Executive Summary
Environmental Impact Assessment Report for Proposed Development
Drilling wells and Testing of Hydrocarbons in Dipling, Sarojini and Sapekhati Block in Sivasagar and Dibrugarh District, Assam

M/s Ramayana Ispat Pvt. Ltd.
EXECUTIVE SUMMARY

1.0 INTRODUCTION
Government of India has awarded 3 blocks (Dipling, Sarojini and Sapekhati) under Dipling PML within the Upper Assam Basin situated in Sivasagar & Dibrugarh District of Assam to consortium of M/s Ramayana Ispat Private Limited, BDN Enterprises Private Limited, Duggar Fiber Private Limited, Mahendra Infratech Private Limited, with lead operator M/s Ramayana Ispat Private Limited and signed a Revenue Sharing Contract (RSC) in DSF round for the same. M/s Ramayana Ispat Private Limited (RIPL) is the operator of the blocks.

As per notification dated 14th September 2006, proposed development drilling of wells is designated as “Category A” project and requires Environment Clearance from Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt. of India, Delhi.

Ministry of Environment and Forest & Climate Change (MoEF&CC) issued Terms of Reference (TOR) for carrying out the EIA/EMP study vide F.No. IA-J-11011/564/2017-IA-II(I) Dated 25th January 2018 based on the duly filled Form I along with pre feasibility report submitted and subsequent presentation made to Expert Appraisal Committee, (Industry-2), MoEF&CC.

2.0 LOCATION OF THE PROJECT
The total area of Dipling PML is 28.15 Sq. Km. Government of India has awarded 3 blocks (Dipling, Sarojini and Sapekhati) under Dipling PML within the Upper Assam Basin situated in Sivasagar & Dibrugarh District of Assam.

The location of the project area is shown in Figure 1.
The proposed blocks are well connected by road through road and by rail network. The Dipling and Sapekhati Block are located at Sivasagar district and Sarojini block located at Dibrugarh district of Assam.

3.0 PROCESS DESCRIPTION

The proposed development wells are within 3 blocks (Dipling, Sarojini and Sapekhati) lies in the proven petroliferous Assam-Arakan basin.

- Project activity involves
- Well site preparation, construction of access roads,
- Well drilling and testing.
Site closure and decommissioning of well not indicative of potential hydrocarbon reserves.

The other details are described in brief as per given hereunder:

1. **Well kick situation**
   While drilling, if the formation pressure exceeds the hydrostatic pressure exerted by the drilling fluid, formation fluids break out in to the well bore.

2. **Blowout**
   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.

3. **Well control**
   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.

4. **Drilling Fluids (Mud)**
   If the drill bit penetrates a formation containing oil, gas or water under pressure, drilling mud are prevented from flowing into the borehole by ensuring that the drilling mud is of sufficient density to the natural formation pressures. The density of the mud can be increased by the addition of barite weighting material. Bentonite is employed to improve the theological properties and enable the drill cuttings to be transported from the hole while drilling and also be suspended in the fluid while the drill bit is being changed. The barite used in the drilling mud would be as per API standard specifications. Water Based Mud (WBM) will be used for development well considering environmental constraints and hazards.

5. **Drill Cutting**
   The drill cuttings, cut by the bit, shall be removed from the mud by the shale shakers and centrifuges and transferred to the mud tank. Once the mud shall be cleaned, it is pumped down the drill string again. The total amount of cuttings produced during the entire drilling period is projected to be about 250 m3.

6. **Drill-stem testing**
   If the geologist detects the presence of oil or gas in the drill cuttings, a drill-stem test is frequently performed to evaluate the formation or zone from which the oil show was observed.
7. Surface 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.

8. Well logging
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.

9. 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.

10. Restoration of Cutting Containment Area
At the conclusion of well testing at each drilling site, solar drying will dewater the waste pits. All residual solids and liner will be covered with thick column of native soil. The cutting mud is inert and with HDPE (High Density Poly-Ethylene) linings of the pit in place.

3.1 UTILITIES

Water Requirements and Source: the water consumption for each well will be 50 kilolitres per day (KLD) for development well. The camp will normally operate with around 60 personnel and will consume water @ 5 KLD for domestic purpose only.

Power Requirement: There will be Four (04) x 1430 KVA DG sets with a diesel consumption of about 6 KL/day. At a time, Maximum three during drilling, 01 standby. During well testing/flaring one auxiliary 250 KVA DG Set.

Waste Disposal: Conduits will be laid to collect wastewater from kitchens, toilets, bathing and washing areas. Wastewater from toilets shall be sent to soak pit after passing through Septic tank while same from other sources shall be sent to soak pit for final disposal.

3.2 PROJECT COST
The total investment for the proposed project works out to approximately INR 15 Crore per well. The estimated Investment Cost will be INR 180 Crore for drilling of 12 wells in 3 blocks is based on the requirement of fixed and non fixed assets.
4.0 DESCRIPTION OF THE ENVIRONMENT

The reconnaissance survey of the area around the Dipling Block, Saphekhkati Block and Sarojini Block under Dipling PML, Sivsagar and Dibrugarh District of Assam was carried out from 18th December 2017 to 9th March 2018 and the field studies were carried out for one season during winter season for the EIA studies to collect baseline primary and secondary data for the present environmental scenario in the study area.

- **Micrometeorology**: Maximum and minimum temperature was observed 28°C and 9°C, relative humidity was recorded between 50% - 98%. The average wind speed varied from 2 to 34 km/hr and blow from the directions between NNE and NE during the period.

- **Ambient Air Quality**: Out of the 13 locations, maximum concentration for PM10 of 50.1 μg/m³ was recorded at Bortimon (AAQ9) & minimum of 23.6 μg/m³ at Lelera Pathar (AAQ3). Oxide of Nitrogen (NOx) varies between 6.5 μg/m³ to 13.6 μg/m³ & AAQ12 had maximum and AAQ3 had minimum. Sulphur Dioxide (SO2) varies between BDL (<5.0 μg/m³) to 6.8 μg/m³ & AAQ9 have maximum. The VOCs of all the location are Below Detection Level.

- **Noise Level**: Out of 12 locations, highest values of noise level 49.3 dB (A) observed at at Moran-Sonari Rd (DP-DD) (N9) and lowest value 41.1 dB (A) was recorded at Sukhani (SJ-DA, SJ-DB) (N2).

- **Water Quality**: Out of 8 locations of Ground water, pH varied from 5.85 to 7.7. TDS varied between 57 to 212 mg/l. Total Hardness varied from 24 mg/l to 164mg/. Chloride varied from 4 mg/l to 44 mg/l and Nitrate varied from 2 mg/l to 8 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 present in all the GW samples (except GW2) which doesn’t meet the IS 10500:2012 standards for drinking water.

Out of 5 locations of Surface Water, pH varied from 7.55 to 7.74. Turbidity varied between 1.6 to 4.3 NTU. TDS varied from 91 to 116 mg/l. BOD found between BDL (<2 mg/l) to 2.8 mg/l. Dissolved Oxygen varied from 4.5 mg/l to 5.8 mg/l. Heavy metals like Chromium, Mercury and Lead were found to be below detection limit at all locations. Total Coliform count varies between 600 to 1120 MPN/ 100ml.

- **Soil Quality**: Out of 7 locations, pH varied from 5.19 to 6.32. Electrical conductivity found within a range from 0.041 to 0.192 mS/cm. The texture of soil is predominantly Clay Loam in nature and with Sandy Loam in some locations. Available Nitrogen ranged from 287 to 512 kg/ha, Potassium ranged from 74 to 156 mg/kg, Available Phosphorus ranged from 19.6 to
63.9 kg/Ha. Soil organic content varied from 0.62 to 1.28 %, which indicates the very low level of organic matter

- **Ecology & biodiversity:** Study conducted within 1 km radius of each well and some important tree species are Shorea robusta, Tectona grandis, Artocarpus species, and Bambusa sp, Albizzia sp., Aegle marmelos, Azadirachta indica, Acacia nilotica, Emblica officinalis, Magnifera indica, Madhuca longifolia and Casia fistula etc. About 12 Mamalian species, 45 avifauna, 9 reptiles were recorded within the study area.

- **Socio economic status:** The study conducted within 10 km radius from centre of each blocks. Total population in the study area is 4,06,899 and 85390 Households. Male population is about 207173 & female population is 199726 with sex ratio of 964 females for every 1000 males. Scheduled Castes and Scheduled Tribes accounted for 6802 and 14167. The literacy rate is 63%.

### 5.0 ANTICIPATED ENVIRONMENTAL IMPACT AND MANAGEMENT PLAN

The proposed project activity will have impact on soil, water resources & water quality, ambient air quality, noise, ecology and socio-economic environment in surrounding area due to the generation, handling and disposal of stack emissions, liquid effluents and solid wastes during construction as well as operation phase and various related industrial activities.

#### 5.1 IMPACT ASSESSMENT

The impact assessment is given in below Table 1.

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<tr>
<th>Source</th>
<th>Potential impact</th>
<th>Component affected</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Roads</td>
<td>Access</td>
<td>H/At/B/Aq/T</td>
<td>Vegetation cleared, possible erosion and changes in surface hydrology; emissions, vibration and (onshore) noise from earth moving equipment; disturbance to local population. Secondary impacts related to influx and settlement through new access routes. Mainly short-term, transient impacts. Potential long-term impacts from access construction.</td>
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<tr>
<td>Site preparation</td>
<td>Footprint</td>
<td>H/At/B/Aq/T</td>
<td>Requirement for proper site selection to minimize possible impact. Removal of vegetation and topsoil; possible erosion and changes in surface hydrology; drainage and soil contamination; land use conflict; loss of habitat; construction noise, vibration and emissions from vehicles; disturbance to local population, aesthetic visual intrusion. Long term provided adequate decommissioning</td>
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### Source
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<tr>
<th>Potential impact</th>
<th>Component affected</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Production of gas</td>
<td>Discharges, Emissions, Waste</td>
<td>Air emission from gas based power generator. Long term adverse impacts</td>
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<td></td>
<td>Socio-economic Cultural</td>
<td>Due to CSR activities, longterm beneficial impacts</td>
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<tr>
<td>Camp and operations</td>
<td>Discharges, Emissions, Waste</td>
<td>Water supply requirements; noise, vibration and emissions from drilling equipment and transport; extraneous light; liquid discharges—muds and cuttings; wash water; drainage; soil contamination—mud pits, spillages, leakages; solid waste disposal; sanitary waste disposal, sewage, camp grey water; emissions and discharges from well test operations; additional noise and light from burning/flare. Nature: Short-term, transient. Land-use conflicts, disturbance and interference to local population, special considerations required for native and indigenous population; interactions between workforce and local population; immigration; potential effects on local infrastructure—employment, education, roads, services; hunting, fishing, poaching. Nature: Short-term, transient.</td>
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<tr>
<td></td>
<td>Socio-economic Cultural</td>
<td>H/At/B/Aq/T</td>
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<tr>
<td>Decommissioning and aftercare</td>
<td>Footprint</td>
<td>Proper controls during construction and operations and careful decommissioning and aftercare should effectively remove risk of long term impacts. Improper controls can result in soil and water contamination; erosion and changes in surface hydrology; wildlife disturbance; loss of habitat; impacts to biodiversity; human and cultural disturbance; secondary impacts to socio-economic infrastructure, immigration, changes in land and resource use.</td>
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H- Human, socio-economic, culture; Aq-Aquatic; B- Biosphere; T- Terrestrial; At- Atmospheric

### 6.0 RISK ANALYSIS

#### MINOR OIL SPILL

A minor oil spill is confined within the well plinth area. The conditions which can result in minor oil spill are as follows:
Diesel Fuel Storage System: Oil spillage from tanker unloading, leaking valves, lines and storage tank.

- **MAJOR OIL SPILL**
  
  Significant hydrocarbon inventories are not maintained at development well drilling site. A major spill can, therefore, only arise as a result of an uncontrolled flow from a well either during drilling resulting from a failure of the surface equipment.

- **BLOWOUT**
  
  Blowout means uncontrolled violent escape of hydrocarbon fluids from a well. Blowout followed by ignition, which prevents access to the wellhead is a major hazard.

- **OTHER HAZARDS AT DRILLING RIG OPERATIONS**
  
  - Setting up the substructure
  - Hazards during setting up the Rig floor and Mast or Derrick
  - Hazards in Rigging up the Circulation system
  - Hazards during installing the Auxiliary equipments.

6.1 **CONSEQUENCE ANALYSIS**

The consequence of igniting a hydrocarbon release during blowout depends on the type of material released, the mass release rate, the timing of the ignition, and the environment into which the hydrocarbon is released. Briefly, typical outcomes are:

- Jet fires: produced by an ignited jet of gas or liquid spray released under pressure;
- Pool fires: produced by ignition of a liquid release that accumulates on the surface and ignites;
- Flash fires: produced by igniting a gas cloud so that a fire propagates through the gas cloud (without generating a significant overpressure);
- Explosions: produced by igniting a gas cloud in conditions where the resultant accelerating flame front produces a significant overpressure.

6.2 **RISK MITIGATION TO CONTROL HAZARDS**

- **BLOWOUT**
  
  - A pit level indicator registering increase or reduction in the drilling mud volume and shall include a visual and audio warning device near the driller stand.
  - A device to accurately measure the volume of mud required to keep the well filled at all times.
  - A gas detector or explosimeter at the primary shale shaker and connected to audible or visual alarm near the driller stand.
  - A device to ensure filling of well with mud when the string is being pulled out.
- A control device near driller stand to close the mud pump when well kicks.
- Blowout prevention drill shall be carried out once every week near the well during drilling.
- Suitable control valves shall be kept available near the well which can be used in case of emergency to control the well.
- When running in or pulling out tubing, gate valve and tubing hanger shall be pre-assembled and kept readily available at the well.

**CONTROL MEASURES FOR H₂S DURING DRILLING**

**H₂S Detection System:** A four channels H₂S gas detection system should be provided. Sensors should be positioned at optimum points for detection, actual locations being decided on site but likely to be:

- Well Nipple
- Rig Floor
- Shaker header tank
- Substructure cellar

### 7.0 ENVIRONMENTAL MONITORING PROGRAM

Prior to development drilling of wells within 3 Blocks of Dipling PML, the following aspects shall be identified and information used in consultation with the relevant parties (e.g., Administrative authorities, Department of Archaeological Survey, Divisional & local Forest and Irrigation Departments, and all concerned State government agencies) for logistical and planning purposes with respect to affected area.

- Ecological details;
- Land use pattern;
- Details of land ownership;
- Details of habitat and other infrastructure;
- Pollution and waste management;
- Safe working practices;
- Rehabilitation (when applicable);
- Employment;
- Compensation; and
- Cultural heritage

### 8.0 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

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| 1      | Land Use      | • Consult local authorities and other stakeholders regarding preferred location for camps and access/maximize use of existing infrastructure.  
• Mark out the site boundaries to ensure that land taken is restricted to pre-agreed area;  
• Minimize the disturbance of vegetation present in and around area proposed to be used, if any;  
• Where possible use existing road/water infrastructure.  
• In-house audit before and after development drilling:  
• Minimum utilization of land and clearing of site;  
• All necessary protocols shall be followed and legal requirements shall be implemented with respect to local regulation pertaining to use of land; etc |
| 2      | Ecology       | • Mark out site boundaries;  
• Choose site to encourage natural rehabilitation by indigenous flora/avoid removal of vegetation and topsoil/preserve topsoil, and seed source for further usages.  
• Siting to minimize impacts on ecology, water resources, and landscape. Consider using site that has been cleared/disturbed previously or of low ecological value, or which may be more easily restored, e.g., agricultural land;  
• Avoid uprooting vegetation to the possible extent;  
• Ensure proper handling and storage of fuels and hazardous materials.  
• Take account of topography, natural drainage and site runoff. Ensure adequate and proper drainage.  
• Minimize cleared area and size of site/maximize perimeter to area ratio to aid natural re-vegetation.  
• Use hand cutting to clear vegetation initially—where necessary be selective in using machinery.  
• Retain vegetation on edge of site to serve as seed bank for future site re-vegetation;  
• All bulldozer operators involved in site preparation shall be trained to observe the defined site boundaries;  
• Kerosene oil/LPG shall be used for domestic purpose; |
| 3      | Water Resources | • Adequate water supply arrangement shall be made at drilling site and camp site;  
• Continuous attempt shall be made to avoid wastage and leakage of water;  
• In case, water courses and aquifers are deemed sensitive, consider a fully sealed site, avoid use of mud pits, preferentially use steel tanks, but if used must be lined. Pits if used must be lined;  
• If an aquifer is breached, the drilling crew can cement the hole to prevent leakage; etc  
• Continuous attempt shall be made to optimize/reduce the use of |
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| 4      | Air Emissions (Dust and gaseous emission) | - Emission from flaring of petroleum hydrocarbons, DG sets and other machinery shall confirm the standards as prescribed by MoEFCC/APCB;  
- Well testing (flaring) to be undertaken so as to minimize impacts of emissions by ensuring:  
  - duration of testing minimized by careful planning; and  
  - high combustion efficiency, smokeless flare/burner to be used.  
- Detectors for CH4 and H2S shall be placed at adequate locations;  
- Any dry, dusty materials (chemicals, construction materials etc) shall be stored in sealed containers and fenced storage yard;  
- Arrangement of water spray at drilling site and access road to the possible extent shall be made;  
- Regular testing of the combustion efficiency of the vehicles/machinery; and  
- Preventive maintenance of vehicles and machinery;  
- Regular monitoring and In-house audit as per details given in this chapter or as stipulated by MoEFCC/ASPCB. |
| 5      | Noise and Vibration | - Engineering specifications for machinery/equipment shall be stipulated during tendering as a condition for contractor to maintain noise level not more than 85 dB(A) at 1 m from each source;  
- Selection of low noise generating machinery/equipment;  
- Provision of rubber padding/noise isolators/silencers to modulate the noise generated by machinery/equipment, wherever possible;  
- The high noise zones within ROW shall be demarcated and temporary enclosures & barriers, if required shall be provided;  
- Use experienced and skilled personnel;  
- Train personnel of standard operating procedures for handling and shooting of explosives;  
- All employees shall receive appropriate training and education as and when required;  
- Provision of protective devices like ear muff/plugs to the workers;  
- Preventive maintenance of machinery/equipment and vehicles;  
- All employees shall be encouraged to cooperate in using agreed safe work practices;  
- Information on noise, the risks of exposure to noise and the appropriate control measures shall be disseminated in a manner appropriate to the workplace;  
- In no case, workers shall be exposed more than 85 dB (A) at 1m from source;  
- Regular monitoring and In-house audit as per details given in this chapter or as stipulated by MoEFCC/ASPCB. |
### Component | Mitigation Measures
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6 Water Quality | • All the debris resulting from the site shall be isolated from the waste water and disposed off separately;
• Incorporate drainage and minimize disturbance to natural drainage patterns. Engineer slopes and drainage to minimize erosion. Design for storm conditions/ensure offsite natural runoff does not wash over site/use perimeter drainage ditches.
• Seal bund and ensure proper drainage of machinery areas, fuel and chemical storage, and mud mixing areas;
• In case, water courses and aquifers are deemed sensitive, consider a fully sealed site, avoid use of mud pits, preferentially use steel tanks, but if used must be lined. Pits if used must be lined;
• Provide base material compatible with local ground conditions. Hard core should be laid on geo-textile membrane. Avoid concreting sites;
• Protect water courses from contamination and siltation;
• Mud and burn pits, if used, must have adequate contingency capacity especially for rainfall, and must be fully lined and bunded.
• Potable ETP shall be used to treat the process waste water while domestic waste water shall be discharged to soak pits.
• Protect groundwater from drill stem penetration and shallow aquifers from possible site contamination;
• At camp site, effective bunds capable of containing 110% of the volume of the largest container within and enclosing all potentially contaminating materials to be used for fuel lubricants and chemicals storage area;
• The storage areas shall be inspected and cleaned at regular intervals;
• Non-contaminated and potentially contaminated run-off shall be kept separately. Non-contaminated run-off shall be routed to off-site areas via silt traps. Potentially contaminated surface run-off shall be routed through oil traps;
• Oil drip pans shall be used wherever there is significant potential for leakage including, but not limited to;
  o Electric generator engine, DG sets, earth moving machinery/equipment etc;
  o Compressors, pumps or other motors;
  o Maintenance areas;
  o Fuel transfer areas; etc
• All spills/leaks to be contained, reported and cleaned up immediately;
• Oil absorbent /spill containment material to be deployed to contain large spill, if any;
• Minimize suspended solids loads to watercourses by installing appropriate surface run-off drainage systems (e.g., silt traps);
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|        |                                          | **Adequate sanitary facilities shall be provided;**  
|        |                                          | **No untreated discharge to be made to water course/land; and**  
|        |                                          | **Regular monitoring and In-house audit as per details given in this chapter or as stipulated by MoEFCC/APCB.**                                                                                                          |
| 7      | Soil quality                             | **Soil Erosion**  
|        |                                          | • Stockpile of topsoil wherever possible at the edge of site;  
|        |                                          | • Minimize area and extent of site clearance, by staying within defined boundaries;  
|        |                                          | • Limit erosion potential/avoid steep slope and drainage courses/avoid cut and fill techniques/incorporate proper drainage, culverting and bridging techniques;  
|        |                                          | • Avoid removing undergrowth where possible so as to retain land stability; etc **Fuel, Lubricants and Chemical Management**  
|        |                                          | • Storage and liquid impoundment areas for fuels, construction materials, solvents, chemicals and waste should be designed with secondary containment (e.g., dykes and berms) to prevent spills and the contamination of soil, groundwater, and surface waters;  
|        |                                          | • All fuels, lubricants, surface treatment materials, welding rods/gases, chemicals etc to be placed in controlled storage i.e. properly fenced area and in clearly marked vessels and containers;  
|        |                                          | • Effective bunds capable of containing 110% of the volume of the largest container within and enclosing all potentially contaminating materials to be used for fuel lubricants and chemicals storage area;  
|        |                                          | • Impervious liners shall be in place for pits for storage of drill cutting and mud;  
|        |                                          | • Impervious liners shall be in place for fuel, lubricants and chemicals storage area;  
|        |                                          | • Non-contaminated and potentially contaminated run-off shall be kept separate. Non-contaminated run-off will be routed to off-site areas via silt traps.  
|        |                                          | • Potentially contaminated surface run-off shall be routed through oil traps.  
|        |                                          | • In-house audit shall be carried out before and after development drilling operation.                                                                                                                                 |
| 8      | Disturbance to community resources & safety | • Advance notice to local administration about the activities;  
|        |                                          | • Minimize use of roads by planning vehicle movements;  
|        |                                          | • Proper cordon off the site with sign boards;  
|        |                                          | • Adequate communication with locals which may be impacted during development drilling;  
|        |                                          | • Diversion of traffic, if required;  
|        |                                          | • Placing the warning board on the vehicles during transportation of machinery and materials;  
<p>|        |                                          | • Proper training to drivers about public safety.                                                                                                                                                                    |</p>
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|        |                                     | **Spray down dirt roads if too dusty;**  
                     | **In-house monitoring and audit; etc**                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 9      | Employment and Socio economic       | **Close monitoring on the type of loss to local habitats, if any. In case of any loss to locals, adequate compensation shall be provided as per the law or on mutually agreed terms;**  
                     | **Preference shall be given to locals for temporary direct and indirect employment;**  
                     | **Where ever local skilled labour is available, should be preferred to be hired for the respective job;**  
                     | **Local employment (unskilled) should be provided in a manner, giving fair representation to all section;**  
                     | **Local suppliers for machineries and construction materials shall be given preference;**  
                     | **Local transporters shall be preferred for transportation of machinery/materials.**  
                     | **Third part audit after completion of activities; etc**                                                                                                                                                                                                                                                                                                                                                                                           |
| 10     | Culture, Aesthetics and Archaeologic al sites | **Culture**  
                     | **Discourage interaction of outsiders with locals, however if any issue arises, Senior officials of RIPL/ Contractor should communicate with the elders/ sarpanch of village and settle down the issue;**  
                     | **All workers should respect the local norms of communities.**  
                     | **Control workforce activities, e.g. hunting, interaction with local population.**  
                     | **Purchase food from recognized local suppliers, not directly from local people without evaluating implications;**  
                     | **Monitoring and control of activities of work force that may affect women in the villages;**  
                     | **No interruption to culturally important sites;**  
                     | **Contractor should not utilize the local village's drinking water resources and must not damage the existing infrastructure;**  
                     | **Community complaint registers must be placed at site and all complaints to be documented and strict compliance to be undertaken;**  
                     | **Consultations with locals must be done by the contractor before making access roads; etc**                                                                                                                                                                                                                                                                                                                                                  |
|        |                                     | **Aesthetics**  
                     | **Strict compliance to Environment Management Plan (EMP);**  
                     | **Camp should be constructed away from sensitive habitats; etc**                                                                                                                                                                                                                                                                                                                                                                               |
| 11     | Occupational Health & Safety        | **Due care shall be taken to maintain continuous water supply in the water spraying system and all efforts would be made to suppress the dust generated during drilling operation to the possible extent;**  
                     | **Any worker found to develop symptoms of dust related diseases will be changed over to other activities in cleaner areas;**  
                     | **General Safety Measures:**  
                     | **Employees shall be provided with helmets, safety boots, eye**
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<td>and ear protection, and snug fitting gloves as appropriate;</td>
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<td>o Sensors shall be placed at adequate location for methan and hydrogen sulphide;</td>
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<td>o Masks and dust-proof clothing shall be provided to personnel; and</td>
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<td>o Procedures shall be strictly enforced for the drilling, storage, handling, and transport of explosives, flammable and hazardous materials.</td>
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<td><strong>General Health Measures:</strong></td>
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<td>• Sanitary facilities shall be well equipped with supplies and employees shall be encouraged to wash frequently, particularly those exposed to dust, chemicals or pathogens;</td>
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<td>• Personnel required to work in areas with high humidity shall be allowed to take frequent breaks away from these areas;</td>
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<td>• Pre-employment medical examinations of all personnel shall be made mandatory for contractor; etc</td>
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<td>11</td>
<td>House keeping</td>
<td>• The facilities should be kept clean, maintained, and operated in a safe and environmentally sound manner;</td>
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<td>• Facilities should be cordoned off in a manner to prevent access to the facility by the general public, livestock, where appropriate;</td>
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<td>• All equipment should be painted and/or kept clean to present an acceptable appearance and to provide protection from external corrosion;</td>
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<td>• Signs should be posted in conspicuous locations to notify employees and the public of any dangerous situations such as, flammable conditions, high voltage, and toxic;</td>
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<td>• Waste receptacles should be provided at appropriate locations for collecting discarded paper, rags, etc. and emptied on a regular basis; etc</td>
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</tbody>
</table>

8.1 COST OF EMMP

Cost of EMP during development drilling shall be INR 32 lacs for development drilling of 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.