Project No: AESPL/IND-E/18-19/EIA/002

Executive Summary of Environmental Impact Assessment Report (Draft report for Public Hearing) (R1)

Proposed establishment of Integrated Project consisting of Poly vinyl Chloride (PVC) Plant, Polymer modified bitumen (PMB) Plant, Gas Storage Terminal, LPG Bottling Plant, Gas Based Captive Power Plant, Sea Water Desalination Plant (RO process)

By

Veritas Polychem Private Limited
At
Dighi Port Area
Village Nanavali, Tal Shrivardhan, Dist Raigad.

Baseline Monitoring: Winter 2018-19

August 2020

Environmental Consultant:
Aditya Environmental Services Pvt. Ltd., Mumbai
QCI- NABET Accredited EIA consultant
www.aespl.co.in

EXECUTIVE SUMMARY

1.1 Introduction

As per EIA Notification S.O. No 1533 dated 14th Sep 2006 the project falls under activity 5 (e) (Petroleum products and petrochemical based processing), Category "A" and requires prior environmental clearance from Ministry of Environment, Forest and Climate Change.

This is an Integrated Project consisting of Poly vinyl Chloride (PVC) Plant, Polymer modified bitumen (PMB) Plant, Gas Storage Terminal, LPG Bottling Plant, Gas Based Captive Power Plant, Sea Water Reverse Osmosis (SWRO) Desalination Plant for sourcing water for operation by Veritas Polychem Private Limited (VPPL).

The project has been issued Terms of Reference for undertaking EIA/EMP in accordance with the provisions of the EIA notification dated September 14, 2006 as per MOEF&CC letter No. IA-J-11011/225/2019-IA-II(I) dated 13th August 2019.

1.2 Project proponent

Veritas Polychem Private Limited is wholly owned subsidiary of Veritas (India) Limited. It is a group company of GROUPE VERITAS (GV) a diversified multinational group with business interest in

- International Trade, Distribution & Manufacturing
- Infrastructure & Logistics
- Alternate Fuel & Energy
- Agro Ventures & Biotechnology
- Information Technology

1.3 Project Description

1.3.1 Activities at Site

Project consists of following activities

Table 1 Products/Activities at site and its capacities

Sr. No.	Plant / Activity	Capacity/ Quantity/Details
1	Unloading of chemicals viz VCM, LPG, Propylene and Bitumen.	Bringing chemicals by sea route through bulk carriers, conveying by pipelines to plant site.
2	PVC Plant	200,000 MTPA
3	PMB Plant	360,000 MTPA
4	Mounded bullets	32 Nos each of capacity 2500 m^3 (8 for VCM, 12 for LPG 12 for Propylene)
5	LPG Bottling Plant	60,000 MTPA
6	LPG Bulk Filling Station	300,000 MTPA

Sr. No.	Plant / Activity	Capacity/ Quantity/Details
7	Captive gas-based power plant	4 x 4.5 = 18 MW
8	Water Desalination Plant (SWRO process)	4500 m^3/day raw water generation
9	Raw water intake pipeline for sourcing sea water for SWRO plant and disposal pipeline for reject from SWRO plant to diffuser for marine outfall.	(1) Intake pipeline of capacity 13345 cmd, size 400 mm of length ~ 165 m. (2) Outfall pipeline of capacity 11200 cmd, size 400 mm and length ~ 397 m. from SWRO plant to diffuser for reject disposal.

VPPL will be importing Vinyl chloride monomer, Liquified petroleum gas (LPG), Propylene and Bitumen by ship carriers. It will be unloaded at Dighi port and will be stored at site.

- VCM will be converted to PVC in the PVC Plant.
- Bitumen will be blended with polymer to produce polymer modified bitumen.
- Propylene will be filled in truck tankers and will be sold.
- LPG will be partly bottled, partly filled in truck tankers and will be distributed.

Loading gantry facilities will be developed for transport of Propylene, LPG road tankers to end customers.

Project site is located at Gat No. 49-54, 56-57, 61, 63, 66, 75-A & adjacent reclaimed land, Dighi Port Area. Village Nanavali, Taluka Shrivardhan, Dist. Raigad, Maharashtra.

Total site plot area is 59.277 Acres. Proposed project cost is ~ Rs. 2050.47 crores

1.3.2 **Power requirement**

For Normal use (operating load 12 MW), power will be generated at site.

There will be 4 x 4.5 MW Gas engine/Gas turbine sets (with waste heat recovery boiler) based on LNG as fuel. Normally three will be in service and fourth will be stand by.

For emergency power, emergency diesel generator set of 315 KVA will be installed.

1.3.3 **Steam requirement**

Steam requirement of the site will be catered by waste heat recovery boilers of Gas engine/turbines and independent 5 TPH and 20 TPH boilers operating on LNG as fuel.

1.3.4 **Water requirement & Sourcing**

The required water for the operation of the project will be met by Sea Water Reverse Osmosis (SWRO) plant or Desalination plant which will be installed ai site. In the proposed SWRO Desalination system, sea water will be passed through a 150µ screen to remove suspended matter. After screening all the colloidal matter will be flocculated with a suitable flocculant and then settled in a clarifier. The clarified water will be stored in a storage tank

and then be passed through an Ultra Filtration (UF) Plant to eliminate fine suspended solids. This water will then be passed through Reverse Osmosis (SWRO) plant to get desired quality of water for further use. The Permeate from SWRO will be treated with a disinfectant to eliminate any biological contamination before storing in Raw Water Storage Tank for use in the plant.

Water requirement at site is as below,

Table 2 Water requirement

No	Water required for	Quantity in cmd (cubic meter per day)
1	Domestic	70
2	DM Plant	2880
3	LPG Plant	25
4	PMB Plant	25
5	Cooling Towers	1105
6	Green Belt maintenance	251
	Total	**4356**

1.3.5 Wastewater generation, treatment, and disposal

Wastewater generation from various sources will be as follows,

Table 3 Wastewater generation

No	Wastewater from	Quantity in cmd (cubic meter per day)	Total, cmd	Treatment and disposal
1	Domestic	56	56	Treated at STP and used at site for green belt maintenance.
2	PVC Plant	1818	2211	Trade effluent is low in organics and will be treated in onsite ETP. Treated trade effluent will be combined with clarified sea water and used as feed to SWRO plant, thereby reducing intake of raw sea water. Thus, treated trade effluent will be fully recycled back in process and there will be no direct discharge to sea.
3	LPG Plant	25		
4	PMB Plant	25		
5	Cooling Towers	160		
6	Boiler blow down	39		
7	DM Plant	144		
	Total	**2267**	**2267**	**-**

1.3.6 Waste generation and its management

Solid waste generation and disposal from the operation will be as follows:

Table 4 Non-hazardous waste generation and disposal

Sr. No.	Particulars	Quantity in TPA	Method of Disposal
1	STP Sludge	100	Used as manure.
2	Insulation waste	2	Landfill – CHWTSDF, Taloja
3	Municipal Garbage	10	Biodegradable garbage will be composted, used as manure. Recyclable material will be segregated and sold.
4	Canteen Waste	10	Composting and used as manure.

Table 5 Hazardous waste generation and disposal

No	Description	Category as per HW rules 2016	Total Quantity (per year)	Method of Disposal
1	Spent and lube oils	5.1	10 Ton	Sale to authorized recyclers
2	Sludge and Filter contaminated with oil	3.3	5 Ton	Incineration.
3	Discarded Containers and Barrels	33.1	5 Ton	Sale to scrap dealers after decontamination / detoxification
4	Chemical Sludge from (PVC) Wastewater Treatment Plant	35.3	127 Ton	Landfill CHWTSDF / Sale to downstream PVC users.
5	Filter and filter material which have organic liquid in them, for example mineral oils, synthetic oil and organic chlorine compounds	35.1	2 Ton	Incineration
6	E waste	-	4 Kg.	Sale to authorized recyclers
7	Lead acid batteries	-	10 Nos.	Will be exchanged with the dealer on purchase of new batteries

1.3.7 Storage / handling of solid and hazardous wastes

All waste will be handed with proper PPEs ensuring safety of the individuals working with the solid and hazardous waste handling. The wastes will be collected in drums and HDPE bags and further transferred to the covered storage area provided with impervious flooring at site and under lock and key.

1.4 Description of the Environment

1.4.1 Study period and area

Baseline environmental study/monitoring is carried out during Winter 2018-19 (December, January, February) within 10 km radius of the site to ascertain quality of ambient air, ground water, surface water, soil, sediment quality, noise level, biological, marine study and socio-economic status of study area.

1.4.2 Land use and Land cover

The project site is located along the Rajpuri Creek adjacent to Arabian Sea.

As a result, waterbody (57.58%) is the most predominant amongst the land use classes found within study area. South side of the project site shows comparatively high altitude and moderate dense vegetation (18.98%) is predominantly observed the hilly terrain.

Open/Mixed vegetation covers near about 5.17% of the land cover within study area. Scrub land (4.46%) and open land (6.14%) are some of the dominant classes within study area. Fallow land comprises of 3.59% of overall land use. Habitation covers rural settlement of 0.17% and there is no urban settlement within 10km radius.

A number of reservoirs located throughout the study area contribute to 0.25% of the land cover. Rajpuri Creek, Vavdungi/Shighre River are important waterbodies within study area. Aquaculture ponds along the shores near mangrove areas which is considered as non-forested wetland corresponding to 1.28% of the land use. (Mangrove patch is at about 4 Km towards east from site near Agardanda and distance of Aquaculture ponds is about 5.2 Km towards east from site near Nandale).

Plantation covers approximately 2.29% of the land cover. Minor industrial establishments are seen within the study area covering 0.07% of the land cover. Mining area (0.01%) also includes small open quarries which are used to extract stone for construction and filling purposes.

1.4.3 **Meteorology**

The meteorology of the site and nearby areas is affected primarily by the presence of Rajpuri creek and Arabian sea and presence of hills on south side in immediate vicinity.

The prominent wind direction at project site during the study period (winter 2018-19) was from north and north west direction.

Project site is in southern part of Raigad district and at seacoast. It has warm & humid weather throughout the year.

The area receives rainfall for more than four months of the year, which provides main climatic variations. Out of total rainfall 90% is experienced during Monsoon season of months June to September.

1.4.4 **Soil**

Based on the soil sample analysis (samples collected from 4 locations) for its physical and chemical properties, it is observed that

- Soil in the area is mainly having “clay” with less moisture content.
- pH of soil varies from 5.67 to 6.63 which is “Moderately acidic” to “Neutral” in nature due to heavy rainfall in the region
- Electrical conductivity (salinity) is average.
- Phosphorus content is medium at all locations.
- Organic carbon is sufficient in the soil.
- Potash content in soil is very less.

1.4.5 **Ambient Air Quality**

The baseline air quality was established by monitoring PM_{10}, $PM_{2.5,}$ SO_2, NOx, CO, nMHC, at 9 locations in Winter 2018-19 (December, January, February).

The broad findings of the ambient air quality monitoring are as follows:

- Concentration of PM_{10} varied from 50.6 µg/m^3 to 70.5 µg/m^3 (NAAQS limit is residential area 100 µg/m^3).
- Concentration of $PM_{2.5}$ varied from 18.7 µg/m^3 to 26.1 µg/m^3 (NAAQS limit for residential area 60 µg/m^3).
- Concentration of SO_2 varied from 8.7µg/m^3 to 14.6 µg/m^3 (NAAQS limit for residential area 80 µg/m^3).
- Concentration of NOx varied from 16.1 µg/m^3 to 27.0 µg/m^3 (NAAQS limit for residential area 80 µg/m^3).
- Concentration of CO varied from 0.17 mg/m^3 to 0.46 mg/m^3 (NAAQS limit for residential area 2 mg/m^3)
- Concentration of nMHC varied from 0.16 ppm to 0.40 ppm (No limit specified in NAAQS)
- Ammonia, Benzene, HCl and VCM were below detection limits.

When compared with National Ambient Air Quality Standards (NAAQ) it can be seen that the results of ambient air monitoring are well within the NAAQS standards in the study area.

1.4.6 **Noise**

Noise monitoring was carried out at 9 locations. Following observations are made,

- Data monitored in and around project site is within specified limits during Day & Nighttime, as not many activities is seen around project site.
- Noise levels were found to be exceeding the standard at Agardanda village during Day time & Nanavali, Agardanda and Dighi villages during nighttime. Exceedance of noise level may be attributable to nearby localized disturbances/ traffic nearby.

1.4.7 **Traffic Survey**

Traffic survey was carried out on important approach road i.e. Mangaon Mhasala Dighi port road NH753F. This is the main approach road from Mangaon to project site.

As per the IRC: 106-1990, Type of carriageway is 2-Lane (Two-Way) and design service volume for this road is considered under category Arterial and PCU per hour 1500.

The calculated PCUs per hour is 510, well within recommended design service volume (PCU/Hour) by IRC.

1.4.8 **Ground Water Quality**

Ground water samples (borewell and open well) were collected from 9 locations within study area.

Ground water quality is mostly within specified standards (IS 10500:2012- Drinking water Quality Norms) except Coliform presence at Nanavali well water.

1.4.9 **Surface Water Quality**

Surface water samples (Pond and Dam water) were collected from 5 locations.

Based on analysis (as compared to IS 2296-1982 -Classification of inland surface water) , surface water analysis mainly falls under classification C (Drinking water source with conventional treatment followed by disinfection) and E (Irrigation, industrial cooling or controlled waste disposal).

1.4.10 **Marine Environment**

Baseline Environment - Marine

The baseline environmental quality was assessed through field studies within the impact zone for various components of the marine environment viz. bathymetry, physical processes (tide, current and waves), water quality, sediment quality and flora-fauna with specific reference to environmental aspects, which may have a bearing on the impacts of the project. The baseline environmental quality was assessed during winter 2018-19 (December, January and February).

Water quality, sediment quality and marine biological diversity impact assessment report and management plan is jointly prepared by Aditya Environmental Services Private Limited. Marine Bathymetry, physical processes i.e. tides, currents & waves, water quality, sediment quality and numerical modelling done by Environ Software Private Limited Bangalore.

Bathymetry

Bathymetry shows that maximum depth of 24.4 m is available in the offshore.

Wind

The wind is quite low for non-monsoon period of the year and it is relatively strong during south-west monsoon i.e. during May-August. In general, the average wind speed for over the year does not fall below 10 km/h.

Tide

Tidal conditions at Dighi based navigational chart No. 2026 are as follows

Details of level Value (m)	(CD)
MHHW (Mean Highest high water)	3.60
MLHW (Mean Lowest High water)	3.30
MSL (Mean Sea Level)	2.40
MHLW (Mean Highest Low Water)	1.70
MLLW (Mean Highest Low Water)	1.30

It is clear from the values of mean HWL, LWL and MSL indicated above that the tidal range is low, just around 2 to 2.5 m. With due consideration to the prevailing bathymetry, vessels can approach the facility at any time of the day for anchoring.

Current

The tidal currents are driven by the tidal amplitude. if the tidal range is low, the tidal currents will also be correspondingly of low magnitude.

Sea Water

Physico chemical, biological and nutrient parameters were studied at 8 sampling stations in various locations from upstream of Rajpuri creek into the Arabian sea.

- Temperature varies from 23.8 to 26.5 deg C.
- pH varies from 7.8 to 8.5.
- Suspended solids varies from 134 to 794 mg/l.
- TDS varies from 35111 to 36380 mg/l.
- Salinity varies from minimum 35.2 ppt to Maximum 36.8 ppt from Rajpuri creek to open sea.
- Dissolved Oxygen concentration various from 2.1 mg/l to 5.6mg/l.
- BOD varies from 1.8 to 3.5 mg/l.

Sediment

- Sediments are mainly clay in nature.
- pH of the sediments was slightly acidic, varied from 6.24 to 6.63.
- Chromium, cadmium, and lead were below detection limit.
- In the winter study at all Subtidal/Intertidal stations, results shows average chlorophyll, with phytoplankton & zooplankton rich in diversity & biomass at mouth & gradual lower values toward upstream, showing stress-free marine environment. While Benthic fauna does not show any specificity in this one season observation.

1.4.1 Biological Environment

District Raigad is one of the coastal districts of Konkan region of Maharashtra, spread over an area of 7152 km^2. It shows variation in topography from high altitudinal Sahyadri hill ranges to coastal plains. The soils of the district are formed from the predominating rock formation i.e. Deccan Trap. According to the topographical situation and location, soils in Raigad district are grouped as Forest, Varkas, Rice, Khar or Salt, Coastal Alluvial and Laterite soils. District receives average 3029 mm annual rainfall mostly contributed by southwesterly monsoon.

According to bio-geographic provinces classification of India, entire study area falls under category 8A i.e. 'Coasts - West Coast'. None of villages in study area are listed as Eco-Sensitive Areas (ESA) vide Order under section 5 of EP Act 1986 dated 13th November 2013, series of draft Notifications dated 03rd October 2018 issued by Ministry of Environment, Forest & Climate Change (MoEF&CC). Nearest ESA, Gopalwat and Bhalgaon (in Roha Taluka) is about 10.6Km towards NE. Besides dense vegetation on hills /Reserved Forest, study area possesses habitats like, water bodies, agricultural fields and human settlements. These habitats possess different characteristic which supports typical composition of flora and fauna within them.

Dense Vegetation: Most of the hills in study area are covered with natural evergreen vegetation. Most of the forest areas are inaccessible to humans due to dense vegetation and topography. There is one protected area viz Phansad Wildlife Sanctuary. The Eco sensitive zone (ESZ) of Phansad Wild Life Sanctuary is Notified vide S.O. no 1603(E) dated 17th May 2017 and is varying in width from 100m to 2.75 Km from the boundary of the Sanctuary. Nearest ESZ village, 'Kasabe Murud' is located about 5.5 Km towards North of project site.

Tectona grandis, Bombax malabaricum, Firmiana colorata, Erithrina indica, Calicopteris floribunda and species of Terminalia were found dominant in Dense Vegetation. Faunal species generally noted are Drongo, Kingfisher, Bulbuls, Jungle bablers, Shikra, Common Mynas, squirrels, evidences of wild boar and black napped hare.

Human Settlements: Human habitation in study area is rural in nature with Murud as semi-urban town. Villages in study area are found situated at base of hills and along major roads. Typical plant species are grown in and around habitated areas. These species are intentionally planted for the purpose of beautification, shade, protection from stray/ grazing animals and for food/economic value.

Faunal species observed are cattle, domestic animals/ birds. Besides these, there are few public gardens, Coconut-Areca nut orchards shows artificial plantation of species. These exhibit different kinds of species composition. Open spaces/ waste areas, plants exist naturally, both supports respective fauna and constitutes part of biodiversity.

Agricultural Fields: Agricultural fields in study area are seen towards foothills and in between open area. Major crop in the region is Rice, however secondary crops like Wari, Nagali etc. are grown. In addition to agriculture crops, vegetable and horticultural crops growing and animal husbandry are also practiced in study area.

Water Bodies: Drainage in the area is mainly through Rajpuri creek. Due to undulating terrain, number of small stream/ nallah and other rivers flow downhill and joins the creek. Entire stretch of Rajpuri creek in study area is saline with Mangroves especially at north bay (between Agardanda and Usadi) and south bay (between Dighi and Harvit). Distance of Mangrove patch is about 4.5 Km towards East from site near Agardanda.

Aquaculture/ prawn farming were noticed near Agardanda and Mithagar on north bank along creek. Distance of Aquaculture ponds is about 5.2 Km towards East from site near Nandale.

Three reservoirs/ dams near Kudki, Amboli, Tisale are sources of drinking water. Flocks of birds like Kingfisher, Egrets etc. were observed perching on trees/rock outcrops here during survey.

Summary of Observations - Flora: During survey, 51 tree, 30 shrub, 17 herb, 4 climbers, 3 epiphytes and some other species were observed. None of the observed species is listed in 'Red Data Book Plants of India (Nayar & Sastry 1987-88)'.

Summary of Observations - Fauna: During survey, 10 mammal, 1 reptile, 49 bird and 5 insect species were observed. Conservation status as per Indian Wildlife Protection Act 1972 of respective species is mentioned against it in Table 3.25. Some species are not classified in any of the schedule. No schedule I species observed during survey.

1.4.2 Socio economic environment

There are total 41 villages & 1 Murud Janjira (M Cl) town are falling in the study area - 62% in Murud tehsil and 31% in Shrivardhan tehsil.

Total population of the study area is 53,003 out of which 25,566 (48 percent) are males and 27,437 (52 per cent) are females. The entire area is rural in nature.

There are 11,622 households in the study area with average family size is 4.6 persons per household as per 2011 census.

Study area as a whole has a moderate sex ratio i.e. 1073 female per 1000 male & it is higher as compared with the average sex ratio of Raigad district (959) Maharashtra State (929 female per 1000 male).

As per 2011 census, study area literacy rate (73.6 %) is similar as compared with Raigad District (73.6 %) but higher as compared with average literacy rate Maharashtra State (72.6%). The male and female literacy rates are 78.7% and 68.8% respectively showing higher literacy in male population.

The total working population in the study area is 18,951, i.e. 35.8% of which 25.5% are main workers & 10.3% are marginal workers it means highest number of populations is shared by non-workers i.e. 64.2% of the total population.

Among the main workers, male participation rate is 40.0 percent and female participation rate is 11.9 percent it means proportion of main workers is higher in male population than in female population while in non-workers the percentage of female population is 78.2% shows higher than of male population i.e. 49.2% in the study area.

12 villages/habitations/settlements in the study area were surveyed through personal interview, focus group discussions to assess the existing physical infrastructure, quality of life and people's aspirations.

1.5 Anticipated Environmental Impacts and mitigation measures

1.5.1 Air environment

Impacts on Air Environment:

Impact on air environment is anticipated due to proposed Gas engine/turbine, and boilers based on LNG (Liquified Natural gas), which is clean fuel having low sulfur and practically no particulate emission. The fuel requirement will principally lead to increase in NOx emissions in the region.

Dispersion modelling studies have been carried out using AERMOD software model of the USEPA and indicates that increase in NOx will be 2.74 µg/cum. Even with additional NOx emissions, the ambient air quality in the study area will be well within the NAAQS limits.

The present plant is a petrochemical plant and thus, other emissions are due to VOC from fugitive sources like pumps, agitators and vents etc

Mitigation Measures to reduce Air Impacts:

Following mitigation measures are planned and suggested for gas engine/ turbine/ boilers in view of air environment during operation phase:

- Stack of sufficient height for Gas engine/Gas Turbines and Boilers
- Low NOx Burners for Boilers & Gas engine/Gas Turbines to limit NOx to 50ppm
- Regular monitoring for fuel burning stacks through MoEF&CC approved laboratory
- On-line monitoring linked to CPCB and MPCB servers.

To reduce VOC emissions following measures will be taken

- All vents from process plants and Pressure relief valve/safety valve releases are routed to flare.
- Provision of mechanical seals on pumps, agitators.
- Provision of Closed loop Sampling
- Provision of hydrocarbon detectors in work room air with set alarm linked to DCS system.
- VCM, Propylene and LPG stored in mounded bullets.

1.5.2 Noise

Impact on Noise Environment:

Noise & vibrations will be generated from the on site equipment & machineries including gas engine/turbine, pumps, motors, blowers. In addition, traffic to and fro from site will add to noise levels along route.

Mitigation Measures to reduce Noise Impacts:

Engineering Measures for Noise reduction

- Acoustic enclosures on all major equipment in the plant for noise attenuation.
- Adopting low noise generating working methods (eg mufflers on all steam vents)
- Proper mounting of equipment & machinery on strong non-vibrating foundation & fitted by proper shunting & rubber padding to avoid vibration and thereby noise.
- DG sets meeting Environmental Protection Act standards for emissions and noise
- Static & dynamic balancing of all rotating equipment & machineries shall be done on regular basis starting from the installation time to reduce the vibration & noise
- Preventive maintenance including regular lubrication of machineries and equipment to reduce noise level

Administrative Measures for reducing Noise impacts

- Provision of ear protection equipment (ear plug/ earmuff) for activities that are likely to create noise in excess of 75 dB (A) to protect worker's health and safety.
- Undertake in plant audit to identify high noise level generating equipment.
- Regular noise monitoring shall be done as per environment monitoring plan chapter 6

- The impacts of noise on occupational health would be mitigated by proper shift timing & annual audiological checkup of concerned employees. Workers showing hearing loss, if any, will be shifted to other less noisy areas.
- Administrative measures to fine persons not using PPEs
- Dense Greenbelt development along the boundary of premises with selected local evergreen species to reduce noise emanating from the premises.

1.5.3 Water & wastewater

Impacts on Water Environment

Total water requirement during operation phase will be ~ 4356 KLD. It will be sourced from Sea Water Reverse Osmosis (desalination) plant, to be located in NDZ area along Rajpuri creek.

Trade effluent (2,211cmd) will be treated in onsite ETP. Treated effluent will be mixed with clarified sea water and then taken to SWRO plant to reduce raw sea water requirement. Sea water requirement without recycle of treated effluent is 15600 cmd while that with recycle of treated effluent is 13345 cmd. Thus, the entire treated effluent will be reused and there will be no discharge of treated effluent to the creek.
Dispersion Modelling Studies for discharge of return sea water from desalination plant has been carried out to ascertain the location of sea water intake and final diffuser location and design using Hydrodyn FLOSOFT and POLSOFT software. Diffuser will be designed as recommended in Modelling study to ensure minimum impact. Marine outfall to convey RO reject will be located at Latitude 18°17'7.52"N Longitude 72°57'0.09"E. Intake of RO plant will be located at Latitude 18°17'2.98"N and Longitude 72°57'10.72"E.

Mitigation Measures Water Environment

Following mitigation measures will be adopted to reduce impacts on water environment:

- Implementation of scheme of in plant pollution control system for process effluents generated comprising of segregation of process effluents.
- Regular monitoring of effluents to gauge the functioning of treatment system be carried out.
- Proper preventive and breakdown maintenance of ETP units from civil, mechanical, electrical and instrumental angle will be undertaken.
- Adequate standby / spare unit / spare capacity shall be provided.
- Logbook of ETP and in plant effluent treatment system will be maintained to indicate chemical consumption and operational status of equipment.
- Records of energy consumption for ETP units will be maintained.
- Close monitoring of effluents will be undertaken to ensure proper functioning of ETP to meet MPCB norms.

- Online monitoring instruments for pH, conductivity, COD, BOD, and flow will be provided for accurate control.
- Rain Water harvesting to conserve water.

1.5.4 Land Environment

Major concern in land environment during operation phase is contamination of land by:

- Spill and leak during transport, handling, storage and handling of chemicals.
- Spills of oil and greases during maintenance of equipment, machineries, and vehicles.
- Improper storage/dumping of wastes, resulting in leachate, contaminating the soil.
- Contaminated runoff from site and contaminated drain from storage areas of hazardous wastes and chemical storages, tanker loading/unloading areas draining to land.
- Transportation in truck/tanker or drums through highway, which may have impacts during the incidence of major accident, as it maybe spilled or leaked.

Mitigation measures for Land Environment

- ETP sludge generated will be dried in mechanical dewatering system and kept in sacks in covered godowns, with impervious flooring sloping so that any leachate will be collected and taken back for treatment. ETP sludge shall be disposed to CHWTSDF facility
- All hazardous wastes will be disposed off as per Authorization granted by MPCB
- Production, maintenance area and warehouses for storage of raw materials, finished products and hazardous wastes will be provided with impervious flooring.
- All bulk storage tanks will be provided with adequate dyke walls to prevent spreading of spill or leaked chemicals causing contamination of soil.
- Necessary cleanup procedures (SOPs) for hazardous chemicals spills will be designed and implemented.
- Used oil from machineries/equipment etc. will be collected in drums & disposed of a per norms.
- ETP facilities for management of effluents will be provided as planned during erection and commissioning phase and untreated effluents will be fully recycled.
- The chemicals used will be transferred through closed pipelines by DCS control system to avoid/prevent spill/leak of the materials.
- Hazardous waste management will be done as per statutory guidelines & requirements.
- Discarded containers will be decontaminated and sale to MPCB authorized party.
- All transportation of hazardous wastes will be done in closed truck/tanker by MPCB approved agencies.

- HAZMAT guidelines will be followed for transport of all hazardous materials. All required safety & emergency equipment & materials will be provided on the transport vehicles.
- Proponent will maintain a good spill or leak control action plan to cope up with such incidents.
- Monitoring of soil samples in areas near hazardous waste storage will be done as per Environmental monitoring plan.
- No waste will be stored on open barren land under any condition.

1.5.5 Biological environment

Impacts Biological Environment:

- Particulate emissions during construction will have some impact on trees located near construction site due to deposition of dust on trees, shrubs.
- Loss of topsoil of open land of factory.
- Noise disturbance to nearby terrestrial fauna, especially sensitive species such as reptiles, birds and subsequent migration thereby creating ecological imbalance.
- Health and life threat to aquatic ecosystems due to possible contamination of ground and marine water.
- Loss of herbaceous vegetation and some trees, as they will be cut.
- Direct adverse impact on flora and indirect on fauna in form of loss of foraging ground.
- Impacts due to increased air emissions, noise pollution during operation phase

Mitigation Measures Biological Environment:

- Provide barriers around site with water sprinkling to reduce particulate dust generation.
- Plant trees around site and roadsides as per green belt plan
- To instruct transporters and drivers for maintaining road safety and monitor adherence.
- Well-developed greenbelt around periphery, along roadside and around various buildings area consisting different species of trees on ~ 20 Acres is proposed.
- For particulate and noise abatement, two rows of trees will be planted all around the boundary of site- tall, native and evergreen broad-leaved species towards outer periphery whereas dwarf and native species towards inner side of it. This arrangement provides better screening effect.

1.5.6 Socio economic environment

Impacts on socio-economic environment due to proposed project during operation phase are envisaged due to direct and indirect employment which will be beneficial.

The project will have positive effect on socio – economic environment as there will be growth in employment for direct/indirect workers. During employment, local populace will be given preference considering their skills & suitability.

VPPL will carry out the Corporate Environmental Responsibility (CER) activities as per the MOEF & CC guidelines.

More details under Project benefits section below.

1.5.7 Environmental monitoring program

Environment monitoring during various phases of project is an important aspect to implement Environmental management plan. In order to verify the outcome on the implemented control/mitigation measures Environment monitoring is required and essential.

Following will be monitored on a regular basis during construction and operation phase to ensure a high level of environmental performance and to comply with statutory/legal conditions

- Effect on baseline data.
- Effectiveness of pollution control measures.

1.6 Additional Studies

1.6.1 Risk Assessment, Hazard identification and consequence analysis

The principal objective of the risk assessment study is to identify and quantify the major hazards and the risk associated with various activities during various phases of the project, which may lead to emergency consequences (disasters) affecting public safety and health.

The company has undertaken to take up all necessary measures to minimize the risks due to the project during design stage and also during operation period viz, Fire & safety control measures, Emergency preparedness plan, Disaster Management plan.

Risk assessment, Hazard identification is carried out for the project during various project phases, Quantitative risk assessment/ consequence analysis based on ALOHA, during storage and transportation of chemicals, loading and unloading of chemicals, Safety aspects and main risks of processes, and suggested control measures.

Major mitigation measures identified are:

- Use of mounded storage for VCM, LPG and Propylene which offer highest safety during storage of pressurized gases.
- All emergency vents, Pressure relief valve vents to flare.
- Flare will be provided with pilot flame and steam injection to ensure complete combustion of hydrocarbons.

- Provisions of state-of-the-art equipment, control and instrumentation to enhance safety
- High-level induction and refresher safety trainings from senior management to contractual workers levels at the facilities.
- Provisions of "OISD Standards 150: Design and Safety Requirements for Liquefied Petroleum Gas Mounded Storage Facility" included in design and operation.
- Each mound bullet shall have accessibility to fire tender from at least two sides.
- Cathodic protection system shall be provided, maintained and tested.
- Each storage vessel shall have minimum two different types of level indicators and one independent high-level switch.
- High level alarms shall be set at not more than 85% level of the volumetric capacity of the vessel.
- Automatic fire detection and /or protection (Fixed) system based on heat detection through thermal fuses/quartz bulbs shall be employed.
- Suitable gas detectors shall be placed at critical locations in the LPG storage.
- All mounded storage vessels, LPG Pump Houses, Bullet Tanker Gantries shall be fully covered by medium velocity water spray system.
- Hydrant and monitor coverage shall also be provided on all four sides of the mounds for adequate coverage.
- Onsite Disaster Management Plan.
- Regular mock drills.
- Comprehensive fire protection system will be developed consisting of the following systems
    a. Fire water storage, pumps and hydrant system.
    b. Automatic medium velocity Spray System for Chemical Storage, 2 × 4 bays of Tanker Loading facility, Tanks PMB-1/2, Tanks B-1/2 and 16 nos. Mounded Bullets.
    c. Automatic sprinkler system for Admin. Building, Fire water pump house, Drumming facility & Storage and Loading Bay.
    d. Portable fire extinguishers throughout the plant.
- 24 x 7 Occupational health center with Ambulance at site.

1.6.2 Coastal Regulation Zone (CRZ) Mapping

As per the guidelines of CRZ notification (2011), VPPL has approached, Institute of Remote Sensing (IRS), Anna University, Chennai (MoEF&CC authorized agency) to demarcate the High Tide Line (HTL) and Low Tide Line (LTL) in and around proposed development at Dighi port area so far as the CRZ Notification, 2011 approved CZMP. The laying of six pipelines from jetty to project site and setting up of SWRO plant has been recommended by MCZMA to MOEFCC vide their letter No. No. CRZ 2017/CR 169/TC 4 dated 28.12.2017.

1.6.3 Public consultation

Public hearing will be conducted as per terms of reference issued.

1.7 Project benefits

The facility will generate direct and indirect employment.

Direct employment will be ~ 1000 persons from this proposed project during operation phase. The indirect employment will be from transport sector, and, associated businesses like packaging, drums manufacturing, provision of services of various kinds like fabrication, courier agencies, material supply, labour supply, contracting etc The indirect employment will also add in the employment potential of the proposed project, which will be beneficial to the local community. As per NCAER estimates, manufacturing industry has the potential to stimulate indirect employment upto five times its direct employment potential.

PVC industry is one of the major contributors to the economy of the country. With massive investments in infrastructure development, India will be the growth center of the global PVC industry. PVC products have huge potential to curb the challenges faced by the country. Introduction of innovative technologies and products based on PVC will certainly make difference in the sustainable development and management of country's infrastructure and economy.

Other tangible and intangible benefits include,

- **Low Cost Housing:** Promotion and Development of low income and cost housing approximately Rs.500 crores of saving annually in terms of the capital outlay with PVC Profiles.
- **Pradhan Mantri Ujjwala Yojana**: LPG bottling plant will support the PMUY. The LPG bottling plant will upsurge the usage of LPG in remote villages of the state.
- **Skill development and economic upliftment**: Location of the whole project being remote village-Dighi, will bring in employment and skill up-gradation of the workforce and in turn prosperity to the villages nearby.
- **Development of Port:** The project will bring in over 2 – 3 MMT of captive cargo to the port presently under stress and enhance prominence of the port.
- **Domestic Production**: Boosting domestic (State) manufacturing capacities will directly bring in prosperity to the State, more so in this underdeveloped area.
- **Import Substitution:** (Over 1.8 MMTA of PVC is being imported into India)- will save foreign exchange exchequer.
- **Decrease Life Cycle cost of Road:** One of the products Polymer modified bitumen (PMB) is especially beneficial for coastal roads and increases the durability & safety of roads up to 8 times compared to normal bitumen roads. Thus, the cost of new development, operations and maintenance of the roads will decrease substantially, on a most conservative basis it will go down by half in effect translating to a savings of at least Rs 1500 crores annually to the State exchequer.
- **Green Power:** Power generation though Natural Gas instead of Coal which is highly polluting but cheaper. The Power Plant is for Captive use however, extra power will be supplied to the existing port, as it does not have the grid connectivity. Thus, project will benefit the port.
- The Employment generation & opportunities will be for Engineers, Jr. Engineers, Technicians and operators, Safety officers, Marketing/ Sales, Store keeper, Chemist/ Application Engineers as permeant employment. It will also generate employment for Helpers-loading personnel, Sweeping/ Housekeeping/ gardening, Drivers/Mobile equipment operators.

- It will boost up ancillary industries like garages for repair of vehicles/Engineering workshop development, Puncture repair and hardware shops, food stalls / canteens, Kirana/ Grocery stores etc.
- It will boost up transport business. Transport of finished goods.
- Development of ancillary industries in nearby industrial areas like PVC Pipes and conduit industries, PVC Cables and Wires industries, PVC Flooring / Windows / Doors profiles industries, Bitumen Emulsions Industries, Chemical Industries using Industrial Gases, Composite Cylinder Manufacturing Plant, PVC Plasticizer Industry.

Corporate Environmental Responsibility (CER)

VPPL will carry out the Corporate Environmental Responsibility activities as per the MOEF & CC guidelines.

As the project is greenfield, VPPL is allocating Rs. 10.25 Crores i.e. 0.50% of estimated project investment of Rs. 2050.47 crores for CER.

CER Plan proposal for improvement in nearby vicinity will include creation of infrastructural facilities which are lacking with special emphasis on health, education, environment, water, sanitation & hygiene, road & skill development in consultation with district authority.

1.8 Conclusion

The assessment for the project of Veritas Polychem Private Limited at Dighi Port area has revealed that the upcoming establishment & associated activities will have not have much environmental impacts in operation phase.

Other impacts of the project will also remain far below acceptable limits after necessary mitigation as described & suggested in EIA report.

The major impacts will also be brought under acceptable limits by implementing the required hazard prevention, mitigation/control and environmental management plan as suggested in the report. Thus, it can be concluded that there would not be any major impacts on environment due to the project.

The EIA study has concluded that the project would be environmentally acceptable, in compliance with environmental legislation and standards, and will be beneficial to surrounding communities and region as whole.