

Lr No: IA-J-11011/483/2017-IA.II (I) dated 22.03.2018

## **EXECUTIVE SUMMARY**

For

### **EXPLORATORY/DEVELOPMENT DRILLING & PRODUCTION IN ONSHORE CONTRACT AREA KG/ONDSF/BHIMANAPALLI/2016 EAST GODAVARI DISTRICT, AP**

#### **Project Workover of 1 Abandoned Well, Development Drilling of 5 New Wells and Subsequent Gas Production**

**Project Proponents:**



### **PFH Oil & Gas**

PLOT G2, CONTRACT AREA GP, SECTOR 5,  
SALT LAKE CITY, KOLKATA, WEST BENGAL.

**Environmental Consultants:**



**BHAGAVATHI ANA LABS**


### **Bhagavathi Ana Labs Pvt. Limited**

**(A Bureau Veritas Group Company)**

Sanath Nagar, Hyderabad- 500 034

**MAY 2018**

IND.BH.41.17.0217B/HSR/EIA

	<p>Environmental Impact Assessment Report for Appraisal/Development Drilling &amp; Production in Onshore Contract Area KG/ONDSF/Bhimanapalli/2016 at Nangavaram, Lakshmiwad, Bantumudi, Uppidi, Sanavalli, Bhimanapalli Villages, Upplaguptam Mandal, East Godavari District, Andhra Pradesh by PFH Oil &amp; Gas Pvt Ltd</p> <p style="text-align: right;"><b>Executive Summary</b></p>
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## Executive Summary

### 1.0 Prelude

This Summary provides a concise outline of the EIA findings and the detailed mitigation measures envisaged for the proposed Appraisal/Development Drilling & Production in Contract Area KG/ONDSF/BHIMANAPALLI/2016 located at Nangavaram, Lakshmiwad, Bantumudi, Uppidi, Sanavalli, Bhimanapalli villages, Upplaguptam Mandal, East Godavari District, Andhra Pradesh by PFH Oil & Gas Pvt. Ltd.


### 1.1 Proposed Project

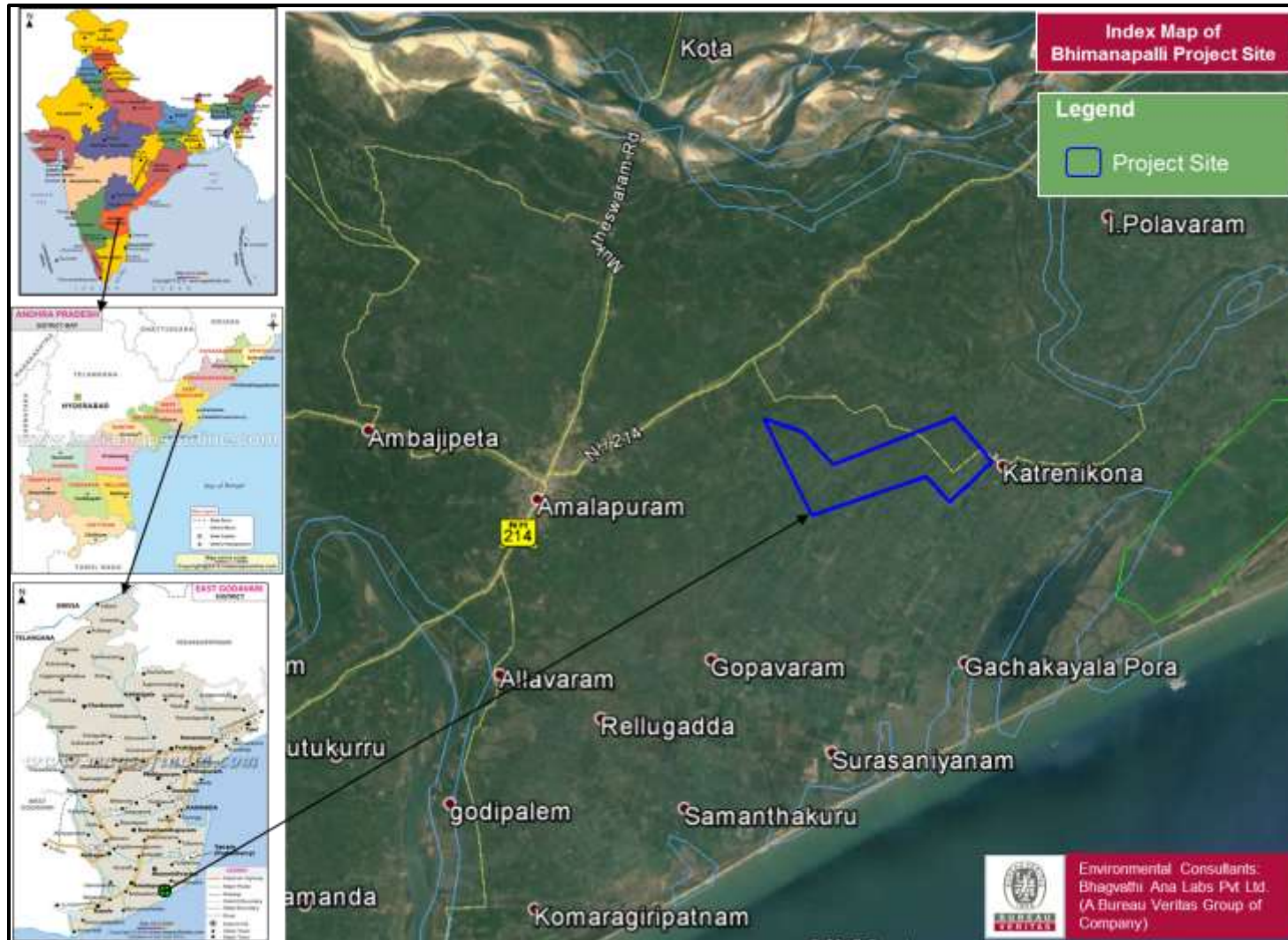
Workover of the temporarily abandoned wells & 5 New Appraisal/Development wells in the contract area KG/ONDSF/BHIMANAPALLI/2016. Proposed project located at Nangavaram, Lakshmiwad, Bantumudi, Uppidi, Sanavalli, Bhimanapalli villages, Upplaguptam Mandal, East Godavari District, Andhra Pradesh. The location index map is shown in **Figure-1** and 10-km radius topo map of the project area is shown in **Figure-2**.

The KG/ONDSF/Bhimanapalli/2016 onshore Field has been awarded to PFH Oil & Gas Pvt. Ltd. by Govt. of India during the Discovered Small Field (“DSF”) bidding round, “DSF-2016”. The total allocated area of the Contract Area is 15.01 sq.km. This Area was explored by ONGC in year 1984 but was not put into production as they did not deem it economically viable for them. ONGC have drilled two wells during exploration phase named as “BHP-1” and “UPD-1” in year 1984 and 2007 respectively. Thereafter, BHP-1 was permanently plugged & abandoned and UPD-1 was temporarily abandoned. UPD-1 had recorded a potential to produce sweet gas during the well tests. PFH Oil & Gas Pvt. Ltd. is proposing to initially work over the UPD-1 well, obtain modern sub-surface & production data, and undertake modern reservoir studies to identify new sub-surface targets to drill 5 new appraisal/developmental wells to optimise the hydrocarbon development of this Contract Area.

The proposed Appraisal/Development Drilling & Production Project is 1(b) type of the activity (Offshore and Onshore Oil and Gas Exploration, Development and Production) and classified as “A” Category project as per EIA Notification 2006 and subsequent amendments.

Environmental Impact Assessment (EIA) studies was conducted in line with the approved Terms of Reference (ToR) issued by MoEF&CC vide Lr No:IA-J-11011/483/2017-IA.II (I) dated 22.03.2018 and present Draft Report was prepared for conducting Public Hearing.


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**FIGURE – 1: Index Map**






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**FIGURE – 2: 10-km Radius Topo Map**



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## 1.2 Environmental Features of the Project

Environmental features around the 10-km radius from the block boundary are given below:


- The total contract area KG/ONDSF/BHIMANAPALLI/2016 is 15.01 sq.km
- The Bhimanapalli marginal block is located in Uppalagupatam Mandal, East Godavari district, Andhra Pradesh and can be located between Latitude (N) 16° 33' 49.6338" to 16° 35' 59.4914" & Longitude (E) 82° 04' 31.0343" to 82° 09' 0.9064". Average elevation of the study area is 8 m AMSL.
- National Highway- 214 (Old) or NH-216 (New) (1.8 km NW)
- The nearest Railway Station is Kotipalli Railway Station (13 km, NW)
- The nearest Airport is Rajahmundry Airport (61 km, NW)
- Gautami Godavari River is located (2.9 km, NE)
- Bay of Bengal Back Water Lake (3.5 km SE)
- Mangrove Forest (5.7 km, SE)
- Kandikuppa Reserved Forest (5.8 km, SE)
- No protected areas as per Wild Life Protection Act 1972 (Elephant Corridors, Tiger Reserves, Sanctuaries, National parks, Conservation reserves, Community reserves) were found within the study area.
- No Defence Installations located within the study area
- No Archaeologically important places located within the study area as per the Archaeological Survey of India.
- As per the Seismic Map of India, IS 1893 (part-1): 2002, study area falling under Seismic Zone –III moderate risk zone

## 2.0 Project Description

After getting Environmental Clearance (EC) from the MoEF&CC plan to test & log the abandoned well & bring it to production. Company will then study the sub-surface data generated during the work over tests, to identify new sub-surface targets. Based on these results Company may drill up to 5 new appraisal/development wells to maximise the delineation of the Contract Area. Government regulation will be taken into account for well spacing.

A total 1 ha land is required for the each drilling well. The drill sites will be selected, based on sub-surface studies, but would attempt to avoid habitation, water bodies and tree plantations. The land will be acquired preferably from private / government lands after obtaining due statutory approvals on temporary basis. Crop and land compensation will be paid as determined by the revenue officials, if private land is involved.

A rig will be installed at the potential site of drilling after thorough inspection for its working capability and quality standards. Top-Hole section will be drilled to a desired depth based on well design. After drilling top-hole section, it will be cased with a pipe called casing. Casing provides support to hole wall and secures hole section. Other than that, it isolates problematic hole section such as loss zones, shale sections, over pressurized formations etc. after running casing, space between hole wall and casing will be cemented. This

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process of drilling and casing the hole section continues until the final well depth is achieved. It is proposed to use Water Based Mud (WBM) and Synthetic Oil Based Mud (SOBM) as detailed in the table for all the three wells. The target drilling depth and the hole diameter are given in the **Table-1**.

**TABLE -1: DRILLING DIAMETER, DEPTHS AND MUD UTILISED**

Diameter	Depth	Mud Type
26" hole	0-600m	Water Based Mud
17 1/2" hole	600-3000m	SOBM

Drilling is a temporary activity which will continue for about 2-3 months for each well. The rigs are self-contained for all routine jobs. Once the drilling operations are completed and if sufficient indications of hydrocarbons are noticed while drilling, the wells tested by perforation in the production casing this normally takes 5-7 days. If the well is found to have intersected a viable hydrocarbon bearing structure, it is sealed off for future completion & development. After completion of drilling operations the drill site shall be reinstated to its original condition as soon as possible.

Operation will be carried out in accordance and guideline prescribes by Oil Industry Safety Directorate (OISD) and international standards. Waste will be disposed by State Registered Agencies. Proper and detailed Program of the Operations will be prepared and shared with Directorate General of Hydrocarbons (DGH) prior to starting operation for review and guidance. Details of the operation will be sent to DGH on a regular basis.


## 2.1 Infrastructure Requirement

**Project Cost:** The project consists of work over of the temporarily abandoned wells and 5 New Appraisal/Development drilling wells within the contract area KG/ONDSF/BHIMANAPALLI/2016. The exact location of the wells will depend on the 2-D and 3-D seismic study, which is under progress. The estimated cost of the proposed each drilling well is 10 Crores.

**Land Requirement:** Minimum land required at each well site is 1 ha. The land will be acquired on a temporary basis and adequate compensation as per the guidelines of local administration will be provided. The approximate area of well site is dependent on the type of drilling equipment deployed which in turn is dictated by the planned depth of drilling.

**Water Requirement:** Water is basically required for preparation of drilling mud and for meeting domestic needs of campsite. Typically the water consumption for each well is 25 KLD for a short period 2 to 3 months. However the drilling and domestic water requirement would depends on the time required to drill the well, which is primarily dependent on the proposed depth.

**Power Requirement:** the total energy requirement at each drill site including campsite is around 2.5 MW which will be met through Diesel Generator (DG) sets (3 X 1000 KVA at drill site and 1X 440 KVA at campsite)

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**Man Power:** The drill site construction would be done largely employing local labour. At each drill site construction, local employment will be generated for about 20-40 persons.

### 3.0 Present Environmental Setting

Baseline Environmental status in and around proposed project depicts the existing physical, biological and human environmental quality with respect to of Air, Noise, Water, Soil, biodiversity and Socio-economic attributes. The baseline environmental quality study was carried out during December 2017 to February 2018 period within 10- km radial distance.

#### 3.1 Climatology of the Study Area

Wind speed and direction data recorded during the study period is useful in identifying the influence of meteorology on the air quality of the area. The meteorological data recorded at the site for the study period is given in **Table-2**.

**TABLE-2 Site Specific Meteorological Data**

Period	Temp (°C)		Humidity (%)		Rain fall (mm)	wind direction
	Min	Max	Min	Max		
December 2017	18.5	31.6	73	83	17.5	NE
January 2018	17	33	70	89	16.0	NE
February 2018	15	36	68	88	18.5	NE

#### 3.2 Ambient Air Quality

The ambient air quality with in study area of 10 km radius around the project site at 6 locations forms the baseline information.

The 98<sup>th</sup> percentile of PM<sub>10</sub> in study area ranging between 50.4 µg/m<sup>3</sup> (at Bhimanapalli village) & 40.4 µg/m<sup>3</sup> (at Cheyyuru village). The 98<sup>th</sup> percentile of PM<sub>2.5</sub> in study area ranging between 25.9 µg/m<sup>3</sup> (at Bhimanapalli village) & 21.3 µg/m<sup>3</sup> at (at Anipuram village)


Minimum and maximum level of SO<sub>2</sub> recorded within the study area was in the range of 7.1 µg/m<sup>3</sup> to 14.7 µg/m<sup>3</sup> with the 98<sup>th</sup> percentile ranging between 9.4 µg/m<sup>3</sup> to 14.7 µg/m<sup>3</sup>. Minimum and maximum level of NO<sub>x</sub> recorded within the study area was in the range of 8.6 µg/m<sup>3</sup> to 15.9 µg/m<sup>3</sup> with the 98<sup>th</sup> percentile ranging between 10.9 µg/m<sup>3</sup> to 15.9 µg/m<sup>3</sup>.

It is concluded from the ambient air quality parameters in the study area are well within the permissible limit as per the prescribed by Central Pollution Control Board (CPCB).

#### 3.3 Noise Environment

Baseline noise levels were monitored at 4 locations within the study area, using portable sound level meter device. The values of noise observed in some of the rural areas are primarily owing to vehicular traffic, other anthropogenic activities and industrial activities. The day equivalents during the study period are ranging between 40.1 to 46.7 dB (A). Whereas the night equivalents were in the range of 32.2 to 34.6 dB (A). The results of day



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equivalents and the night equivalents are compared with the ambient noise standards of respective industrial, residential, commercial area and sensitive zone standards. Monitored ambient noise levels are within the standards suggested by CPCB.

### 3.4 Water Environment

About 4 ground and 4 surface water samples were collected from the study area to assess the water quality during the study period. The ground water samples were drawn from the hand pumps and open wells being used by the villagers for their domestic needs. Surface water sample was collected from the Rivers/Lakes/Ponds/Backwater Zone/Bay of Bengal.

#### 3.4.1 Ground water Quality

Ground water quality in the region is complying with the prescribed limits as per IS: 10500-2012. Hardness of the ground water samples is ranging between 250 - 395 mg/l water samples are within the permissible limits. pH of the ground water samples is ranging between 7.05 to 7.70 water samples are within the acceptable limits & TDS of the ground water samples is ranging between 940 mg/l to 2984 mg/l two samples falling under permissible limits & 2 samples indicating saline nature.

#### 3.4.2 Surface water Quality

Surface water quality in the region is complying with the prescribed limits as per IS: 10500-2012. Hardness of the ground water samples is ranging between 135 - 7656 mg/l water samples collected from village ponds are within the acceptable limits & samples collected from the Godvari River indicates Back water influence. pH of the ground water samples is ranging between 7.38 to 7.91 water samples are within the acceptable limits & TDS of the ground water samples is ranging between 320 mg/l to 26608 mg/l two samples falling under permissible limits & 2 samples indicating saline nature.

### 3.5 Soil Quality


For studying the soil types and soil characteristics, 4 sampling locations were selected to assess the existing soil conditions representing various land use conditions and geological features. The pH values of the soils in the study area were varying from 6.5 to 7.38 indicating that the soils are Neutral & Slightly acidic. The electrical conductivity in the study area was varying from 120 to 680  $\mu$  mhos/cm indicating that soils considered under Normal category. The Total Organic Carbon in the study area was varying from 0.01 to 0.02 %. The available Nitrogen as N in the study area was varying from 12.32 to 26.32 %. The available Phosphorous as P in the study area was <5 kg/ha. The available potassium as K in the study area was varying between 461 to 1241 kg/ha making it suitable for plant growth.

### 3.8 Ecology & Biodiversity

Studies were conducted based on the primary data collected by field visits and based on the secondary data collected as per the records of forest department and literature survey.





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Biodiversity database of the region reveals the presence 38 species of trees, 76 herbs & shrubs, 28 grasses & climber species and 7 Mangroves. Fauna were recorded / observed during study period are Schedule – IV specie. A total 95 species are reported in the study area. Since the study area is mainly involved in pisciculture, marine fishes, Crabs & Prawns are reported in the study area.

The zooplankton samples were collected at 4 different locations with the help of Zooplankton net. The highest biomass was recorded Kotha Muramalla whereas lowest in Pallamkuru. The highest population of zooplankton was reported at Pallamkuru whereas lowest population in Kundaleswaram. Total 8 group of zooplankton were observed in all sampling stations. Benthos were collected at all 4 sampling station total 6 group of benthos were reported in sampling location. The highest population and biomass were recorded in Pallamkuru whereas lowest biomass and population were reported in Kesaukuru.

### 3.9 Demography & Socio-Economic Environment

The 10 km radius study area constitutes East Godavari districts. In the study area there were total 7 mandals.

- As per 2011 Census, total population of the study area was 3,64,632 out of which male population was 1,83,282 and female population was 1,81,350
- Total population of the study area is 3,64,632 with a total 1,01,535 households. Average family size is 3.59.
- Total SC population is 1,13,596(31.15%) and ST population is 2,978 (0.81%).Average sex ratio is 989 females to 1000 male
- Total child (below 6 years of age) population was 34,846 (9.55%)
- According to census 2011, in the study area, overall literate population is 70 % which is 3% higher than district rate.
- Total workers in the study area are 1,55,531 (43%). Male workers are 70% and female workers are 30%. Main worker population is 1,20,366 (33%), marginal workers are 35,165 (10%) and non-workers are 2,09,101 (57%).


### 3.10 Land Use & Land Cover

Contract area KG/ONDSF/BHIMANAPALLI/2016 is considered as study area for the Land Use Land Cover Studies. The total land area of contract area is 15.01 sq.km.

- Water Bodies: 33.5 ha of the study area is covered with water bodies 2 ha is Rivers/streams/ Canals, 2.5 ha is surface water tanks & 29 ha are Aquaculture Ponds.
- Builtup Land: 50 ha of the study area are occupied with rural development.
- Agricultural Land: 1418 ha of the study area is agricultural land in which 1072 ha is crop land (single/Double Crop), 340 ha of land is Plantation & 6 ha of land is Fallow land.

## 4.0 Anticipated Environmental Impacts & Mitigation Measures



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#### 4.1 Ambient Air

The potential sources of air emissions at the well sites will be as follows:

- Dust from earth works (during approach road and site preparation)
- Emissions from DG sets;
- Emissions from possible flaring during well testing
- Emissions from vehicular movement;

During the short period of site preparation, mechanical shovels and earthmovers will be used for vegetation clearance, cut and fill and other site leveling activities. However, these activities will be only temporary and the impact to ambient air quality would be within the close proximity of well site.

The gaseous emissions from the DG set will be controlled by efficient combustion of fuel in the DG set. The flaring of oil and gas during well testing is last for few days only. The impact on air quality is assessed based on increase in emissions levels from the DG set operation during emergency usage. Impact predicted has been carried out for two major Ambient Air Quality (AAQ) pollutants, viz., Sulphur dioxide (SO<sub>2</sub>) and Oxides of Nitrogen (NO<sub>x</sub>). The existing emissions from other industries within 10 km have been considered to be covered under the baseline scenario. Prediction of impacts on air environment has been carried out employing a steady state Gaussian plume mathematical dispersion model, namely **AERMOD**.


The model simulations have been carried out for winter season. The maximum incremental short-term 24 hourly GLCs for SO<sub>2</sub> and NO<sub>x</sub> likely to be encountered during winter season are 0.01 and 15.5 µg/m<sup>3</sup> respectively. The GLCs predicted are shown in **Table-3**.

**TABLE-3: Ground Level Concentrations**

Pollutant	Concentration (µg/m <sup>3</sup> )		
	Baseline	Incremental	Resultant
NO <sub>x</sub>	15.9	15.5	31.4
SO <sub>2</sub>	14.7	0.01	14.71

##### 4.1.1 Mitigation Measures

- The exhaust of the DG set will be at sufficient height to allow dispersion of the pollutants and DG sets will be properly maintained so that emissions will be under statutory limits.
- The flaring system will be properly managed at all times.
- Water spraying will be done on the access roads to control re-entrained dust during dry season (if required).
- The engines and exhaust systems of all vehicles and equipment used in this project will be maintained as such, that exhaust emissions are low and do not breach statutory limits set for the concerned vehicle/equipment type.

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- Blow out preventer of sufficient capacity will be installed at well head during drilling operation.
- Ensuring the availability of valid Pollution Under Control Certificates (PUCC) for all vehicles used on site.

#### 4.2 Noise Environment

The maximum predicated noise level at distance of 100 to 300 m from the rig boundary would be less than <30 dB (A). The ambient noise levels at most of the places in the region are within the CPCB standards. Since, the drilling operation last for the proposed exploratory drilling will be insignificant on the community and will be minimized after 100m.

The proposed drilling operations and related activities will lead to emission of noise that may have significant impact on the surrounding communities in terms of increase in noise levels and associated disturbances. Following activities would result in increase in noise level.

- Noise from rig and associated machinery
- Noise from vehicular movement
- Noise from DG sets

##### 4.2.1 *Mitigation Measures*

- Sufficient engineering control during installation of equipment's and machineries (like mufflers in DG sets) is to be ensured to reduce noise levels at source.
- Proper and timely maintenance of machineries and preventive maintenance of vehicles is to be adopted to reduce noise levels.
- All noise generating operations, except drilling is to be restricted to daytime only to the extent possible.
- Personnel Protective Equipment's (PPE) like ear plugs/muffs is to be given to all the workers at site and it will be ensured that the same are wore by everybody during their shift.


#### 4.3 Surface Water and Groundwater

Quantity:

Drilling operations require the use of water for domestic requirements as well as for operations, but the use will be of temporary nature and limited to a few days for each well (25 KLD per well). And the water will be sourced from Groundwater/ tankers. As per the CGWB classification proposed project site is falling under "safe category" hence these impacts are not significant.

Quality:

Approximately 8 KLD of waste water would be generated from the drilling operation. Water based non-toxic biodegradable fluids with inhibitive and encapsulative characteristics are

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proposed to be used as drilling mud for minimizing any long term impact on groundwater quality. Additionally, the drilling mud collection and recirculation pond is lined with impervious layer to prevent seepage and loss of drilling fluid into the subsoil. Further, proper casing installation and cementing of well will ensure least groundwater contact.

#### 4.4 Land Environment

Impact on land environment, due to site preparation shall be loss of vegetation or change in land use from agriculture land use to industrial land use for a parcel of land. The drill site preparation will last for 2-4 weeks.

##### 4.4.1 *Mitigation Measures*

- Necessary efforts will be made during selection of drill site to minimize disruption of current land use to the extent possible.
- Necessary restoration efforts will be made during decommissioning and site closure to restore the site back to its original condition to the extent possible.
- Proper restoration of site will be carried out to bring the physical terrain, soils and vegetation, as closely possible, to their original condition after target drilling activity are accomplished.
- On completion of works (in phases), all temporary structures, surplus materials and wastes will be completely removed till 1m below the surface.
- Temporary new approach roads can be constructed and existing roads can be improved, if required, for smooth and hassle free movement of personnel as well as materials and machineries.
- Optimization of land requirement through proper site layout design will be a basic criteria at the design phase.


#### 4.5 Soil Quality

During site preparation the topsoil will be removed from the drilling site and the approach road, which contains most of the nutrients and organisms that give soil productivity. This will in turn result in minor changes of topsoil structure Soil quality may be affected by setting up of rig and associated machinery and will continue till the site is restored to its original condition Contamination of soil can result from the project activities if certain operations like storage of chemicals and fuels, cement and mud preparation, spent oil and lubricants are not managed efficiently Improper storage of drilling waste and return/unused drilling mud at the on-site waste disposal facility can also result in contamination of the soil.

##### 4.5.1 *Mitigation Measures*

- Store, preserve and protect topsoil separately to use it during restoration period.
- Carry out adequate restoration of soil at the drilling site, to the extent possible using the soil stored from piling and excavation activities.



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- Dispose drilling mud and drill cutting temporarily in an impervious HDPE lined pit for evaporation carefully so that there is no spillage.
- Management of spilling of contaminants such as oil from equipment's, cement, drilling mud, and etc. on the soil.

#### 4.6 Socio Economic

Although the level of existing communications and support services in the area are considered adequate based on the population density, establishment of the proposed project would further strengthen the road network and access to some of the remote areas with all-weather roads would be of distinct beneficial impact. The overall impact is considered to be positive.

Impact on health due to emissions and noise from drilling activity has been assessed to be minimal. In addition employees working at the drill site would be provided protective devices like ear plugs/ear muffs for ensuring minimum impact on human health.

For most potential drilling sites in the exploration area, it should be possible to avoid impact on existing arable land. By following the compensation procedures and by observing common courtesy, impacts on existing use and benefit rights holders can be minimized.

#### 4.7 Flora & Fauna

Impact on the ecology of the study area will vary with the proximity of the habitats from the drilling locations. However, the impacts are of temporary nature, which will last for few days at each drill location during the exploratory drilling activities and will thus allow subsequent recovery after the activities stops.


##### 4.7.1 *Possible Biological Impacts of proposed Project*

- Impact on terrestrial fauna due to noise.
- Project infrastructure and well development will disturb agriculture land of site.
- Drilling fluids, spillage, leakage and well treatment may produce chemical spillage which will disrupt agriculture of nearby farm.
- Drilling activity may increase deposition of dust and dust settling on the vegetation may alter or limit plants' abilities to photosynthesize and/or reproduce.

##### 4.7.2 *Mitigation Measures*

- Acoustic enclosure shall be provided to D.G. set to reduce the noise intensity during the drilling operation.
- Development of plantation of native species to substitute the access cutting, site preparation will provide habitat, food and breeding areas to birds, small animals and insects.



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- Use existing facilities (e.g. Access Roads) to the extent possible to minimize the amount of new disturbance.
- Avoid use of unnecessary lighting at night to avoid attracting avifauna.

#### 4.8 Solid Waste

Major sources of solid waste at the proposed well sites will be construction waste, drill cuttings, disposed mud, waste oil and other domestic waste. Approximately 150-200 m<sup>3</sup> of drill cuttings (earth cuttings), devoid of any oil, will be generated at site in each Well. The drilling rig system to be employed for drilling will be equipped for the separation of drill cuttings and solid materials from the drilling fluid. The drill cuttings, cut by the drill bit, will be removed from the fluid by the shale shakers (vibrating screens) and centrifuges and transferred to the cuttings containment area and will be disposed off in accordance with Notification dated 30th August 2005 - G.S.R 546 (E).

Small amounts of solid wastes will be generated during normal operation at the drilling rig. The wastes will be disposed on compliance with local and national legislations. Spent waste oil will be stored in a secure paved area and disposed to MoEF/ APPCB approved waste oil recyclers. Drill cuttings and sludge from drilling mud to be buried within the impervious lined pit and covered with soil as part of the site abandonment plan. Biodegradable waste arising from kitchen and canteen activities to be scientifically composted and the bio-manure so generated to be used for green belt development.

#### 5.0 Analysis of Alternatives Sites

Development drilling of wells for oil and gas resources is site specific in nature hence no alternative site has been considered.


#### 6.0 Environmental Monitoring Program

A detailed post project monitoring in respect of air, water, soil, land use, occupational noise, etc. to assess the changes has been evolved covering various phases of project advancement. A network of sampling locations around the operational facilities will be established. The monitoring shall include the compliances to legal and statutory controls imposed on the operation as well as other corporate commitment to responsible environment management. A detailed wastes management plan with monitoring program will be in place during various phases of activity. The summary of monitoring programme is given in **Table-4**

**Table-4: Summary of Monitoring Program**

SI. No.	PARAMETERS	SCHEDULE	LOCATION
1	Air quality monitoring	24 hourly Monitoring will be carried out once in a month during drilling process or Monitoring as per State Pollution Control Board (PCB) conditions	2 in core zone 1 in buffer zone



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SI. No.	PARAMETERS	SCHEDULE	LOCATION
2	Noise quality monitoring	State Pollution Control Board (SPCB) conditions or once in month or entire drilling activity life cycle	Core & Buffer zone
3	Water quality monitoring	State Pollution Control Board (SPCB) conditions or once in a month during entire drilling activity life cycle	Surface water bodies including seasonal streams nearby and ground water from nearby villages
4	Soil quality analysis	State Pollution Control Board (SPCB) conditions or once in a month during entire drilling activity life cycle	4 locations from the area around the project site
5	Green belt / Plantation	Once in a year	Plantation area
6	Socio Economic Developmental activities	As per need based assessment	Study area

## 7.0 Environmental Risk Management

The hazard potential of oil and gas and estimation of consequences in case of their accidental release during drilling has been identified and risk assessment has been carried out to quantify the extent of damage and suggest recommendations for safety improvement for the proposed facilities. Risk mitigation measures based on MCA analysis and engineering judgments are incorporated in order to improve overall system safety and mitigate the effects of major accidents.


An effective Disaster Management Plan (DMP) to mitigate the risks involved has been prepared. This plan defines the responsibilities and resources available to respond to the different types of emergencies envisaged. Training exercises will be held to ensure that all personnel are familiar with their responsibilities and that communication links are functioning effectively.

## 8.0 Project Benefits

The project benefits are summarized below;

- The proposed exploration program will establish hydrocarbons in the block. The development of the oil field will result in considerable growth of service sector and will also generate new industrial and business opportunities in the area. Small and medium scale industries may be developed as consequence.
- The major benefits of the project include reduction of the oil import bill of the nation as well as reduction of the imbalance in oil production and consumption.
- The commercial development will also lead to investment in AP, bringing oil and gas revenues both to the State and to the Central Government. The presence of PFH in the region will substantially improves the socio-economic conditions of the region.



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- The proposed exploration drilling program is expected to generate local employment in the order of 20 to 40 unskilled and semi- skilled people, for a period of approximately 3 months at each drilling site location. While this benefit is small by most standards, it is a significant employment opportunity in the block.
- Development of ancillary activities resulting into indirect jobs and skills of local manpower.

## 9.0 Environmental Management Plan

### 9.1 Removal of Equipment and Material

After completion of the drilling activities, the well will be capped with a wellhead in place, but all other equipment and materials will be removed from the site. The site would be returned to its original form in most environment friendly manner. All empty drums, wastes, used and unused drilling fluids, fuel and lubricants will be removed from the drilling site. Water supply and effluent discharge hoses and associated equipment will be removed. The access road(s) would be reinstated.

### 9.2 Decommissioning upon Abandonment

In the event that no economic quantities of hydrocarbons are found, a full abandonment plan will be implemented for the drilling sites in accordance with the applicable Indian petroleum regulations. The well will be capped and the land would be handed over back to the owners in the original form.

### 9.3 Management of Drilling Wastes

The major waste product of a drilling operation is the generation of rock cuttings with residual mud adhering to the drill cuttings and spent drilling fluid. Approximately 150-200 m<sup>3</sup> of drill cuttings (earth cuttings), devoid of any oil, will be generated at site in each Well would need to be disposed off.


Project proponent proposes to use internationally followed methodologies while drilling with Water Based Muds (WBM). The mud will be reused after its separation from the cuttings. A mud mixing tank will be set up at the drilling site with a collection system so that any spill of chemicals will be collected.

The spilled oil may be reused in the mud preparation. The residual drilling fluids will be reused in the drilling campaign to the maximum extent and the drilling fluid which can not be further used will be discarded as per procedure.

### 9.4 Management of the Solid Wastes

Small amounts of solid wastes will be generated during normal operation at the drilling rig. The wastes will be disposed on compliance with local and national legislations. Spent waste oil will be stored in a secure paved area and disposed to MoEF/ APPCB approved



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waste oil recyclers. Drill cuttings and sludge from drilling mud to be buried within the impervious lined pit and covered with soil as part of the site abandonment plan. Biodegradable waste arising from kitchen and canteen activities to be scientifically composted and the bio-manure so generated to be used for green belt development.

#### 9.5 Management of Wastes Disposal Sites within Drill Site

The project proponent will dispose the drill cuttings, drill mud and waste water generated during the drilling operations into the lined pits of various sizes and undertaking plantation within the drill site particularly on the reclaimed pits will be undertaken.


The EMP provides a delivery mechanism to address potential adverse impacts, to instruct contractors and to introduce standards of good practice to be adopted for all project works. For each stage of the program, the EMP lists all the requirements to ensure effective mitigation of significant biophysical and socio-economic impacts identified in the EIA. The EMP covers the following;

- The timing for implementation of the action to ensure that the objectives of mitigation are fully met.
- The parameters that will be monitored to ensure effective implementation of the action.
- A comprehensive listing of the mitigation measures (actions) that PFH Oil & Gas will implement.
- Budgetary Allocation for Environmental Protection measures will be Rs.10,00,000 for each well.

#### 10.0 Summary & Conclusion

The study brings out the following points;

- The drill site after completion of drilling operations shall be reinstated to its original condition as soon as possible. The proposed activities are not likely to have any significant adverse effect on the environment and the neighboring population.
- The sources of air emissions include diesel engines/ generator sets, flaring of natural gas at drilling site during well testing. It was observed that the ambient air quality due to proposed activities is not expected to cause an effect on vegetation and human settlements in the vicinity of the operational sites.
- The noise generated due to the diesel engines operating the rig along with the mud circulation system is considered to be significant in the vicinity of the noise generating equipment only. This can be mitigated satisfactorily by the workers wearing ear protection while working. This noise is transient & temporary and lasts for a short period.
- The proposed drilling activities will not cause any significant adverse effect on water resources. Characteristics of wastewater discharged from the drilling operations shall meet the prescribed norms specified by CPCB. Thus, since all emissions shall be within acceptable limits, no adverse impact is anticipated on the water resources.

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- The proposed drilling activities shall generate indirect employment in the region due to the requirement of workers in supply of raw material, auxiliary and ancillary works, which shall marginally improve the economic status of the people. The activities shall result in an increase in local skill levels through exposure to drilling technology.
- In the event that commercial quantities of hydrocarbon reserves are discovered, more long-term employment opportunities would be generated. Besides, the hydrocarbons brought to the surface shall help in contributing the ongoing efforts of the government to meet the national demand of petroleum resources.
- The risk of occupational hazards, personal injuries, accidents during rig building and operation shall be very less as safety measures shall be adequately implemented by PFH Oil & Gas Pvt. Ltd.

Thus, it can be concluded on a positive note after the implementation of the mitigation measures as suggested in EMP/DMP, the proposed activities of PFH Oil & Gas Pvt. Ltd. shall have overall beneficial impact on local population