

**Executive Summary of Draft
Environmental Impact Assessment
Report for Proposed Drilling of
Development Wells in
AA/ONDSF/Disaijan/2018 Block
located in Doom Dooma Taluka, Dist:
Tinsukia, Assam**

M/s Invenire Energy Pvt. Ltd (IEPL)

Project Proponent



EIA Consultant



Executive Summary

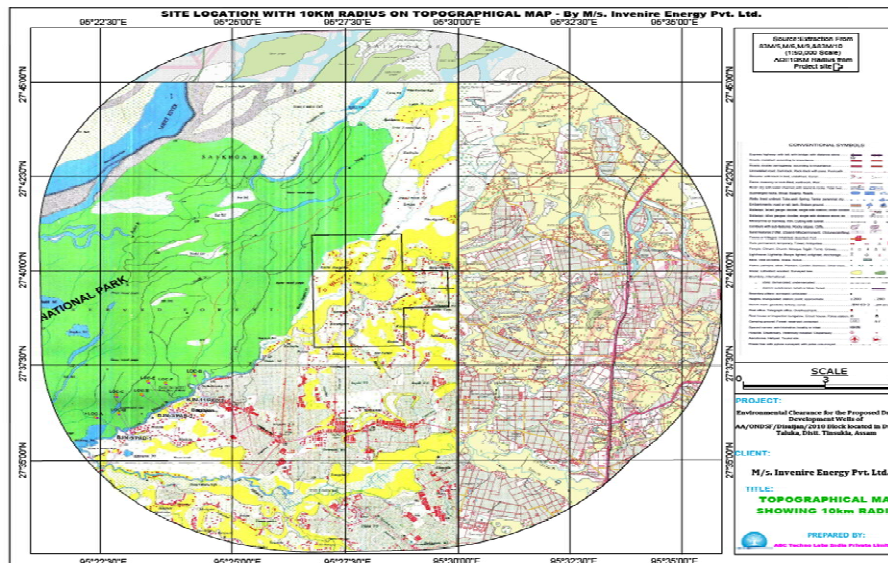
1.0 INTRODUCTION

Invenire Energy Private Limited (IEPL) is incorporated in India on 2nd September 2016. It is classified as Non-govt Company and is registered at Registrar of Companies; Chennai with a balanced portfolio has been engaged in Exploration, Production, EPC, O&M and Gas Business. Government of India has awarded Block AA/ONDSF/Disaijan/2018 (“Disaijan”) to Invenire Energy Pvt. Ltd (IEPL) under the Discovered Small Fields (DSF) Bid Round-II. Block AA/ONDSF/Disaijan/2018 (“Disaijan”) is located in Doom Dooma Taluka, District Tinsukia, of Assam State. The Revenue Sharing Contract (RSC) for the Block Disaijan was signed on 7th March 2019 and Petroleum Mining Lease (PML) was granted by the state Government of Assam on 17th January 2020.

As per EIA notification dated 14th September 2006, Proposed Drilling of Development Wells in AA/ONDSF/Disaijan/2018 Block is designated as “**Category A**” project and requires Environment Clearance (EC) from Ministry of Environment, Forest & Climate Change (MoEF&CC), New Delhi. The present proposal is classified under **Schedule 1 (b) - Offshore and Onshore oil and gas exploration, development & production**, Category ‘A’ according to EIA Notification 2006 & subsequent amendments. The Terms of Reference for the Project have been approved by MoEF&CC vide letter **F. No IA-J-11011/7/2021-IA-II(I) (Proposal No: IA-J-11011/7/2021-IA-II(I))** has been issued by MoEF&CC on **13th January 2021**.

2.0 BLOCK LOCATION AND ACCESSIBILITY

The block AA/ONDSF/Disaijan/2018 is located in Doom Dooma Taluka, Tinsukia district of Assam. The Contract Area consist of 21.26 Sq. Km. The Block is accessible through rail and road network. The Nearest Railway Stations is Bogapani Railway station and Nearest Airport is Dibrugarh Airport (66 Km from block boundary towards North Western direction).



Source: Survey of India

Figure 1: Topo Map (1:50000) showing the location of the Blocks

3.0 PROJECT DESCRIPTION

The proposed project will be following activities:

- Drilling of five development wells within the Disaijan Block, Tinsukia district of Assam
- Installation of EPS/QPF oil and gas processing facility having capacity of 2000 BOPD & 2 mmscf/d associated natural gas.

The development wells will be drilled to produce oil and gas from the reservoirs depth approximately 4300 m.

Land requirement: The approximate land requirement for each drill sites is 2.0 ha and land requirement for EPS/QPF is 1.0 ha. The land will be procured through long term lease. For laying of flowlines ROW of existing road will be utilized.

3.1 DRILL SITE PREPARATION

- Drill Site Selection and Procurement** - An initial assessment of the development well site will be carried out through analysis of satellite imageries. Field surveys carried out to earmark the drill site location maintaining maximum possible distance from any settlement and sensitive receptors. Ease of accessibility to the site will also be considered.
- Site Preparatory Works** - Detailed site surveys will be carried and the boundary of the drill site earmarked. Site leveling and excavation works will be carried out for site preparation. New approach roads to drill sites will be constructed or existing village roads will be strengthened/ widened to provide access for the drilling equipment and machinery.
- Rig Mobilization** -After completion of the construction activities and with the provision of the basic facilities, drill rig will be transported to the site. The drill equipments are designed as standard land rig or a "Mobile Land Rig" type, which facilitates quick mobilization and demobilization. Rig essentially comprises of a Drilling mud system, drilling cuttings separation system Cementing unit along with utilities to supply power (DG sets), water and fuel (HSD).

3.1.1 Drilling Operation

- The drilling process will involve drilling of the well across various stratigraphic levels and simultaneous data logging. Drilling shall be undertaken approximately 4300m depth and the size starting from around 26" and decreasing in depth up to 6", area 140m X 140m for each well.
- While drilling, if the formation pressure exceeds the hydrostatic pressure exerted by the drilling fluid, formation fluids break out in to the well bore. This is called kick. Primary means of well control is to have sufficient over-balance over formation pressure. For some reason if an unexpected over-pressurized formation is encountered while drilling and if the well control situation arises, rig is equipped with equipment to control this situation.
- Blowout prevention:** Uncontrolled "well control situation" eventually leads to a blowout. Blow out can cause a partial or total destruction of drilling rig. Blowouts are often associated with hydrocarbon spill followed by fire. This set of equipment is called "Blowout Preventers (BOP)". Blow Out Preventer consists of, "Annular Preventer", which can generally close on any size or shape of tubular in the well bore and closes the annular space between drill string and casing. Another type of blowout preventer is a "Ram Preventer".
- Drilling Mud:** Based on geological prognosis and predicted formation pressures, Water Based Mud (WBM) will be used for all the wells considering environmental constraints and hazards.
- Drilling operations continue until the predetermined total depth of the well is reached. The drill string is removed from the well bore to allow the insertion of logging tools, which are lowered all the way to the bottom of the hole by means of a special cable.

- f) **Well Testing & Flaring-** In case hydrocarbons are detected in the well, the quantity and quality will be tested. The fluids & gases coming out from the well will be flared. The flaring will be intermittent and last only for few days. However, for flaring all the flaring guidelines for onshore wells will be followed and the design, size and location of flaring stack will be decided based on surrounding habitations and the flaring guidelines."
- g) **Completing the well:** When drill-stem testing and well-logging operations have been completed and the results have been analyzed, the company management must decide whether to complete the well as a producing well or to plug it as a dry hole. If the evidence indicates that no oil or gas are present, or they are not present in sufficient quantity to allow for the recovery of drilling, completion, and production costs and provide a profit on investment, the well will probably be plugged and abandoned as a dry hole.
- h) **Site Closure and Decommissioning:** After completion of the drilling activity, partial demobilization 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.
- i) **Site Restoration:** All abandoned drill sites will be restored back to its near original condition. After decommissioning of site, it will be de-compacted and stored top soil will be overlaying on the de-compacted site with certain moisture conservation measures and seeding of leguminous plant for restoration of soil nutrient level naturally.

3.1.2 Operation of Early Production System (EPS)

An Early Production System (EPS) is a complete facility to produce oil and gas from discovered small fields. The fluid handling capacity of the EPS will of 2000 BOPD. A EPS/QPS will mainly consists of a three phase separator & heater-treater, electrostatic coalescer, oil storage tanks, oil tanker loading system, produced water (PW) degasser, PW treatment skid, PW pump, power generation & distribution system having GEG or DG, utility systems such as fuel gas system, flare system, Inst. Air package, diesel storage & distribution system, firefighting equipment, etc. and associated electrical, instrumentation & civil facilities.

All the equipment for treating the oil, gas and water such as separator, heater, scrubbers, storage, flaring, produce water treatment, metering & pumping are installed in skid mounted, inter-connected and commission on the site.

3.1.3 Resource Requirement

Water – For drilling water consumption will be 25 KLD/well. The water requirement for all the project activities will be sourced locally through approved/ authorized sources of surface water and/ or ground water (e.g. PHD bore wells, privately owned bore wells, Irrigation Dept./ Water Resources Dept. of State Govt.). In case, required water could not be sourced from locally available approved sources, ground water will be extracted after obtaining permission from CGWA/ State Govt.

For operation of EPS/QPF water requirement is expected to be about 15 KLD.

Power– The power requirement for each drill sites will be met through the DG sets. Two DG sets of 670 KVA each will be simultaneously operable and one will be kept as standby during drilling operation. A 134 KW generator will be made available for lighting at residential camp and other emergency requirements.

Labour– It is anticipated that, the total number of personnel involved in the drilling activities is expected to be about 50. Production facility: Installation work of EPS/ QPF and laying of flowlines will involve maximum 15-20 persons per day.

3.1.4 Project Cost

The cost of the project has been estimated to be about **INR 72 Crores**.

4.0 EXISTING BASELINE ENVIRONMENT OF THE PROJECT AREA

Baseline information about the Block was collated by review of other published literature, site surveys, stakeholder interactions and primary monitoring carried out during 9th October 2020 to 3rd January 2021 by ABC Techno Labs India Pvt. Ltd.

Site Settings: The project location falls in Doom Dooma Taluka, Tinsukia district, Assam. The proposed site is easily accessible through the rail and road network. The nearest Railway Station is Bogapani Railway station which is about 8.3 Km from the block boundary on West direction. Dibrugarh airport is about 66 Km from block boundary towards North Western direction.

Topography & Soil: The project area is almost flat topography with elevation varying 110-130 m above mean seal level. Physiographically the area is characterised by Brahmaputra River plains and hilly areas in the southern part, with gentle slope towards north-west.

Hydrology & Drainage: As per district Ground Water Brochure published by CGWB, Ground water occurs under unconfined and confined conditions saturating the fine to coarse sandy horizons mostly belonging to Tertiaries. Water table generally rests at depth of 4 m below land surface. The drainage pattern in this region is dendritic. In general, the slope of the area is towards west. The drainage density is moderately high indicating more runoff than infiltration from the areas at the eastern side of the area. Brahmaputra river passes through the block towards north west section of the block. Nearest well is about 1 Km from the river.

Climate and Meteorology: The predominant wind direction is from East & North-East direction during study period. The average temperature during study period in the site locations at Disaijan varied from 8.2°C to 36.1°C. The average relative humidity during study period in the site locations at Disaijan varied from 25% to 99%. The monthly wind speed in and around Disaijan during the study period (3 months) are found to be varied from 0 KMPH to 32 KMPH.

Ambient Air Quality: Out of the 8 locations, maximum and minimum concentrations of PM10 were recorded as 53 µg/m³ at Rupai TE (AAQ3) and 34 µg/ m³ at Keseruguri Gaon (AAQ4). Oxide of Nitrogen (NO_x) varies between 9.1 µg/m³ to 15.2 µg/m³ & Rupai TE (AAQ3) had maximum and Badal Pathar No.1 (AAQ1), Hatihal Gaon (AAQ2), Keseruguri Gaon (AAQ4) had minimum. Sulphur Dioxide (SO₂) varies between 5.1 µg/m³ (BDL) to 8.1 µg/m³ & Gatang Gaon (AAQ5) had maximum and Badal Pathar No.1 (AAQ1), Hatihal Gaon (AAQ2), Keseruguri Gaon (AAQ4) & Jakaichuk Gaon (AAQ7). The VOCs of all the location are Below Detection Level.

Ambient Noise Levels: Out of 8 locations, during daytime highest values of noise level 48.1 dB(A) at Gatang Gaon (N6) and lowest value 45.4 dB (A) was observed at Keseruguri Gaon (N4). Noise levels observed to fall in the range 39.5 to 42.6 dB (A) during the night time.

Water Quality: Out of 8 locations of Ground water, pH varied from 6.51 to 7.11. TDS varied between 60.5 to 184 mg/l. Total Hardness varied from 30 mg/l to 92 mg/l. Chloride varied from 15 mg/l to 46 mg/l and Nitrate varied from 1 to 7 mg/l. Heavy metals like Arsenic, Manganese, Chromium, Lead, Mercury, Cadmium were found to be below detection limit at all locations. Total coliform found to be absent in all samples.

Out of 8 locations of Surface Water, pH varied from 6.98 to 7.54. Turbidity varied between 0.5 to 1.6 NTU. TDS varied from 80 to 153.6mg/l. BOD found between BDL (<2 mg/l) to 2.4 mg/l.

Dissolved Oxygen varied from 6.7 mg/l to 7.3 mg/l. Heavy metals like Chromium, Mercury and Lead were found to be below detection limit at all locations. Total Coliform count varies between 102 to 800 MPN/ 100ml.

Soil Quality: Out of 6 locations, pH varied from 5.97 to 6.54. Electrical conductivity found within a range from 0.078 to 0.154 mS/cm. The texture of soil is predominantly Sandy loam in most of the places. Available Nitrogen ranged from 152 kg/Ha to 241 kg/Ha, Potassium ranged from 248 kg/Ha to 366 mg/kg, Available Phosphorus ranged from 26.9 kg/Ha to 41.8 kg/Ha. Soil Organic Carbon varied from 0.57% to 0.72%, which indicates the very low level of organic matter.

Ecology: Dibru Saikhowa National Park is within the 10 Km surrounding study area towards North Western side and Namdapha National Park boundary is 43 Km from AA/ONDSF/Disaijan/2018 Block boundary. There is no reserve forest/protected forest within the Disaijan block boundary. Study conducted within block area and some important tree species are *Dipterocarpus macrocarpus*, *Dipterocarpus turbinatus*, *Shorea assamica*, *Palaquium polyanthum* *Erianthus ravannae*, *Mesua ferrea*, *Shorea robusta* etc. Most dominant shrubs in the study area were, *Lantana camara*, *Calotropis procera*, *Calamus flagellum*, *Calamus floribundus*, *Vitex negundo* and *Bambusa tulda* etc. Among the herb species observed are *Cynodon dactylon*, *Imperata arundinacea*, *Catharanthus roseus*, *Mimosa pudica*, *Mucuna pruriens*, *Tridax procumbens*, *Alysicarpus vaginalis* etc. About 17 Mamalian species, 78 avifauna, 15 reptiles & amphibians were recorded within the study area. **Schedule I species - *Nycticebus bengalensis* (Bengal slow loris), *Hoolock hoolock* (Western Hoolock Gibbon) and *Varanus bengalensis* (Bengal Monitor)** which are found near the Dibru-Saikhowa National Park area.

Socio-economic Environment: The study area located inside Tinsukia district in Assam State under taluka Doom Dooma which includes total 36 villages. Total population in the study area is 39110 with 19756 male and 19354 female populations with sex ratio of 980 female per 1000 males and a literacy of 49.64%; Scheduled Castes and Scheduled Tribes accounted for 740 (1.89%) and 2222 (5.68%) of the total population respectively. There were a total of 11344 (29.01%) main workers, 4462 (11.41%) marginal workers, 23304 (59.59%) non-workers.

5.0 Impact Assessment and Mitigation Measures

Activities	Potential Impacts	Management/Mitigation Measures
Land requirement	<ul style="list-style-type: none"> Issues pertaining to compensation 	<p>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 and short-term lease will be taken for 3 - 5 years for developmental purpose and in case of commercially viable discovery of hydrocarbon resources; the land lease would be converted into long term lease up till life of the project. For sites selected are having any settlements, Resettlement & rehabilitation (R&R) plan will be developed and implemented as per the applicable State/ Central Govt. policy. Compensation to the affected landowners for any loss of land will be ensured by IEPL and also will ensure the livelihood of local community, if any affected by the proposed land procurement, will be identified and compensated through adequate compensation and other livelihood restoration activities directly or indirectly through CSR activities.</p>
Site Clearance and Grading	<ul style="list-style-type: none"> Fugitive dust Generation 	<ul style="list-style-type: none"> Top soil would be properly stored for future use. Water sprinkling to be carried out while working in proximity of

Activities	Potential Impacts	Management/Mitigation Measures
	<ul style="list-style-type: none"> Loss of top soil 	<p><i>agricultural fields or settlements/habitations;</i></p>
Construction/ preparation of Drill Site	<ul style="list-style-type: none"> Handling of excess earth material; Noise generation Increase in traffic volumes Health & Safety risks 	<ul style="list-style-type: none"> <i>Temporary storage sheds to be provided for construction material such as cement;</i> <i>The slope of land will be maintained during designing of the drains for the purpose of waste water handlings at site</i> <i>Excavated soil to be used during site preparation;</i> <i>Provision and usage of adequate PPEs to workers as applicable and identified for the respective activity.</i>
Installation of camp site	<ul style="list-style-type: none"> Structural Failure of crane Crane overturning/ Collapse Falling Objects Health & Safety risks 	<ul style="list-style-type: none"> <i>Surface conditions to be examined prior to movement of crane;</i> <i>Provision and usage of adequate PPEs to workers as applicable and identified for the respective activity.</i>
Transportation of Drilling Components and Rig	<ul style="list-style-type: none"> Vehicular emissions Damage to road conditions Oil leaks 	<ul style="list-style-type: none"> <i>Only trained drivers with knowledge of on defensive driving to be involved in the movement of rigs.</i> <i>All movement of major equipment shall be scheduled in the lee hours keeping consideration of the traffic movement in the connecting major arterial road.</i> <i>Local administration and village administration as applicable to be informed during movement of rigs through village roads;</i>
Drilling and Well Testing	<ul style="list-style-type: none"> Additional stress on the local water resources; 	<ul style="list-style-type: none"> <i>Water will be sourced from locally approved sources, if not possible ground water would be withdrawn with prior approval from CGWA.</i>
	<ul style="list-style-type: none"> Potential for contamination due to handling, storage and transportation of wastes 	<ul style="list-style-type: none"> <i>Two separate Drill cutting disposal pits to be provided for WBM and SBM cuttings;</i> <i>Drill waste pits to be provided with HDPE lining;</i> <i>Used chemical barrels, used oil and other hazardous waste to be sent to ASPCB authorized recyclers;</i> <i>IEPL to also explore disposing drill cuttings containing for co-processing as alternate fuel and or raw material (AFR) in cement industry based on suitability and availability.</i>
	<ul style="list-style-type: none"> Generation of noise 	<ul style="list-style-type: none"> <i>Equipment upkeep and regular maintenance to minimise noise generation from all rotary equipment;</i> <i>PPE's such as ear plugs, muffs to be provided to workers at site;</i> <i>Periodic maintenance of vehicles and machinery to be undertaken;</i> <i>DG sets to be provided with acoustic enclosures as per requirements under CPCB guideline.</i>
	<ul style="list-style-type: none"> Air emissions 	<ul style="list-style-type: none"> <i>Cold venting of gas not to be carried out.</i> <i>Adequate stack heights to be provide for generators, adhering to the EPA standards for diesel generators;</i>
	<ul style="list-style-type: none"> Improper sanitation 	<ul style="list-style-type: none"> <i>Proper sanitation facilities would be provided to workers</i> <i>Safe drinking water would be provided at site</i>
	<ul style="list-style-type: none"> Occupational Health & Safety Risks 	<ul style="list-style-type: none"> <i>Blowout preventers to be provided;</i> <i>Flare pit to be placed at a safe distance from the well head and fuel storage areas;</i> <i>Fire fighting measures to be provided as may be required;</i>
Operation of Campsites	<ul style="list-style-type: none"> Stress on water resources; Potential 	<ul style="list-style-type: none"> <i>Safe drinking water would be provided at site</i> <i>All waste to be collected in bins located near each set of porta cabins. Segregation of waste at the source of generation to be put</i>

Activities	Potential Impacts	Management/Mitigation Measures
	<ul style="list-style-type: none"> contamination from generation of biomedical waste Wastewater generation Waste generation 	<p><i>in practice.</i></p> <ul style="list-style-type: none"> All hazardous waste to be collected and stored on secure and paved area, and subsequently sent to authorised recyclers Food waste to be stored in a closed container; Mobile STP to be provided for campsites. Waste generation to be separated and disposed of as per the regulatory requirements.
Operation of mud plant and warehouses	<ul style="list-style-type: none"> Waste generation Potential contamination due to mud preparation Dust due to stacking of the materials Emission due to the forklifts and crane usages 	<ul style="list-style-type: none"> If area not paved, then periodic sprinkling shall be carried out All diesel operated generators shall have acoustic enclosures and effective stack heights Waste shall be effectively segregated at the source of generation and disposed as per the waste management plan All the vehicles to be operated inside the mud plant and warehouse shall follow all the HSE requirements
Decommissioning and Abandonment	<ul style="list-style-type: none"> Demolition of drill cutting pits; 	<ul style="list-style-type: none"> A site restoration approved plan shall be prepared with the detailed checklist; All drill cuttings, spent mud, waste oil and other waste to be completely removed from the site and sent to designated disposal place prior to commencement of demolition work; All concrete or steel installations will be removed to at least 1 m below ground level, so as to ensure that there will be no protruding surface structures. The casing wellhead and the top joint of the casings will be cut below the ground level and capped with a cement plug. Prior to commencement of any demolition, a planned programme of site clearance will be formulated. All pits, cellars and holes will be removed and filled to ground level, any oil or otherwise contaminated soil will be removed and disposed to suitably.

Spill/Release Response Strategies

IEPL's spill management plan would aim to control the spill to a limited area and take necessary mitigative actions.

- Spill management plan for each substance/chemical to be stored shall be in place based on its hazardous properties. MSDS for each substance/chemical to be stored shall be available;
- Adquate training shall be provided on spill management plan of each chemical to be stored;
- Adequate PPE and resources shall be provided

6.0 Environment Management and Monitoring Plan

IEPL has formulated a Health, Safety and Environment (HSE) Policy for its operations. Through the HSE Policy, IEPL is committed to protect the health and safety of everyone involved in its operations, and the sustainability of the environment in which it operates. IEPL strives for continual improvement and the adoption of international codes and standards. IEPL 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 recognized laboratories for pre drilling and post drilling operations.

7.0 Cost of EMMP

Cost of EMP during developmental drilling shall be **INR 25 lakhs** for each well which mainly includes rent of mobile ETP, waste management, environment monitoring, audit etc. Cost of civil construction & other facilities for waste management, compensation to be paid for land and other losses, PPE, site restoration, etc shall be additional.
