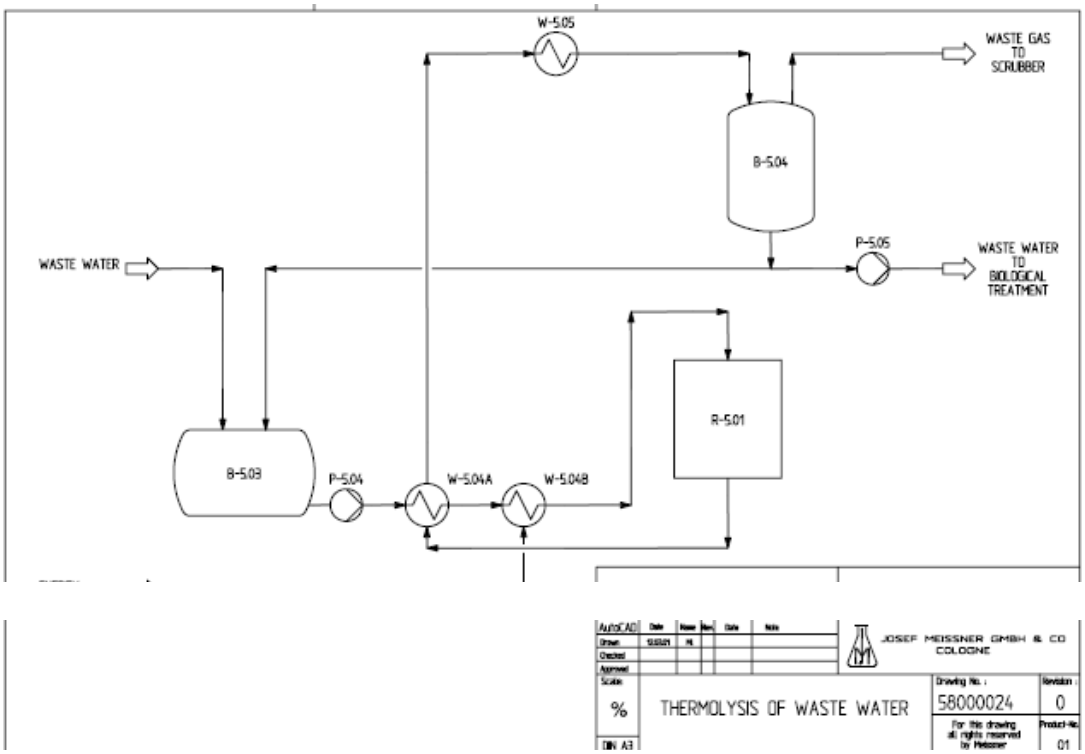
The total water requirement is about 1000 cmd for Domestic, boiler/cooling, Greenery and process. The source of water shall be from MIDC. The water supply will be through the good offices of MIDC. We will not be encroaching on anybody's water source.

6.7 Sewage and waste water treatment system:

WASTE FROM NITROBENZENE PLANT

For the pretreatment of the alkaline waste water (approx 5 m^3/hr) leaving the nitration plant consists of a continuous single-step treatment wherein nitrophenolic and -cresolic compounds (as by-product in 2,000 ppm range) are decomposed to more than 99 % and that the remaining organic materials are only of low molecular organic acid (i.e. 20 ppm) that shall be easily eliminated in the final biological treatment.

The waste gas contains slight amounts of NOx which are fed into burner of heating system.



Quality of Treated Waste Water

More than 99 % of the nitrophenolic and -cresolic compounds of the original waste water are decomposed in the wet oxidation process and the resulting, slightly colored waste water shows a "Zahn-Wellens-Test" result of 99 % which indicates the suitability for the subsequent biological treatment.

<u>NB waste water after treament</u>

Mononitrophenols	max. 1 ppm
Dinitrophenols	max. 1 ppm
Picric Acid	max. 1 ppm
Ammonia	max 500 ppm
COD	max. 1500 ppm
Ph	9-10
Temperature	max. 40 °C

DNT waste water after treatment

DNT	max. 10 ppm
Nitrocresols	max. 1 ppm
NH_4	about 450 ppm
Phenolic Compounds (formed ones)	about 60 ppm
COD	about 3500 ppm
pH	9 – 10
Temperature	max. 40 °C

Waste Gas (for NB and DNT)

Nitrogen	abt. 80 %
Water	abt. 7 %
Nitrogen monoxide	abt. 3 %
Methane	abt. 1 %
Hydrogen	abt. 8 %

Amount per ton of waste water: abt. 0.15 m3

WASTE FROM HYDROGEN PLANT

The expected effluents are

1. Tail gas *(will be recycled)*

   This stream will be fired with make-up fuel in thermal oil system.

   Quantity expected, approx 1940 Nm3/hr at 0.3 Bar g, ambient temperature, having below mentioned quality (approx)
   - Hydrogen 31.4 vol%
   - Carbon monoxide 5.3 vol %
   - Carbon dioxide 61.7 vol%
   - Methane 0.3 vol%
   - Methanol 0.1 vol%
   - Water vapor 1.2 vol%

   Lower heating value (approx) 1.135 kWh/Nm^3

2. Flue gas

   Quantity approx 4,650 Nm3/hr at ambient pressure and 260 ^{0}C temperature, having below mentioned quality (approx)
   - Nitrogen 48.6 vol%
   - Oxygen 1.5 vol %
   - Carbon dioxide 30.5 vol%

- Methane 19.4 vol%

Expected atmosphere emissions

- NO_x content less than 200 mg/Nm^3

WASTE FROM PROCESS PLANT

Effluents streams per Hour and their Treatment										
No.	**PFD NO.**	**STREAM NO.**	**SOURCE**	**FLOW (kg/h)**	**Components**	**Total Quantity, (kg/h)**	**Recovery and reuse, (kg/h)**	**Total Effluents, (kg/h)**	**Oxygen requirement kg/hr**	**Proposed treatment**
1	4	422	EV-102 CONDENSATE	8509.3	WATER MEG	8509.28 Traces				CAN BE USED AS BOILER FEED WATER
2	6	632	DC-107 RESIDUE	526.0	PAP ANILINE DADPE MEG	5.26 467.62 52.60 0.53	458.27	5.26 9.35 52.60 0.53	9.27 19.31 100.99 0.54	RECOVERY OF SOLVENT AND CAVITATION
3	4	441	PURGE FROM RECYCLE MEG STREAM	148.5	PAP OAP MEG	11.44 1.04 136.07	133.35	11.44 1.04 2.72	20.15 1.83 2.81	RECOVERY OF SOLVENT AND CAVITATION
4	5B	566	PURGE FROM RECYCLE MEOH STREAM	2067.1	PAP WATER, ppm OAP MEOH MEG	206.71 0.89 2.07 1581.30 274.92	1549.67	206.71 0.89 2.07 31.63 274.92	364.10 0.61 31.63 283.79	RECOVERY OF SOLVENT AND CAVITATION
5	5A	523	FILTERED ACTIVATED CARBON AFTER WASH	499.9	AS MEOH ACT. C WATER,ppb	94.49 400.94 4.50 0.00	392.92	94.49 8.02 4.50 0.00	8.02	METHANOL RECOVERY AND CARBON DISPOSAL

MEG is mono ethyl glycol, DADPE dimer impurity

EFFLUENT TREATMENT PLANT: (TENTATIVE SCHEME)

UNIT OPERATIONS

PRIMARY TREATMENT: EQUALIZATION TANK

The effluent from all sources shall be collected in the collection cum equalization tank. The collection tanks are two in numbers to facilitate fill & draw operation. The pH of the effluent is to be checked and is required to be adjusted between 8.5 to 9 by adding lime solution (10 %) & then ferric alum (10%) for neutralization & flocculation and polyelectrolyte shall be used as flocculant for proper coagulation. For equalization and mixing compressed air shall be provided with air distribution system. For further treatment effluent is pumped to flash mixer with the help of Effluent transfer pump.

CHEMICAL DOSING SYSTEM

Chemicals required (Lime, ferric Alum) for the treatment of effluent is prepared in the flash mixer. Polyelectrolyte dosing will be in the chemical dosing system as per requirement. (Lime 10 %, ferric Alum 10 % & poly. 0.1 %)

PRIMARY SETTLING TANK

For the settlement of the mixed liquor, the industrial waste enters the inlet launder of settling tank through a pipe where it flows downwards and then outwards to launder. The supernatant Overflows to the aeration tank for biological treatment. The sludge settles at the bottom of the settling tank in the hopper cone. The settled sludge drains out into sludge drying beds for dewatering and solar drying. With the help of diffused aeration, The effluent with the bio sludge overflow through launder into the center feed well of the secondary Settling Tank.

AERATION TANK (TO REDUCE THE REMAINING BOD / COD)

Effluent from primary settling tank & sewage water passes to aeration tank for biological degradation of available organic matter to reduce the remaining BOD and COD aerobically. The biological treatment tanks are designed on aeration principle. It enables the bacteria to act upon the biodegradable matter in the effluent and reduce the BOD content while the rapid and turbulent movement of the effluent in the presence of oxygen available from the air, certain amount of COD is also removed. Diffused aeration system is provided for the same. The chemical reactions that take place aeration tank can be defined according to the following three processes;

A. Oxidation process

$$COHNS + O_2 + \text{Bacteria} + \text{DAP \& UREA} \longleftrightarrow CO_2 + NH_3 + \text{Energy} + \text{Other end Products}$$

DAP and Urea is used as food for the microorganism.

B. Synthesis Process

$$COHNS + O_2 + \text{Bacteria} \longrightarrow C_4H_7NO_2 \text{ (New bacteria)}$$

C. Endogenous Respiration

$$C_4H_7NO_2 + 4O_2 \longrightarrow CO_2 + NH_3 + 2H_2O$$

Apart from the above basics reaction there are some other reactions that take place in the aeration tanks. During aeration the oxygen reacts with C, S and N which is shown below.

$$C + O_2 \longrightarrow CO_2$$

$$S + O_2 \longrightarrow SO_2$$

$$N + O_2 \longrightarrow NO_2$$

The biological degradation process in enhanced by addition some Di-ammonium Phosphate(DAP) and UREA. It acts as food for the microorganism. Therefore it will be

necessary to supply food for the bacteria. Thus a combined solution of Urea and DAP are dosed in the biological tank to feed the bacteria. Also the via the sewage transfer pump, the sewage line is connected to the aeration tank which allows treatment of sewage water.

SECONDARY SETTLING TANK

Aerobically treated wastewater from aeration tank is passes through settling tank. This separates the solids/sludge from treated water & allows settling it. The slurry is continuously recirculated from this tank to aeration tank. The excess sludge is transferred to sludge digestion tank.

POLISHING TANK

The clear supernatant from secondary settling tankis collected here. Oxidation is done over here to certain extent by adding hydrogen peroxide. This tank is also equipped with air distribution system. The water from polishing tankis pumped to pressure sand filter followed by activated carbon filter with the help of filter feed pump for removal of fine suspended solids
and reduction of COD, BOD, suspended solids etc.

PRESSURE SAND FILTER

The pressure sand filter (PSF) is used as a tertiary treatment unit to trap the trace amounts of solids which escape the clarifier, and can typically handle up to 50 mg/l of solids in an economical manner. This unit is essentially a pressure vessel that is filled with graded media (sand and gravel).The water filtered with PSF is passed on to the next stage in the STP chain: the Activated Carbon Filter.

ACTIVATED CARBON FILTER

The suspended particle free effluent enters in the activated carbon filter. Activated carbon filter comprises of a pressure vessel in mild steel construction or FRP pressure vessel with granular Activated carbon supported on layers of pebbles and silex. The activated carbon shall be of High iodine value and isopodous structure for maximum adsorption of organics, Color and COD.

SLUDGE DRYING BED (SDB)

Sludge is pumped out from bottom of settling tank and transfer to the Sludge Drying Bed. The clear effluents from S.D.B transfer to the equalization tank by gravity. The dry sludge is disposed to hazardous waste management.

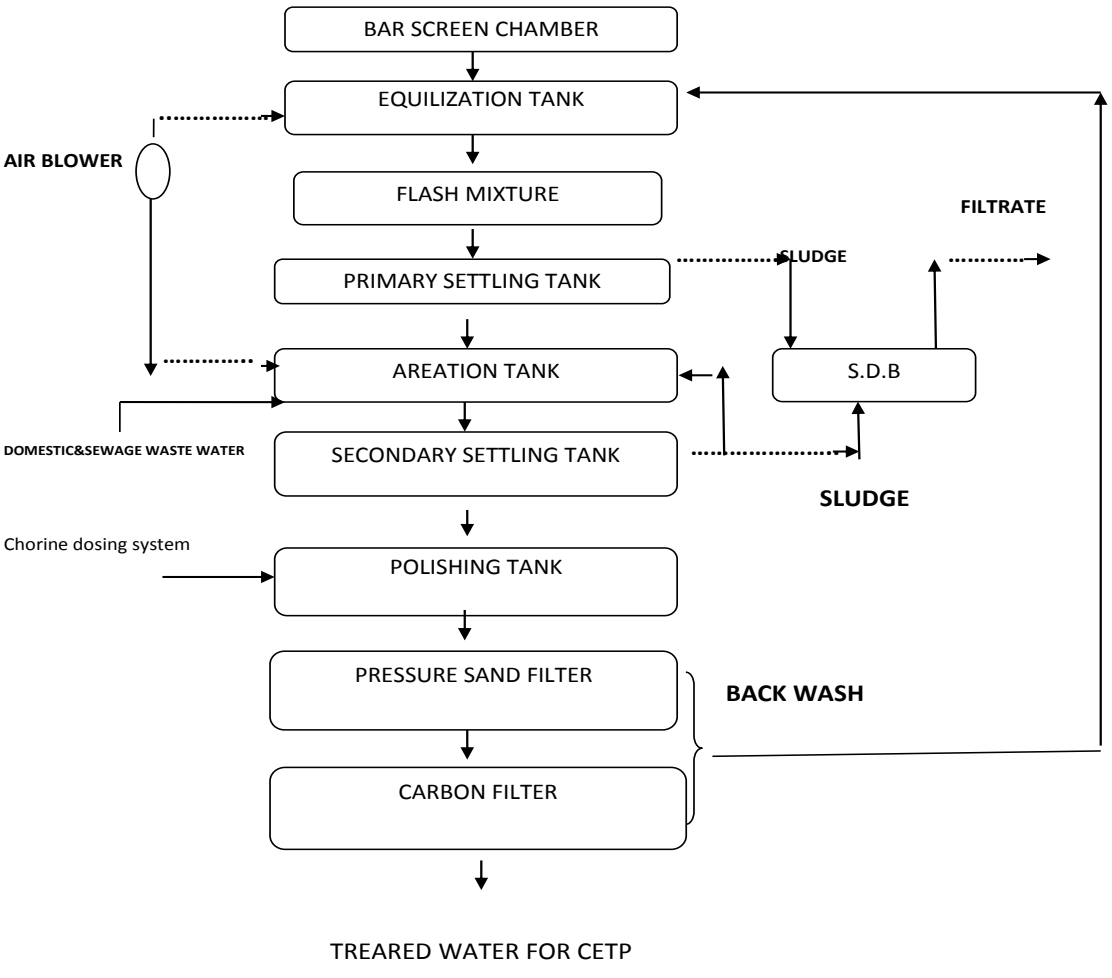
Expected effluent quantity and expected quality parameters

Effluent generation source	**Effluent Qty (cmd)**	**Expected effluent quality in mg/L except pH**						
		pH	**TDS**	**COD**	**TSS**	**BOD**	**O & G**	**TAN**
Domestic effluent	10	5 - 7	650	300	200	200	150	0
Process effluent	99	3 - 6	3000	15000	2000	8000	50	0

Expected treated effluent quality parameters

Sr. No.	Parameter	Standard Prescribed
1	pH	5.5 – 9.0
2	Suspended Solids	100
3	BOD_{3d} 27°C	100
4	COD	250
5	Oil & Grease	10
6	Total Dissolved Solids	2100
7	Chlorides	600
8	Sulphates	1000

The proposed effluent treatment scheme is depicted below as block diagram



Chapter 7 Rehabilitation and Resettlement (R & R Plan)

The proposed new facility shall be at plot of the company which is located in Additional Mahad MIDC area. It does not require acquisition of Land and the Infrastructure so there is no any kind of activity of Rehabilitation and Resettlement carried out.

Chapter 8 Project schedule and cost estimates

8.1 Time schedule of the Project

It is expected that the project shall be completed within 24 months from date of grant of Environmental clearance.

8.2 Estimated project cost (Economic Viability of the Project)

Total estimated project cost is Approx. 554 Crores

Chapter 9 Analysis of Proposal

9.1 Financial and Social Benefits

The proposed para Amino Phenol project envisages

- Implementation of new technology developed by CSIR National Chemical Laboratory, Pune
- Replacement to existing polluting manufacturing routes with new novel technology that involves Green chemistry, benefits environment
- For the Domestic market, an Import substitution
- Direct employment to locals and will prompt ancillary business
- Export benefits

Annexure I
Land allotment letter

MAHARASHTRA INDUSTRIAL DEVELOPMENT CORPORATION
(A Govt. of Maharashtra Undertaking)
Regional Office, MIDC, Opp. Khanda Colony, Near Flyover Bridge
New Panvel, Dist. Raigad -410206.
Email-roparivel@midcindia.org 022-27483647, Fax 27483647

No.MIDC/ROP/Offer/A.Mahad/ZFMS/D 40664 Date:- 16/11/2015

To,
M/s. Vinati Organics Pvt. Ltd.
Plot No. B-12 & B-13/1, MIDC
Mahad Indl. Area, Mahad.
Dist. Raigad-402309.

Sub :- Offer of Land
Addl. Mahad Industrial Area.

Ref :- Your application dated 19/03/2015.

Dear Sir,

1. Please refer to your application dated 19/03/2015 for plot in **Addl.** Mahad Industrial Area for **manufacturing activity of Pearlescent Pigments** as per the details contained in the application.
2. Your application has been scrutinized by Land Allotment Committee of the Corporation and has decided to offer you land admeasuring 1,00,054 m^2 (Approx.) subject to availability of the plot on this date of issue of "OFFER LETTER" for land, the rate of premium for land applicable is rate of Rs. 295/- Sq. mtr. You are hereby requested to submit the enclosed "BLUE APPLICATION" duly completed in all respect with Demand Draft of Rs. 73,79,000/- (Rupees Seventy Three Lakhs Seventy Nine Thousand only) towards the earnest money within 15 days from the date of receipt of this letter.
   Please note that non-receipt of Blue Application duly completed and/or payment of Earnest Money Amount by demand draft within the stipulated period the application shall be rejected summarily.
3. The rate of premium payable in respect of land in this area is Rs. **295/-** per Sq. mtr. if you fail to deposit the EMD within **15 days** from date of this offer letter, the revised rate of premium, if any, will be applicable. However this offer is subject to regulation No. 9 of MIDC Disposal of land Regulations, 1975.
4. If the plot which may be finally allotted to you in this Industrial Area contains any fencing or tree plantation or any such development carried out by the corporation prior to allotment, you are required to pay to the Corporation the cost of such development which will be in addition to the premium mentioned above and the amount payable on this account will be communicated to you separately alongwith the allotment order.
5. The amount referred to in paragraph 2 should be paid by a Bank Demand Draft drawn it favour of the ***Executive Engineer, MIDC Thane Division-II,*** payable in any Bank at ***Panvel*** Applications received with Cheque will not be entertained.
6. In case, you fail to accept the final allotment after it is communicated to you or fail to pay the balance of premium amount or to execute the Agreement to Lease the Corporation will be entitled to **forfeit the entire amount of earnest money** paid by you.

2

7. The Corporation reserves the right to reject your application altogether without assigning any reason.

8. This offer of land given in **this letter is valid only for 15 days from the receipt of this letter** during which Earnest Money Deposit can be accepted by demand draft by this office along with the Blue Application duly completed. At the end of 15 days this offer letter stands lapsed and no further correspondence in this connection will be entertained thereafter.

9. The land offered to you has Extra Road Frontage, you will have to pay Extra charges/premium for the same. This will be communicated in the allotment letter.

10. **This offer letter is issued subject to condition that, the allotment letter will be issued only after obtaining possession by MIDC of plot No. L-2/1 & L-2/2 admeasuring 100054 Sqm.**

11. Applicant have to submit No Objection Certificate form CETP, Mahad before commencing the production.

12. Applicant have to obtain & submit Environment Clerance before commencing the production.

13. Applicant have to obtain MPCB Consent before commencing the production.

14. This Offer is Subject to condition that Zero Effluent Discharge by using cleaner technologies to achieve stringent standards laid down in the consent order, which will be confirmed to the stream standards unless the disposal of treated effluent is on land for irrigation purpose or gardening and tree plantation or otherwise recycled/reused in the process itself and will not disposal of treated effluent to CETP till the upgradation of Mahad CETP is completed and in case of violation, the MIDC reserves the right to take back the possession of the plot.

14. This Offer is subject to any further orders which may be passed in PIL No 17 of 2011.

Yours faithfully,

6/11/2015

Area Manager,
M.I.D.C. PANVEL.

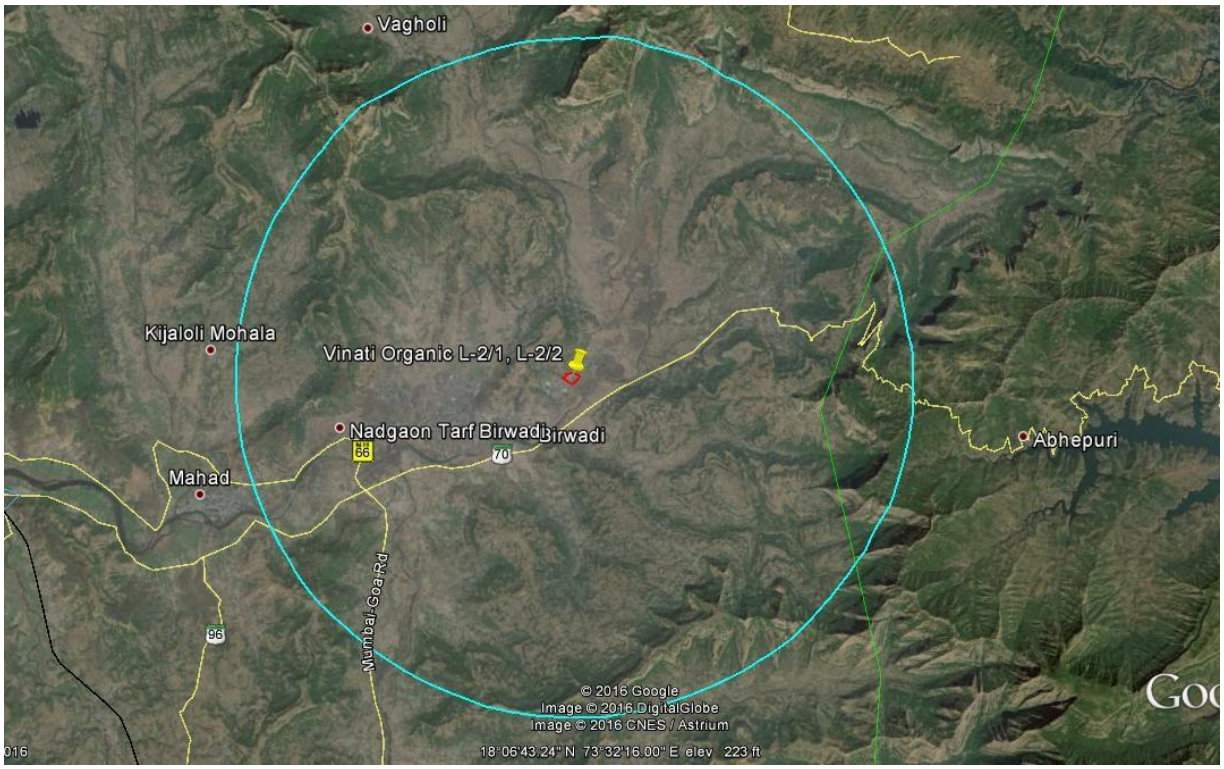
D.A.:- Application form (Blue Form).

Annexure II

Proposed Site

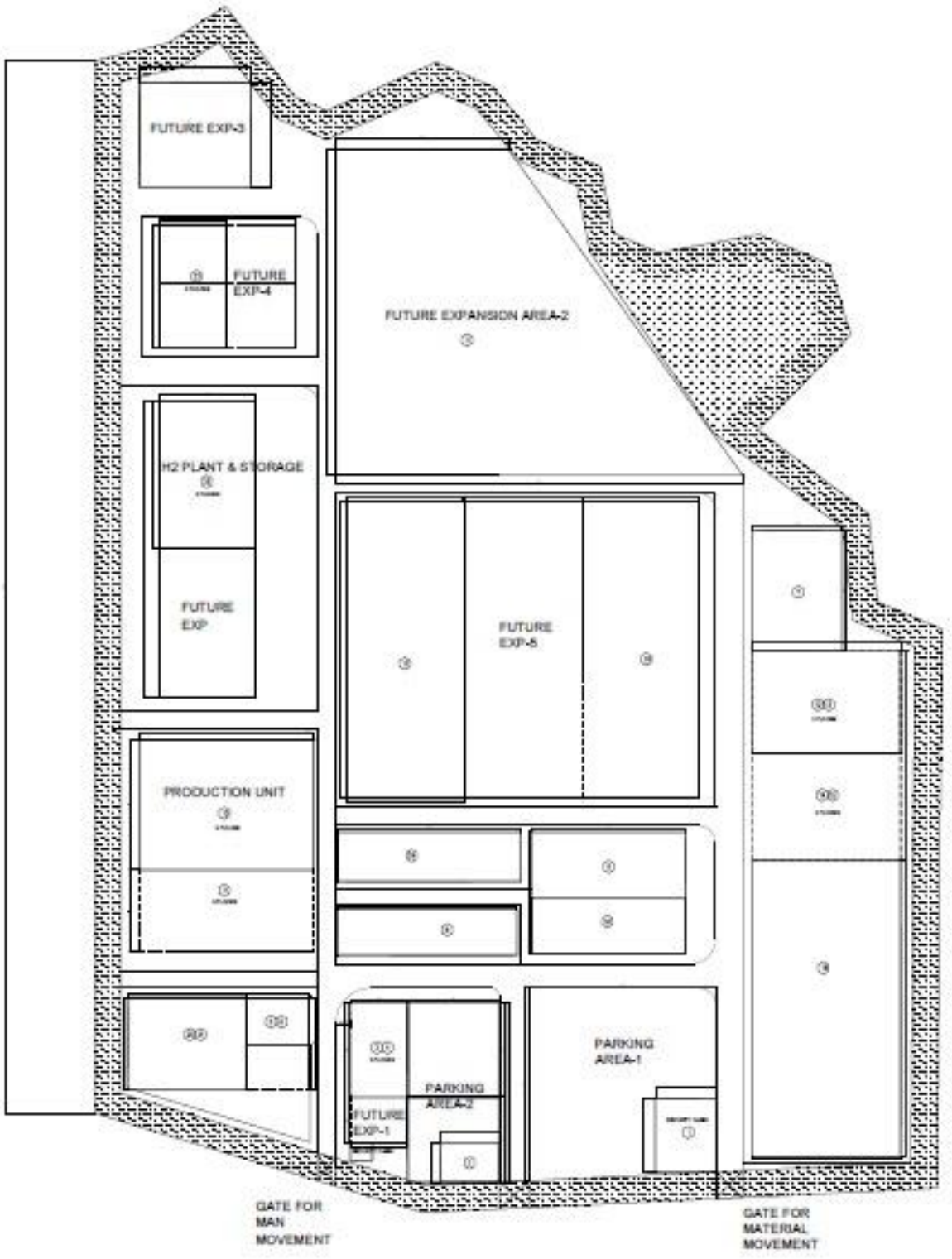
Site & surrounding study area of 1 km

Site & surrounding study area of 10 km



Annexure III

Proposed Layout Plan



Proposed Area statement for New plot at Addln. Ma

Sr. No	Area Description	L	B	Area	No of floors	Built - up Area

1	Gate house, Medical, Visitor Room	20.50	25.00	513	-	513
2	Electrical Substation / Transformer	13.00	20.00	260	-	260
3& 4	Admn. Builiding & Canteen & R&D	32.00	19.50	624	3	1,872
5 & 6	Quality Control & Change Room	21.50	16.00	344	3	1,032
7	Engg Store, Workshop & Office	30.00	40.00	1,200	-	1,200
8	Raw Material Warehouse	60.44	15.39	930	-	930
9	Finished Goods Warehouse	51.70	22.00	1,137	-	1,137
10	Production Area	58.69	44.22	2,595	5	12,976
11	Future Expansion	28.00	58.69	1,643	5	8,217
12 & 13	Utility Building & MCC & DG	50.00	35.00	1,750	2	3,500
14 & 15	Utility Building Expansion	50.00	35.00	1,750	2	3,500
16	Fuel Storage Area	39.41	100.00	3,941	-	3,941
17	Solvent Storage Area	40.00	100.00	4,000	-	4,000
18	Effluent Treatment Pant	50.00	100.00	5,000	2	10,000
19	Weighbridge, Control Cabin	51.70	19.22	994	-	994
20 & 21	Water & Fire Water Storage tanks	40.00	31.00	1,240	-	1,240
22	Hydrogen Plant	33.00	50.00	1,650	3	4,950
23	Other Products (NB plant)	23.00	42.00	966	4	3,864
24	Powder processing Area	61.80	16.60	1,026	2	2,052
25	Parking Area-1	63.19	64.19	3,544	-	3,544
26	Parking Area-2	31.00	60.00	1,600	-	1,600
27	Future Expansion -1	15.67	19.50	306	-	306
28	Future Expansion-2	58.43	110.24	10,812	-	10,812
29	Future Expansion -3	37.46	35.27	1,321	-	1,321
30	Future expansion -4	23.00	42.00	966	-	966
31	fiuture expansion -5	40.00	100.00	4,000	-	4,000
32	Green field Area			34,637	-	-
33	Roads			11,306	-	11,306
Total Area				**100,054**		**100,031**

Total plot area 100,054
Proposed built up area 100,031
Proposed green belt area 34,637
Proposed parking area 5,144