

# EXECUTIVE SUMMARY

## VEDANTA LIMITED (Division: Cairn Oil & Gas)

Onshore Oil and Gas Exploration and Appraisal in  
AA-ONHP-2017/14 Block in Karimganj, Hailakandi,  
Cachar Districts of Assam and Kolasib District of  
Mizoram



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### **PREPARED BY** **SV ENVIRO LABS & CONSULTANTS**

Visakhapatnam

Phone: 0891-2755528, Fax: 0891-2755529

Email: [svenviro\\_labs@yahoo.co.in](mailto:svenviro_labs@yahoo.co.in)

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## INTRODUCTION

Vedanta Ltd. (Division: Cairn Oil & Gas) has been allocated the AA-ONHP-2017/14 hydrocarbon block under the OALP (Open Acreage Licensing Policy) by MoP&NG, Govt. of India. RSC (Revenue Sharing Contract) has been signed between Vedanta Ltd and MoP&NG on 1st October, 2018 for the exploration and exploitation of hydrocarbons. Vedanta Ltd. (Division: Cairn Oil & Gas) proposes to carryout exploratory and appraisal drilling of 24 wells and setting up of Early Production Units (EPUs)/ Quick Production Units (QPU) in AA-ONHP-2017/14 block.

SV Enviro Labs & Consultants a NABET-QCI Accredited firm has been entrusted to conduct an Environmental Impact Assessment (EIA) for the proposed activities in AA-ONHP-2017/14 hydrocarbon block. The application (Form-1, proposed ToR and PFR) was submitted on 10<sup>th</sup> April, 2019. The MoEF&CC approved the standard ToR for the proposed project vide F.No. IA-J-11011/148/2019-IA-II(I) dated 13<sup>th</sup> May, 2019.

## BLOCK LOCATION & ACCESSIBILITY

The AA-ONHP-2017/14 block is located in Karimganj, Hailakandi, Cachar districts of Assam and Kolasib district of Mizoram. It encloses an area of 1719 Sq. Km. out of which 1716.5 Sq. Km. falls under Karimganj, Hailakandi and Cachar districts of Assam and the remaining 2.5 Sq. Km falls in the Kolasib district of Mizoram. Proposed well Locations in Block AA-ONHP-2017/14 on SOI Toposheet given in Figure 1.

Major portion of the block is traversed by two main roads, i.e. NH-154 which connects Badarpur with Hailakandi and the SH-39 which connects Karimganj-Hailakandi-Silchar. Majority of the wells can be accessed by Silchar-Hailakandi road and Karimganj road. Silchar is the main railway station for getting access to the rest of the block. The nearest airport to the block is Silchar Airport, which is approximately 21.68 km from the block boundary. Borail Wildlife Sanctuary ESZ boundary is at a distance of 8.76 km from the proposed block boundary.



## PROJECT ACTIVITIES

The various activities involved as a part of the drilling of exploration wells are described in detail in the subsequent sections.

### *1. Site Selection*

The seismic data interpretation of the seismic survey would decide the exact locations of the drilling well. Field surveys will be carried out to earmark the drill site location maintaining maximum possible distance from any settlement, sensitive receptors.

### *2. Site preparation*

Site preparation will involve all activities required to facilitate the operation of the drilling rig and associated equipment and machineries. At the initial stage, the drilling site will be elevated to about 2.0 m from the existing ground level with minimal clearance of existing ground vegetation. The loose top soil will be removed by using mechanical means like bulldozer and saved at a nearby place for later use during site restoration. Levelling and compaction will be done with the help of graders and mechanical rollers. The land filling materials and rubbles will be required for the purpose of site preparation.

### *3. Drilling Activities*

The proposed drilling would be carried out by using a standard land rig or a “Mobile Land Rig” with standard water based drilling fluid treatment system. This rig will be suitable for deep drilling up to the desired depth of 5000 meters (TVDSS) as planned for the project. Additionally, there will be other ancillary facilities like Drilling mud system, ETP, Cuttings disposal, Drill Cementing equipment etc. and utilities to supply power (DG sets), water, fuel (HSD) to the drilling process and will be set up as a part of the project. Drilling and wash wastewater generated will also be stored at onsite HDPE lined pit.

### *4. Well Testing & Flaring*

During the exploration and appraisal drilling, where a hydrocarbon formation is found, initial well tests (generally about one month of duration) will be carried out to establish flow rates, formation pressure and other parameters. However, depending on the need, based on nature of the reservoirs, the exploratory and appraisal wells will be tested for longer/extended durations to ascertain the reservoir parameters. In case hydrocarbons are detected in the well, the quantity and quality will be tested.

**Associated Facilities** – Each drill site will be provided with facilities such as drilling rig foundation and cellar pit, waste and water storage pits, chemical storage area including fuel storages, drill cutting disposal pit, flare pit and modular/ mobile STPs, mobile ETP. The drill cuttings and spent mud pits will be provided with a HDPE lining for temporary storage. Adequate storm water drainage system also will be provided.

**Liquid Mud Plant (LMP)** – The Liquid Mud Plant (LMP) will be located at suitable location as may be required to prepare mud for the drilling operations.

**Hydraulic Fracturing Activity** – Hydraulic fracking may be conducted in wells with low permeability formation and the wells with low pressure. Fracking fluid will typically be 99% water and sand (or other granulated material) and approximately 1% gelled chemicals that will be pumped at a high rate (in excess of 20 bpm) and high pressure (up to 5000 psi) to fracture the formation and improve the well deliverability. Sites for the wells with more than 2 fracs per well (multi-stage fracturing) will have provision of additional space for water storage for better continuity of operation.

### ***5. Completion of Drilling***

On completion of activities, the well will be either plugged and suspended (if the well evaluations indicate commercial quantities of hydrocarbons) or will be killed and permanently abandoned. In the event of a decision to suspend the well, it will be filled with a brine solution containing very small quantities of inhibitors to protect the well. The well will be sealed with cement plugs and some of the wellhead equipment (Blind Flange) will be left on the surface (Cellar). If the well is abandoned it will be sealed with a series of cement plugs, all the wellhead equipment will be removed, by leaving the surface clear of any debris and the site will be restored.

**Appraisal**–When, exploratory drilling is successful, more wells (termed as Appraisal wells) will be drilled to determine the size and the extent of the field. The technical procedures and activities in appraisal drilling will be the same as those employed for exploration wells. Deviated or directional drilling at an angle from a site adjacent to the original discovery well may be used to appraise other parts of the reservoir

**Early Production Units (EPU)/ Quick Production Unit (QPU)** – In case of commercially viable discovery, EPU/QPUs will be installed for the processing of produced well fluid

processing and early production of up to 8000 BOPD crude oil and up to 1.6 MMSCFD associated natural gas. A QPU will be a packaged/ modular mobile unit and will mainly consists of a three phase separator & production heater or heater-treater, oil storage tanks, oil tanker loading system, produced water (PW) separation and disposal system, power generation (GEG or DG), utility systems such as fuel gas, flare & Inst. Air packages, firefighting equipment, etc. Each QPU capacity will be ~2,000 BFPD (Barrels of Fluid per Day).

**Camp Site** – Temporary camp site (porta cabin) for the drilling of exploratory (including appraisal wells are envisaged, which will be dismantled after drilling of the wells. At any point of time, it is anticipated that about 50 personnel per shift will be housed in the campsite during the well drilling campaign.

#### ***6. Decommissioning & closure of wells***

After the completion of the drilling activity, partial de-mobilization of the drilling rig and associated infrastructure will be initiated. As discussed earlier, well testing may be carried out immediately after the drilling is completed. The complete de-mobilization of the facilities at site will happen once well-testing completed successfully. This will involve the dismantling of the rig, all associated equipment and the residential camp, and transporting it out of the project area. If no indication of any commercially viable amount of oil or gas is encountered either before or after testing, the well will be declared dry and accordingly will be plugged of and abandoned, and the site will be restored in line with applicable regulations and good industry practice.

### **PROJECT UTILITIES AND RESOURCE REQUIREMENTS**

#### ***Land Requirement***

An area of approximately 300m x 300m would be taken on temporary short-term lease basis for the preparation of well pad (drill site) for exploratory and appraisal wells. For the preparation of suitable access roads connecting to well pads, accommodating OHL and other utilities in future, a width of 30m (approx.) Right of Use (RoU) will be required.

#### ***Power requirement during exploratory and appraisal well drilling***

The power requirement for a drilling site and the campsites will be provided through diesel generator (DG) sets. Two (2) Nos. of DG set of 2x350 kVA (one working and one standby) capacities will be used at Camp site. Three (3) Nos. of DG set of 3x1000 kVA (two working

and one standby) or 2 x 1850 kVA\* (one working and one standby) capacities will be used at Drilling site. Two (2) Nos. of DG set of 2x100 kVA (one working and one standby) capacities will be used at Radio Room.

\*Depending on the rig capacity & rig availability during E&A (exploratory & appraisal) drilling phase

***Power requirement during early production***

There will be 1 Gas Engine Generator (GEG) of 1MW output and D.G. set of 500 KVA (emergency) for each early production unit/quick production unit.

***Water requirement during exploratory and appraisal well drilling***

The water requirement in drilling rig is mainly meant for preparation of drilling mud apart from washings and domestic use. While former constitutes majority of water requirement, latter or the water requirement for domestic and wash use is minor. The water requirement for the water based drilling mud (WBM) preparation is envisaged to be of 600-1000 m<sup>3</sup>/well and 150-300m<sup>3</sup>/well will be required for preparing the synthetic based drilling mud (SBM). For domestic consumption, approx. 20 - 30 m<sup>3</sup>/day water will be required during drilling period and 25-50 m<sup>3</sup>/day for drilling operation like engine cooling, floor/equipment/string washing, firefighting storage / make up etc. The water requirement at the drilling sites during construction and drilling phase will be met through procurement of surface water from approved local sources/suppliers and partly through re-cycling of treated water from ETP.

***Water requirement during early production***

The water requirement during early production will be 15-18 m<sup>3</sup>/day for each early production unit/quick production unit.

***Manpower***

Most of the workforce will be from local/nearby areas. During the site preparation for drilling, approximately 30-35 workmen will be employed per drill site. During the drilling phase, about 50 workmen per shift will be working on site. This will include technical experts, who will be responsible for various drilling related activities and some technical manpower. It is anticipated that, at any given time, there will be about 80 - 100 personnel working on site including technical staff, drilling crew, security staff etc.

## BASELINE ENVIRONMENTAL STATUS

The study of the baseline environmental status helps in assessing the existing environmental conditions and identifying the critical environmental attributes. The study of the physical, biological and socio-economic environment of the Block and an area within a radius of 10 km (study area) comprises of the baseline environment. Primary and secondary data were collected for the EIA study.

### Physical Environment

#### *Climate and Meteorology*

The study area falls under Humid Subtropical zone according to Koppen's classification of climate zones. Winter and early summer are long and dry; summer is exceedingly hot leading to heat waves. The rainy season lasts from June to September. Wind speed is high and found mostly between 2.4 – 1.0m/sec for all the months. The wind speed during summer recorded is high, and during rainy season, and winter recorded low. The predominant wind direction is from NE and East throughout the year.

#### *Air Quality*

The ambient air quality representing PM<sub>10</sub>, PM<sub>2.5</sub> Sulfur Dioxide (SO<sub>2</sub>), Nitrogen Oxides (NO<sub>x</sub>), Carbon Monoxide (CO) was monitored at eighteen different locations for 24 hours twice a week from March'19 to June'19. Volatile Organic Carbons (VOCs), Methane (CH<sub>4</sub>), non-methane hydrocarbons (NMHCs), Ozone, Ammonia, Lead (Pb), Benzene (C<sub>6</sub>H<sub>6</sub>), Benzo(a)pyrene (BaP), Arsenic (As), Nickel (Ni) were monitored for the same period. All the parameters were found to be below the National Ambient Air Quality Standards (NAAQS), 2009. The average 24 hourly PM<sub>10</sub> at monitoring locations ranged between 30.4-73.1 µg/m<sup>3</sup> (NAAQS-100 µg/m<sup>3</sup>). The average 24 hourly PM<sub>2.5</sub> at monitoring locations ranged between 9.9-42.2 µg/m<sup>3</sup> (NAAQS-60 µg/m<sup>3</sup>). The average 24 hourly SO<sub>2</sub> at monitoring locations ranged between 6.1-13.1 µg/m<sup>3</sup> (NAAQS-80 µg/m<sup>3</sup>). The average 24 hourly NO<sub>x</sub> at monitoring locations ranged between 6.8-14.8 µg/m<sup>3</sup> (NAAQS-80 µg/m<sup>3</sup>). Lead (Pb), Benzene (C<sub>6</sub>H<sub>6</sub>), Benzo(a)pyrene (BaP), Arsenic (As), Nickel (Ni), HC (methane and non methane Hydro Carbon), Volatile Organic Carbon (VOC) are remained below detection limit (BDL) in the study area.

#### *Noise Quality*

The noise quality was monitored for 24 hours at eighteen locations close to the drill sites. The ambient noise quality at day and night was in compliance to the Noise Limits set for the



residential area as per Noise Pollution (Control and Regulations), 2000. The daytime noise level was found in the range between 49.0-62.3 dBA whereas the night time noise level was found in the range between 31.4-47.7 dBA □

### ***Geology***

Geologically, the region can be divided into two major groups, i.e. unconsolidated deposits comprising alluvial deposits of Sub-Recent to Recent age and semi-consolidated Tertiary deposits of Bhaban, Bokabil, Girujan/ Tipam, Dupitila and Dihing formations of Miocene to Pliocene age. The alluvial deposits containing in the central parts mainly comprises of sand, silt and clay with gravel and occasional coal bands. The semi-consolidated rocks are exposed in the form of hillocks comprising shale, sandstone, ferruginous sandstone, mottle clay, pebble bed and boulder beds etc.

### ***Hydrogeology***

The hydrogeological formations are Alluvium, Dupitila and Tipam formations. Alluvial formation occurs along the banks of main rivers with thickness varying from 10 to 15 m.

In Karimganj valley there are six major aquifers within the depth of about 260 m. The cumulative thickness of aquifer zones is to a depth of 200 m. The aquifers are persistent throughout the valley with minor facies variations. The depth to water level during pre-monsoon period in phreatic aquifer varies from 0.35-2.80 m bgl and during post monsoon varies from 0.19-3.88 m bgl.

In Hailakandi district ground water occurs under unconfined condition in alluvial formation. In Dupitilla and Tipam formations ground water occurs under unconfined, semi confined to confined conditions.

In Cachar district ground water occurs in phreatic condition in shallow aquifer and in semi-confined condition in deeper aquifer. Flow of ground water is from the North to South in northern parts and from South to North in southern parts of the district. The area mostly represents a water logged area. The pre-monsoon water level is 1.05 m bgl while the post-monsoon water level is 1.62 m bgl.

### ***Groundwater Quality***

Groundwater was collected and analyzed as per IS: 10500:2012 from eighteen locations in the studyarea. All the parameters analyzed was under the acceptable and permissible limit of IS: 10500:2012except TDS, Chloride, Hardness that was found to be exceeding the

permissible limit as per IS:10500:2012 in one sample. Heavy metals were found to be below detection limit.

### ***Surface Water Quality***

Surface water was sampled from eighteen representative locations. The water samples were analyzed and compared as per IS 2296. The pH of the surface water samples varied from 4.1-6.6. The DO levels at all the locations exhibited values ranging from 4.2-7.3 mg/l. Chloride and nitrate content of all collected surface water sample ranges from 6.8-9.9 mg/l and 0.13-0.36 mg/l respectively. The total coliform count of the surface water samples varied between (380 MPN/100ml) to 560 MPN/100ml. Though the water quality is not coming under any class designated by CPCB Water Use Criteria, but during the field visit it has been observed that the water is being used for irrigation, bathing, cleaning and for catching fishes.

### ***Land Use***

The land use of the study area shows that majority of the land (48%) in the area is open scrub. 29% land is used for agricultural purposes. 6% of land is occupied by water bodies. 6% of land is occupied by Roads and 6% of the land by Railways whereas Built up area constitutes only 5% of the total land.

### ***Soil Quality***

The soil of the region is almost the same like that in the Brahmaputra valley. It is characterized by an abundance of marshes and low lands, soil of which contains a large percentage of organic matter. The alluvial soil of the district is very fertile. The primary analyses of the soil sampled from 18 locations in the study area shows that the soils are clayey and acidic in nature and are high in available nitrogen content. The micronutrient levels observed in the soil samples do not indicate any extraordinary enrichment of metals or contamination from any external sources.

### ***Natural Hazards***

The study area lies in Zone V of the Bureau of Indian Standard (BIS) 2000 which might encounter earthquakes of maximum intensity. It was revealed from Flood Hazard Maps (1998-2007) prepared by National Remote Sensing Agency (NRSA) that part of the AA-ONHP-2017/14 Block is flood prone, but majority of the proposed exploratory wells are not located at the flood prone zones.

### **Biological Environment**

Baseline Survey and Secondary data received from Forest Department's Website and other published and unpublished document regarding sensitive ecological habitat and sensitive flora and fauna in the study area revealed that the block falls in part of Katakhal Reserve Forest and Inner line Reserve Forest. However, none of the exploratory/ appraisal wells will fall in forest area. The study area has an undulating topography characterized by hills, hillocks (Locally known as tillah), wide plains, and low-lying waterlogged areas (locally known as beels). The vegetation is mixed evergreen and deciduous forest and in this region, forests are degraded due to development of Tea Estates and Rubber plantations.

### **Traffic Survey**

The vehicular traffic was monitored on National Highway NH-154, connects Badarpur with Hailakandi, NH-53 which connects Silchar with Karimganj and on SH-39 which connects Karimganj-Hailakandi-Silchar on hourly basis for 24 hours once during the study period at six locations i.e. Srikona (NH-53), Duarbond (SH-39), Hailakandi (NH-154), Lalapur (NH-154), Chandrapur (SH-39) and Ramakrishna Nagar (Bishnunaga-Bhairabnagar road). Movement of traffic shall be very minimum which shall be used only for mobilization of manpower and consumable materials on continuous basis. Road Safety & Traffic Management Plan outlines specific measures would adopted and implemented by Vedanta Limited (Division: Cairn Oil & Gas) to mitigate any potential impact on community health and safety that may arise out of movement of vehicles and transportation of drilling rig and other heavy equipment during construction, drilling and decommissioning of well sites.

### **Socioeconomic Environment**

The socio-economic baseline has been prepared on the basis of available secondary sources of information was generated through site observation, individual interviews and focus group discussion with the people living in the villages identified to be within the study area. In addition to this, Field survey was conducted in the villages from 115 participants. It has also been undertaken to assess their awareness and perceptions about the proposed project. Random interactions were also made with the local communities, school teacher, PHC centre, stake holders, and anganwadi workers.

The entire Cachar district is divided into two Sub-divisions: such as Silchar and Lakhimpur. Again each sub-division is divided into revenue circles and under revenue circles there are Mouzas comprising revenue villages. The district comprises of five Revenue Circles, Katigora, Silchar, Udaband, Lakhimpur and Sonai covering 1040 villages.

From Karimganj, there are 7 towns (2 statutory towns and 5 Census towns) in the district. The district is comprised of 936 villages with 7 Community Development Blocks. The district possesses 5 Revenue Circles namely, Karimganj, Badarpur, Nilambazar, Patharkandi and Ramkrishna Nagar. The district area is divided among 7 Police Stations, namely Karimganj, Badarpur, Patharkandi, Ramakrishana Nagar, Ratabari, Nilambazar and Bazerichera.

The district Hailakandi is situated in the Barak Valley region of Assam. It comprises 4 Revenue Circle with 331 villages. It has 5 Community Development Blocks. There is no any jurisdictional changes taken place during 2001-2011. The district has 3 towns (2 statutory towns and 1 census towns).

The average literacy rate is Cachar in 79.34, Hailakandi, literacy rate of in 2011 were 74.33 and Karimganj is at 78.22.

## ENVIRONMENTAL IMPACT ASSESSMENT AND MITIGATION MEASURES

The potential impacts of the project on different components of the environment was systematically identified and evaluated for significance. The principal concerns that emerged are:

### Impact on Air Quality

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

- Operation of vehicles and construction/ site preparation machinery
- Construction/ site preparation material transport, storage and handling

The operation of DG sets, movement of vehicles and machineries during construction/ site preparation and drilling at drill sites will result in the generation of air pollutants viz. PM, NO<sub>x</sub>, SO<sub>x</sub> and CO which may affect the ambient air quality temporarily. Air pollutants like NO<sub>x</sub> will also be generated as a result of flaring of natural gas.

### *Mitigation measures*

- All vehicles used for transportation of loose and friable materials will not be loaded over the freeboard limit and will be covered.
- Water spraying will be done on the access roads to control re-entrained dust during dry season.
- Equipment, machinery and vehicles having inbuilt pollution control devices will be considered as a measure for prevention of air pollution at source.

### **Impact on Noise Quality**

Potential impact on noise quality is anticipated from operation of construction/site preparation machineries/equipments and vehicular movement during site preparatory activities. Operation of heavy machinery/equipments and vehicular movement during site preparatory and road strengthening/construction activities may result in the generation of increased noise levels. Operational phase noise impacts are anticipated from operation of drilling rig and ancillary equipment, shale shakers, mud pumps and diesel generators.

#### ***Mitigation measures***

- Periodic maintenance of vehicles and machinery to be undertaken
- Providing Personnel Protective Equipments (PPEs) like ear plugs/muffs to workers at site.

### **Impact on Soil Quality**

The soil of the block in the Assam province is silty alluvial in nature thereby contributing to the agricultural productivity of the region. Stripping of top soil is therefore likely to affect the soil fertility of the well site. Potential impact on soil quality may result from storage and handling of fuel, lubricants and from storage and handling of drilling mud and drill cuttings. However, such impact is considered to be temporary taking into account the fact the proper reinstatement of site will be undertaken by the proponent in case the exploratory wells are not indicative of any commercially exploitable hydrocarbon reserves.

#### ***Mitigation measures***

- Carrying out adequate restoration of soil, to the extent possible;
- Implementing adequate sediment control measures to prevent discharge of untreated surface run-off characterized by increased sediment load to abutting agricultural land.
- Ensuring proper storage of drill cutting and chemicals to prevent any potential contamination from spillage.

### **Impact on Topography and drainage**

Potential impact on drainage and topography viz. alteration of drainage pattern, water logging etc. are anticipated during well site preparation, widening/strengthening of access roads and surface runoff from construction sites. There would be slight change in topography at the drill site as it will be elevated from ground level to avoid storm water accumulation. This may

lead to alteration of onsite micro-drainage pattern leading to potential problems of water logging in the agricultural land and settlements abutting the drill site.

#### ***Mitigation measures***

- Leveling and grading operations will be undertaken with minimal disturbance to the existing contour, thereby maintaining the general slope of site;
- Loss of micro-watershed drainage, if any, is to be compensated through provision of alternate drainage.
- Disruption/alteration of micro-watershed drainage pattern will be minimized to the extent possible.
- Proper engineering control must be employed as mitigation measures so that the flow and the course of the stream will not be altered.

#### **Impact on Water Quality and Hydrology**

The surface run off from drilling waste (cuttings and drilling mud), hazardous waste (waste oil, used oil etc) and chemical storage facilities on open soil is likely to contaminate if allowed to flow into nearby water bodies viz. natural drainage channels, ponds etc.

#### ***Mitigation measures***

- Drainage and sediment control systems at the well site will be efficiently designed
- Proper treatment of all wastewater and produced water discharges will be made to ensure that they comply with criteria set by the regulatory body (MoEF&CC and SPCB/CPCB)
- All chemical and fuel storage areas, process areas will have proper bunds so that contaminated run-off cannot escape into the storm-water drainage system.

#### **Impact on Biological Environment**

Impact on the ecology will be mainly confined to drilling site and will vary with the proximity from the drilling locations. During the site preparation activities vegetation clearance would be nominal or minor. Efforts will be made to avoid areas of comparatively dense vegetation cover, unless absolutely essential. The land, in case the exploration drilling is unsuccessful, would be restored in its original condition.

#### ***Mitigation measures***

- Minimum clearance of vegetation during site preparation

### **Impact on Socio economic Environment**

The land requirement would be very less and on temporary short term lease and at a suitable distance from the settlements. If the identified lands are of private landowners then land lease mode will be applied and in case of govt. land, land allotment from Govt. to be applied. Initially temporary short term lease will be taken for 3-5 years for exploration purpose and in case of commercially viable discovery of hydrocarbon resources; the land lease would be converted into long term lease up to life of the project. Compensation to affected landowners for any loss of land, Vedanta Limited (Division: Cairn Oil & Gas) will ensure the livelihood of local community, if any affected by the proposed land take, are identified and compensated through adequate compensation.

The project will benefit the people living in the neighboring villages through direct & indirect employment opportunities associated with the various project activities and boosts the local economy.

#### ***Mitigation measures***

- Construction/ site preparation phase could lead to creation of direct/indirect employment and procurement opportunities.

### **Quantitative Risk Assessment**

The quantitative risk assessment has been done to provide a systematic analysis of the major risks associated with exploratory drilling activities in AA-ONHP-2017/14 Block. Oil spills, loss of well control/blow-out and process leaks constitute the major potential hazards of onshore drilling.

#### ***Risk mitigation measures***

- Necessary active barriers (e.g. Well-designed Blowout Preventer) be installed to control or contain a potential blowout;
- Weekly blow out drills be carried out to test reliability of BOP and preparedness of drilling team;
- Close monitoring of drilling activity be done to check for signs of increasing pressure, like from shallow gas formations;
- Penetration rate shall be monitored. In case of any drilling break, stop rotary table, pull out the Kelly, stop mud pump and check for self flow;
- Before starting drilling, hole should be centered to avoid touching of kelly with casing / wellhead and ensure that no damage is done to well head and BOP.

## **ENVIRONMENTAL MANAGEMENT PLAN AND MONITORING PLAN**

Vedanta Ltd. (Division: Cairn Oil & Gas) has formulated a Health, Safety and Environment (HSE) Policy for its operations. Through the HSE Policy, Vedanta Ltd. (Division: Cairn Oil & Gas) is committed to protect the health and safety of everyone involved in its operations, and the sustainability of the environment in which it operates. Vedanta Ltd. (Division: Cairn Oil & Gas) strives for continual improvement and the adoption of national/international codes and standards. Vedanta Ltd. (Division: Cairn Oil & Gas) aims at ensuring that all its operations comply with applicable health, safety and environmental laws, regulations and other requirements.

A comprehensive environmental monitoring plan has been developed for the project. Monitoring of ambient air quality, noise levels, soil and groundwater quality to be carried out by MoEF&CC/NABL/SPCB recognized laboratories during pre and post drilling operations.

### **Proposed CER Strategy**

As per MoEF&CC office memorandum number F.No 22-65/2017-IA-III dated 1st May, 2018, Corporate Environmental Responsibility requirement will be fulfilled.

## **PROJECT COST**

The total project cost for the proposed project activities in the AA-ONHP-2017/14 block is estimated to be around 560.0 crores.