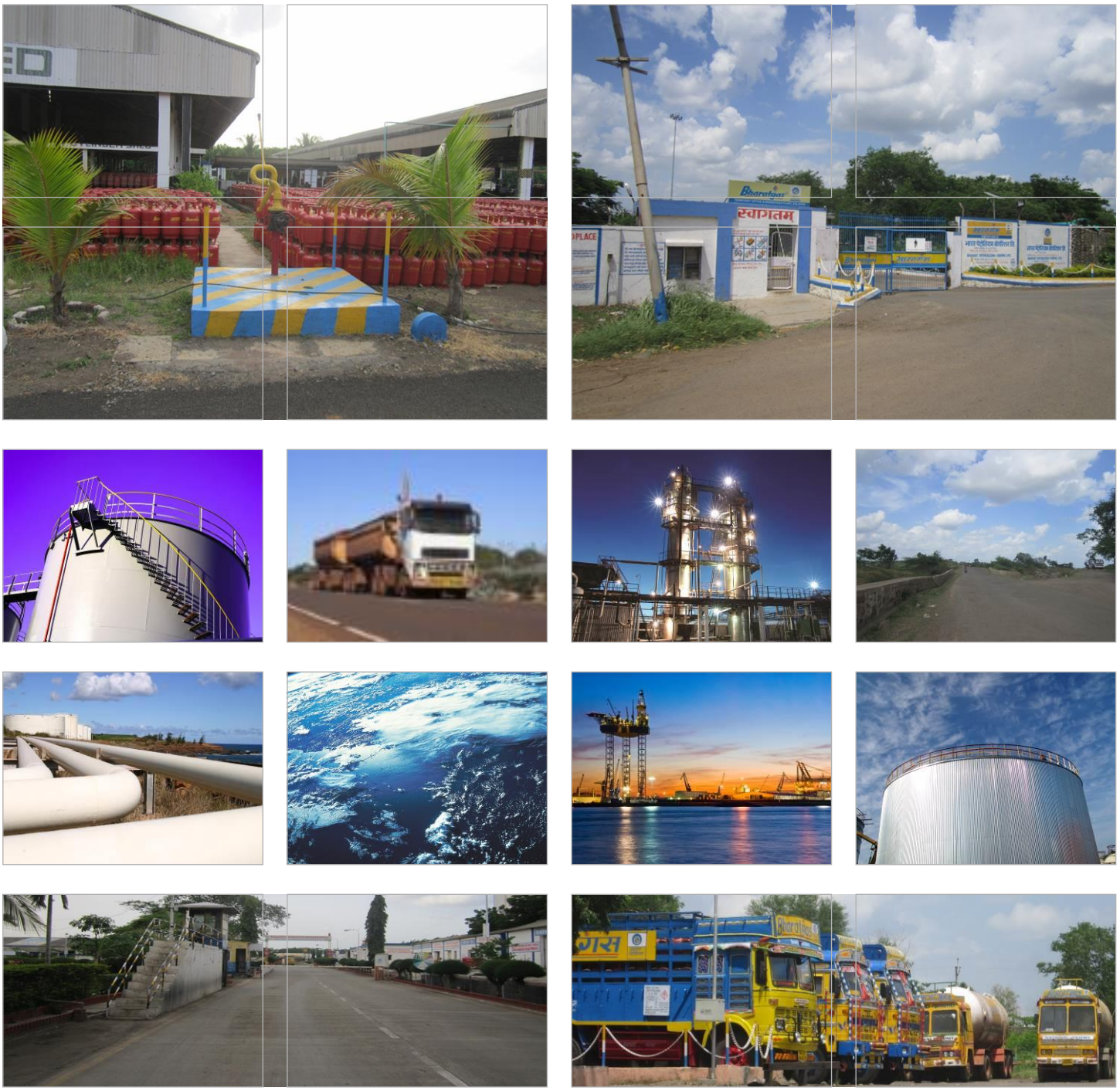

EIA & EMP Report for Proposed Expansion of LPG Storage Capacity (Mounded Storage Vessel) at Solapur LPG Plant

Bharat Petroleum Corporation Limited

Executive Summary

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INTRODUCTION

Bharat Petroleum Corporation Limited (hereinafter referred to as "BPCL"), has a LPG bottling plant in Solapur district in Maharashtra, operational since 1988. The plant has a bottling capacity of 132000 metric tonnes per annum (MTPA) and LPG storage capacity of 1800 MT (4 X 125 MT Bullets, 2 x 650 MT spheres). Currently, BPCL intends to enhance the capacity of the storage facility with addition of mounded storage vessels (MSV) of 600 MT (2 x 300 MT). On commissioning of the MSV, existing LPG Bullets of 4 nos. X 125 MT will be decommissioned. Thus the final LPG storage capacity in the plant after this expansion would be 1900 MT (2 X 650 MT Spheres + 2 X 300 MT MSV).

The proposed project will require Environmental Clearance (EC) from State Environment Impact Assessment Authority (SEIAA), Maharashtra as per the requirements of the EIA Notification, 2006. BPCL has received an approved Terms of Reference (ToR) from State Expert Appraisal Committee (SEAC). M/s ERM India Pvt Ltd. has been engaged by BPCL for conducting EIA study for environmental clearance (EC).

Location & Accessibility

The proposed MSV units will be constructed within the premises of the existing plant. The existing plant is located at Chincholi village in Mohol taluka of Solapur district, Maharashtra.

The plant can be accessed from Solapur by National Highway 65 (NH); which runs along the southern boundary of the project site. The nearest railway station is Pakni, which is approximately 3 km from the plant. The nearest airport in Pune is approximately 280 km from the plant. The district Head Quarter, Solapur is approximately 12 km from the plant towards south-east.

PROJECT DESCRIPTION

Resource Requirement

Land: The Solapur LPG plant was constructed on 49.11 acres of land. Area required for the proposed MSV i.e., approximately 1600 sq. m. (~0.40 acre) is available within the plant premises. No additional land will be required for the proposed project.

Water: During construction phase, peak water requirement will be about 3.0 KLD to meet domestic and drinking water requirement for construction workers. About 10 Kilolitres per Day (KLD) of water will be required for construction work. Domestic water requirement will be met through

Maharashtra Industrial Development Corporation (MIDC) supply, whereas water requirement for construction work will be sourced from local supplier.

Presently, about 27 KLD of water is required for operation of the plant. Water is sourced from MIDC, Chincholi. After proposed expansion, additional quantity of water will not be required for the project.

Power: During construction phase, power will be sourced from two diesel generator sets each having capacity of 125 kilo-volt-ampere (KVA).

During operational phase, maximum demand of power for plant is about 380 KVA which is obtained by the grid connection from Maharashtra State Electricity Board (MSEB). Further, diesel generators sets (1x 500 KVA, 1x 250 KVA and 1 x 65 KVA) are installed to serve as alternative sources of power supply during power failure. No additional quantity of power will be required for the proposed expansion project.

Manpower: The construction and commissioning of the project will take about approximately 12 months and peak labour requirement will be about 60 including skilled, unskilled and professional work forces. Construction workers will be sourced from nearby villages & town. No labour camp would be developed on-site. Existing amenities like portable drinking water, toilet, rest room etc. will be used by the construction workers.

Manpower requirement for day to day operation of the plant is 100 including BPCL staff and contractor's workmen. No additional manpower is required for the proposed expansion project.

Operation Description

Existing operational process at the Solapur LPG plant is receipt of LPG by bulk tankers, storage of LPG in different type of storage vessel (MSV, Sphere etc.), bottling of LPG using electronic carousel, quality checking of LPG cylinder and finally dispatch to different distribution centre. Under this proposed expansion project, there will not be any changes in the existing operational process.

Description of Proposed Storage Facility- MSV

Proposed project will involve construction of MSV (2 Nos X 300 MT). Mounded storage is the term given to the pressurised storage at ambient temperatures of liquefied petroleum gases in horizontal cylindrical tanks placed at or just below ground level and completely covered with suitable backfill. Here it is proposed that two tanks to be placed side-by-side under one 'mound'. Proposed MSV will be constructed as per OISD (Oil Industry Safety Directorate) 150 and PD 5500/ SMPV (The Static and Mobile Pressure Vessels) rules.

BASELINE ENVIRONMENTAL STUDIES

An area of 10 km from the boundary of the project site has been considered for the baseline studies. The baseline data obtained by primary monitoring/survey and review of veritable secondary information has been summarized below:

Land Use: The predominant land use-land cover of the study area within 10 km includes agricultural land (71.70%) followed by grass land (19.01%), open scrub (4.04%), industry (2.22%), settlement (2.18%), river (0.63%) and waterbodies (0.22%).

Soil Quality: The soil samples were collected from three locations in the study area. The pH level in soil sample was 8.14 to 8.46 indicating moderate alkaline soil as per standard soil classification. The SAR values in the soil samples were observed between 0.47 and 0.51, which is suitable for cultivation. The nitrogen content varied from 128 to 249 mg/kg, phosphorous varied between 3.3 to 7.9 mg/kg and potassium content between 30 to 220 mg/kg. Nitrogen and potassium content of the soil samples were found to be low to medium while the phosphate content was found to be very low. Also soil quality does not indicate contamination of heavy metals from any external source.

Natural Hazards: The project area falls within the Zone III as indicated in the Bureau of Indian Standards (BIS) 1893-1 (2002) Seismic Zone Map for India. Zone III comprises of regions which have the risk of an earthquake with the maximum expected intensity of around 7.0 on MM scale. The design for the proposed MSV will considered taking into account all applicable safety design standards.

Ambient Air Quality: Monitoring of ambient air quality was conducted at 8 monitoring locations in the study area during post-monsoon season. The monitored average PM_{10} concentration varied from 57.6 µg/m^3 to 77.9 µg/m^3. The monitored average $PM_{2.5}$ concentration ranged from 30.2 to 39.7 µg/m^3. Also all other air quality parameters (SO_2, NO_2, CO etc.) monitored near the project site were found below the national ambient air quality standard (NAAQS). Volatile organic compound (VOC) was only recorded within the plant site monitoring location.

Ambient Noise Quality: The baseline noise monitoring in the study area was carried out at 8 locations (two industrial areas and six residential areas) in the vicinity of the project site. The day time equivalent noise level (Leq day) near residential area varied from 49.3 dB(A) to 52.7 dB(A) while the same for industrial area varied from 52.1 dB(A) to 52 dB(A). Night time equivalent

noise level near residential area and industrial area varied from 42.7 dB(A) to 44.1 dB(A) and 44.4 dB(A) and 43.2 dB(A) respectively.

Surface Water Quality: Surface water quality was analysed from two locations. The pH of the samples varied from 8 to 8.6. Dissolve oxygen (DO) levels varied from 6 to 6.3 mg/l. Biochemical oxygen demand (BOD) level varied from 12 to 17.6 mg/l. The total coliform count of the surface water samples found from 22 to 33 MPN/100 ml. The surface water samples were in compliance to the criteria values for propagation of wild life and fisheries (Class D as per CPCB Use Class) and for irrigation, industrial cooling and controlled waste disposal (Class E as per CPCB Use Class).

Ground Water Resources: Ground water development in the district is mainly through dug wells and bore wells. Ground water is mainly used for domestic, irrigation and industrial purposes. The stage of ground water development in the Mohol block was 87.69%, which is categorised as safe block.

Ground Water Quality: A monitoring network consisting of 5 locations for ground water was selected within the study area. pH level in the ground water sample varied from 6.98 to 7.55. Total dissolve solid (TDS) and total hardness in the groundwater samples varied from 572 mg/l to 1950 mg/l and 341 mg/l to 1897 mg/l respectively. Total hardness in all the ground water samples was observed above the acceptable limit of IS 10500 i.e., 200 mg/l. In three ground water samples level of total hardness meets the permissible limit of IS 10500. In remaining two ground water sample collected from Chincholi and Sawaleshwar, value of total hardness exceeded the permissible limit of IS 10500 standard (600 mg/l). Concentration of nitrate in all ground water samples varied from 76.1 to 97 mg/l, therefore exceeding the permissible limit of IS 10500 (45 mg/l). Concentration of iron at two locations viz. Sawaleshwar village and Pakni village exceeded the drinking water standard i.e., 0.3 mg/l. Concentration of heavy metals like Mercury, Cadmium, Lead and Chromium in the ground water sample was below the acceptable limit of IS 10500. Presence of E coli was detected in ground water sample in Sawaleshwar, Darfal and Pakni village.

Biological Environment: Trees present within the project site are planted in the greenbelt areas and includes species like *Leucaena leucocephala, Albizzia labbek, Azadirachta indica, Peltophorum pterocarpum. Delonix regia, Polyalthia longifolia, Trema orientalis, Terminalia catappa, Pongamia glabra, Cassia siamea* etc. Faunal species recorded within the BPCL site include Common Indian Toad, Garden Lizard, Little Cormorant, Rose ringed Parakeet, Red vented Bulbul, Purple Sunbird, Green Bee-eater, Coppersmith Barbet, Black Drongo, House Crow, Laughing Dove, Common Pigeon, Spotted Dove, Five striped palm squirrel etc.

Habitats within the buffer zone include agricultural lands, homestead plantation, scrubland, grass lands, water bodies etc. During terrestrial plant species survey, 117 plant species including 61 species of trees, 22 species of

shrubs, 11 species of herbs, 9 species of climber and 14 species of grass were recorded. Two amphibians, nine reptiles, 62 birds and 11 mammals species were reported/recorded from the study area. One Schedule I reptile, Indian Monitor Lizard (*Varanus bengalensis)*, three birds viz. Black Kite (*Milvus migrans*), Black Winged Kite (*Elanus caeruleus*) and Shikra (*Accipiter badius*) were listed under Schedule I of Wildlife Protection Act, 1972.

Great Indian Bustard Sanctuary or Jawaharlal Nehru Bustard Sanctuary is located about 2.4 km from the project site. IUCN Critically Endangered species (Ver. 2016-3) Great Indian Bustard (*Choriotis nigriceps*) is protected in the wildlife sanctuary. Apart from the Great Indian Bustard, about 134 bird species are reported from this Sanctuary.

Socio-economic Environment: The study area spread across 23 census villages. Out of this 23 villages, one village (Chincholikati or Chincholi) is located within the 2 km of the plant (core area), while the remaining 22 villages were located from at a radius of 2 to 10 km from the plant (buffer area). The total population in the core zone was recorded to be 2785. Total population in the buffer area was 12105. The overall literacy and female literacy rates in the core zone were 71.99 % and 61.26 % respectively. The overall literacy and female literacy rates in the buffer zone were 75.94 % and 66.94 % respectively. The work participation rate (WPR) in the core area was 37.02 % as compared to 47.30% in the buffer area. The core area village is characterised by dominance of non-farm based livelihoods, both as the primary and secondary livelihood sources but farm based livelihood is still in dominance in buffer area villages however non-farm based livelihood also has significant amount of involvement of local people.

IMPACT ASSESSMENT

The potential impacts of the project on different components of the environment are systematically identified for evaluation of significance.

Impact on Ambient Air Quality: During construction phase, the sources of emission are fugitive emission from construction material handling, earth work, and emission from machinery, vehicles and DG set. The pollutant especially particulate matter will settled in areas surrounding proposed project site, however this activity will be continuing only during the construction phase (12 month). The impact in this respect is assessed to be of minor significance.

During operational phase, the sources of air emissions will mostly be fugitive emission in the form LPG (mainly comprising of Propane and Butane) which will be released into atmosphere only due to potential leakages from static and dynamic joints and seals used in flanges, pumps, valve packing etc. In order to minimize the fugitive emissions, appropriate measures like minimum number of flanges, valves etc. will be incorporated at the design stage. The impact for this aspect is assessed to be of minor significance.

Impact on Noise Quality: The major sources of noise emission during construction phase are operation of machineries, vehicles, DG sets. It is assessed that noise will be attenuated with 500 m from construction site. The impact on this aspect is assessed to be of minor significance.

During operational phase, there will be no changes in the existing operational process, except creating additional storage space for LPG. It is also envisaged that vehicular movement will not increase after expansion as capacity of LPG bottling plant would not increase. Therefore increase in noise level due to the proposed project is not expected.

Impact on Surface Water Quality: The domestic waste water from construction site will be treated through STP. The surface runoff from construction site during rainy season will be channelized into existing storm water drainage system and same will treated through sedimentation tank before discharge. The impact on surface water quality is assessed to be minor.

During operational phase, effluent generated from the plant will be treated through effluent treatment plant (ETP) and treated water will be used for landscaping. The domestic waste water from admin building and canteen will be treated through sewage treatment plant (STP) and treated water will be used for landscaping. The surface run-off from the plant will be channelized into existing storm water drainage system of Chincholi industrial area, which finally discharges into a surface water body, located on south-eastern side. Surface run off from oil storage waste handling unit (waste oil, used oil, etc.), hazardous waste handling site (paint sludge, ETP sludge) may lead to assessment of potential impacts on receiving water bodies. The potential impact on surface water quality is assessed to be minor.

Impact on Ground Water Resource: No adverse impact on ground water resources is envisaged as no withdrawal of ground water is proposed during construction phase as well as the operation phase of the project. Water for the proposed project will be sourced from Chincholi MIDC.

Impact on Ground Water Quality: Ground water can be contaminated from site drainage or accidental spillage of fuel, lubricants and chemicals from storage areas, vehicles and machinery if they are not properly designed or maintained. impact significant is considered minor.

Potential Impact on Terrestrial Habitat: The proposed expansion unit will be constructed in the available area of the site. However, 100 sq. m greenbelt area will be cleared for construction of MSV. Total greenbelt in the project site is about 114,760 m^2, (approx. 59% of total plant area) and removal of 100 m^2 of greenbelt will involve reduction of only 0.09% of the total greenbelt area. Felling of 100 trees from an area of 100 m^2 is not expected to cause significant loss terrestrial habitat. The Great Indian Bustard Sanctuary is located about 2.4 km from the project site. Incremental load of VOCs, CO, NO_2 and SO_2 and noise is not expected to cause any significant impact to the Sanctuary or

Schedule I species or their habitats. The impact significance is considered to be minor.

Potential Impact on Socio-economic Environment: The proposed expansion of LPG storage will be constructed within the existing plant area. Therefore, socio-economic impacts linked to the acquisition or purchases of land will not be applicable to the project. The proposed LPG storage facility will generate direct and indirect employment opportunities during construction phase (approx. 12 months). About 60 local skilled, semi-skilled and unskilled labourers will be employed in the construction activities. Hence the proposed expansion project will have temporary beneficial impacts as some local unskilled, semiskilled and skilled persons will get direct or indirect job. Immigration of work force during construction phase is insignificant; the social impacts on literacy, health care, transport and housing facilities and cultural aspects were also insignificant.

RISK ASSESSMENT

Risk Assessment (RA) study was carried for the project to understand major risks that may arise due release of LPG from failure of loading/unloading line or hose including pumps and compressors. The accidental release of LPG from failure of proposed MSVs and existing storage facility (spherical tanks) may lead to jet fire (from immediate ignition), flash fire or vapour cloud explosion (from delayed ignition). The jet fire scenario was studied to assess the risk to plant and receptor.

In worst case scenario, i.e. 300 mm leak of a sphere tank may lead to jet fire and zone of impact will be in a radius of 425m around the respective tank area, and potential lethal effect zone will be in a radius of 159m.

In worst case scenario, i.e. 300 mm leak of a MSV tank may lead to jet fire and zone of impact will be in a radius of 400m around the respective tank area, and potential lethal effect zone will be in a radius of 148m.

In worst case scenario, i.e. 300 mm leak of bulk tank truck may lead to jet fire and zone of impact will be in a radius of 320m around the respective tank truck location, and potential lethal effect zone will be in a radius of 125m.

ENVIRONMENTAL MANAGEMENT PLAN

Site-specific Environment Mitigation Measures to prevent and mitigate major/significant adverse impacts and accentuate beneficial impacts will include:

Air Quality Management Plan:

- Covered storage area will be provided for construction materials like cement;
- Vehicles loaded with construction materials will be covered with tarpaulin sheets;

- Regular maintenance of machineries, equipment's and vehicles to control emission;
- Housekeeping of the site will be maintained to minimize the fugitive emission from material handling areas, internal roads and construction waste storage areas;
- Periodic monitoring will be carried for ambient air quality and for source emissions;
- In order to minimize fugitive emissions, the following measures have been incorporated at design stage:
  - Minimum number of flanges, valves etc.;
  - Provision of fire safe Remotely Operated Valves (ROV);
  - High grade gasket materials; and
  - Usage of pumps with (single/double) mechanical seals.

Noise Quality Management Plan

- Periodic preventive maintenance of operational units will be undertaken in accordance to supplier/manufacturer manual;
- Construction equipment generating minimum noise and vibration will be selected;
- Periodic monitoring of ambient noise quality near receptors will be undertaken to ensure compliance with regulatory standards;
- Personnel deployed near high noise generating areas will be equipped with proper personal protective equipment (PPEs) (ear plugs etc.) and subjected to rotation; and
- Periodic health surveillance programs to be organized to monitor the health of workers.

Solid & Hazardous Waste Management Plan

- The construction waste will be stored in designated waste storage areas;
- Temporary construction waste storage area at the plant to be properly bunded and provided with garland drains and silt traps;
- Construction waste will be disposed in the designated waste disposal site;
- Municipal solid waste will be disposed at disposal ground of Solapur municipality;
- The waste oil , tank bottom sludge and paint sludge will be stored in properly labelled and covered bins located in paved and bunded area;
- The waste oil/lube oil, tank bottom sludge and paint sludge to be periodically sent to MPCB authorized vendors for disposal.

Waste Water & Effluent Management Plan

- All the effluent generated from process will be channelized to ETP for treatment;
- Treated effluent will be reused for landscaping;
- The performance of the ETP will be evaluated periodically;

- Domestic waste water will be treated through STP; and
- Quality of treated effluent will be monitored periodically.

Storm Water Management Plan

- Additional drainage structures will be created at the construction material handling site. Necessary measures will be provided during construction phase to prevent earth and stone material from blocking cross drainage structures;
- All the drainage structures and road drainage system will be cleaned periodically to maintain uninterrupted storm water flow;
- Oil traps and oil water separator will be used to separate oil from runoff water; and
- Sediment control measures in the form of silt traps and sedimentation tank will be provided to treat surface run-off before disposal.

Occupational Health & Safety Management Plan

- Training programs will be conducted for the workforce regarding proper usage of Personal Protection Equipment (PPE), handling and storage of fuels etc.;
- No employee will be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day. Provision of ear plugs, ear muffs etc. and rotation of workers operating near high noise generating areas;
- Hazardous and risky areas, installations, materials, safety measures, emergency exits, etc. will be appropriately marked;
- Adequate sanitation facilities will be provided onsite for the construction workers;
- All chemicals and hazardous materials storage container will be properly labelled and marked. Materials Safety Data Sheets (MSDS) or equivalent data/information in Marathi language must be readily available to exposed workers and first-aid personnel;
- Worker to be adequately trained on correct use of machinery and safety devices. Safety instructions and cautionary signage to be displayed near each machinery;
- Adequate sanitation facilities will be provided onsite for the workforce.

Water Conservation and Rainwater Harvesting Plan:

Roof top rain water from the office building will be harvested. The harvested water will be stored in a surface water tank for further use. Also the entire collected water may be used simultaneously for landscaping and other purposes.

Biodiversity Management Plan:

- *Habitat Preservation*: Preservation of the existing greenbelt within the project site would be done for habitat preservation of birds, reptiles and small mammals;

- *Contributing to the Existing Habitat Improvement Programme of the Forest Department*: BPCL will discuss with the forest department officials in order understand plans for habitat improvement and wildlife management activities in the study area, particularly at the Great Indian Bustard Sanctuary area. As per understanding reached with the forest department, BPCL will frame a plan for contributing to the existing State level habitat improvement and wildlife management activities.
- *Awareness Generation Meetings at Villages*: BPCL will also conduct awareness campaigns at the village level to make the locals aware about the protected species in the area; their behaviour, habitat, ecology, breeding/nesting seasons, threats to habitats and species, laws regarding protection of species.

Socio-economic Management Plan:

Bharat Petroleum Corporation Limited is Public Sector Company. Therefore, Corporate Social Responsibility (CSR) program in the area are undertaken as per Government of India guidelines. Some of the key highlights of CSR initiatives of BPCL are providing educational support to under privilege students and students in rural areas; water conservation programme in water scared area of the country, skill development programme for under privilege group of the society, health check-up programme etc.

Cost of Implementation of EMP

Total cost of implementation of EMP during construction phase and operational phase would be around INR 2.12 lakhs and 12.90 lakhs respectively. 2.5% of the total project budget would be used in phases for CSR activity.