

Pre-Feasibility Report (PFR)

For

**Proposed Development Drilling wells and
Testing of Hydrocarbons in Charaideo Block
in Charaideo District, Assam**

By

M/s. Oilmax Energy Pvt. Ltd.

Submitted by



Prepared by





PROJECT DETAILS

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Pre Feasibility Report (PFR) for Proposed Development Drilling wells and Testing of Hydrocarbons in Charaideo, Assam By M/s. Oilmax Energy Pvt. Ltd.

CHAPTER 1

INTRODUCTION

CHAPTER 1: INTRODUCTION

1.1 PREAMBLE

With the present consumption pattern of hydrocarbon energy, the available reservoirs in the country will be depleted to a larger extent by the next decade. It is expected that increased hydrocarbon exploration and production operations can boost up the energy supply and can help to reduce the supply-demand gap. Keeping the required growth rate and rising energy demand for hydrocarbons in view, the Government of India has come out with plans to encourage national, private and foreign companies to explore and develop the hydrocarbon prospects. With this objective, Government of India has awarded 1 block (Charaideo) under Charaideo Nahophabi PML within the Upper Assam Basin situated in Charaideo District of Assam to M/s Oilmax Energy Pvt. Ltd and signed a Revenue Sharing Contract (RSC) in DSF round for the same.

Upper Assam Basin

The Upper Assam Basin is a composite foreland basin which is located between the eastern Himalayan foot hills and the Assam - Arakan thrust belt. The basin is terminated to the northeast by the Mikir Hills block and to the southwest it is partly disrupted by the Shillong plateau basement uplift. The stratigraphic record of upper Assam foreland basin is controlled by three variables: eustasy, tectonic subsidence, and sediment supply. The sediment supply feeds the foreland basin either from NW side of Himalayan Mountains or from SE side of overriding thrust belt. The eustasy and sediment supply control the short term stratigraphic framework that superimposed over the tectonic sequences that are formed due to asymmetric slope of the basin and position of forebulge. The basal unconformity is formed due to erosion of progressively migrating forebulge and upper unconformity is formed due to tectonic effects. The sedimentary record of the basin was formed during passive margin setting in Paleogene time during drifting phase of Indian Plate after detachment from Antarctica Plate. Fluvial to marine coarse clastic sediments deposited in Paleocene to lower Eocene period there after widespread transgression leading to deposition of carbonate sediments in middle Eocene period and shale is dominated in upper Eocene time. During Oligocene and Miocene increased proportion of coarse clastics is attributed to the tectonic uplifts in the provenance as well as falling sea level. Successive basin wide compressive orogenic phase during late Miocene to Pliocene

resulting emergence of landforms and subsequent erosion are marked by unconformable relations between Tipams and overlying sediments of Moran Group.

Structural Evolution of Upper Assam Basin

The general view inferred from seismic surveys is that the Assam plains form a broad arch at the basement level with its apex in the region of the present Brahmaputra River and sloping towards the Himalayan foot hills in north and Naga Hills in the south. This arch is dissected by a number of faults with a general strike of NE-SW or ENE-WSW parallel to the fault pattern observed in the Mikir Hills metamorphic complex (Roy et.al., 1975) and also parallel to thrust pattern in Naga Hills. The structural pattern in the sedimentary cover is controlled by the irregularities in the basement surfaces known from gravity survey and differential movement along faults. There is good correspondence between gravity high in the basement and structures in the sedimentary cover. The structures are platform type, either gentle domes or elongated gently anticlinal folds dissected by numerous faults.

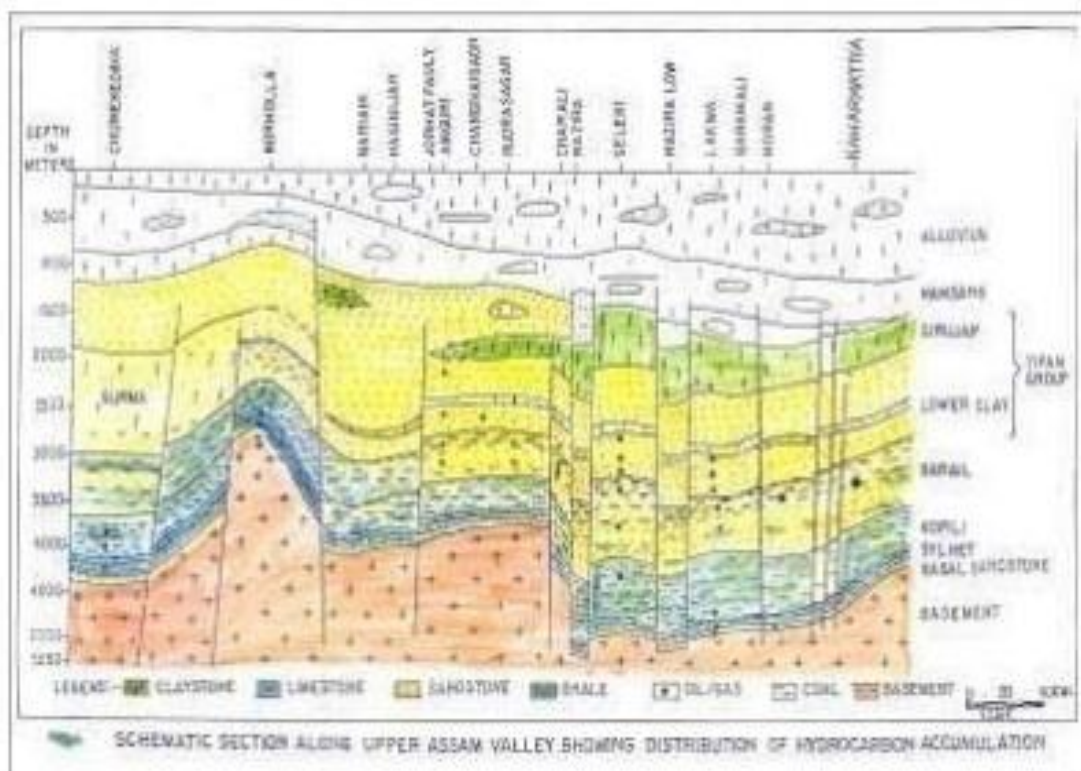


Fig 1.1: Distribution and accumulation patterns in Basin

Table 1.1: Salient Features of the proposed Oil blocks

Particulars	Details
Company Name	M/s. Oilmax Energy Pvt. Ltd.
Name of blocks	Charaideo Block
Area of block	Charaideo Block (11.48 Sq.Km)
Average elevation	102 m
Category of the Project	As per EIA Notification dated 14 th Sept., 2006 as amended from time to time, this project falls under S. No. 6 (Service sectors), Project activity "1 (b)"- Offshore and onshore oil and gas exploration, development & production
Hydrocarbon reserve (initial in place) in block	17959 Mbbl of Oil and 21701 MMSCF of Gas
Lithology	Sandstone
Net Pay thickness	7-23 m
Average porosity	14%
Land required	For well site during drilling will be 2.25 ha, including site facilities and for camp site
Coordinates of wells	Refer Table 2.1
Hydrocarbon reserves	Gas 21.7 bcf and Oil 17.9 mmbbl in place as per DGH docket
Development plan in case of strike	Will be connected to nearest ONGC GGS
Test flaring, duration	2 to 3 days
Depth of well	4500 m
Duration of Drilling	About 5 months per well
Quantity of drilling fluid.	500 m ³ per well
Quantity of drill cutting	200-250 m ³ (approx.) per well
Quantity of waste water generated from drilling	1000 m ³ per well
Estimated life of well	20 years
Estimated average production rate	70-80 cu.m. / day (refer Table 2.1 for details)
Estimated operational loss	1% (max)



Particulars	Details
Presence of H ₂ S	No H ₂ S content observed in a nearby well. Hence, H ₂ S content is not anticipated in the proposed well.
Estimated project cost	INR 60 Crores
Manpower Requirement	Total Manpower: 45-50 (Construction Phase) and 100 (Operational Phase)
Seismic zone	The proposed plant-site area falls in Seismic Zone V as per IS 1893:2002 (Part-1), which is a highly sensitive seismic zone.

1.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

Oilmax Energy Private Limited is a privately owned integrated Oil & Gas company with a balanced portfolio spreading from Exploration, Production, EPC, O &M to Gas Business. Oilmax Energy Endeavour innovative concept building and project management throughout the life cycle of the assets in areas of Exploration, appraisal, development and Production. Oilmax focuses on creating value through robust technical workflows in providing optimum solutions, building in operational efficiency and maximizing returns.

Oilmax Energy has its presence in India, Romania and Nigeria at present. We are actively evaluating assets in strategically aligned areas such as Far East Asia, Africa, Middle East and Russia etc. both for Organic resource growth as well as Inorganic acquisitions.

Oilmax Energy specializes in concept building and developing strategy for upstream business, execution and implementation of the projects. Oilmax Energy's key team comprises of industry experts in the areas of geology, geophysics, petroleum engineering, well drilling, project management and execution, FEED development, commercial and financial management.

Oilmax Energy follows internationally accepted HS&E standards and stringent quality benchmarks in all spheres of the activity domain. We emphasize on timely completion, maximizing returns and provide sustainable growth.

Mr. Kapil Garg, Chairman & Managing Director:

Kapil Garg, a seasoned E&P professional has served the industry in various key positions globally. A graduate from the prestigious premier institute, IIT Roorkee, also completed his masters from the same institute. He started his career with ONGC as a production engineer, then moved to Enron Oil and Gas India Ltd. In 1995 as Offshore Installation

Manager responsible for managing offshore production facility and soon rose to the position of General Manager Production. Subsequently he joined BG Group in India as Director Operations for upstream business and then he moved as Technical Director for Asia and Middle East based in the U.K. He returned to India to join as Managing Director of BG's upstream business in India. His last assignment was as Asset General Manager/Managing Director of BG India. Under his leadership the production has significantly increased by three fold from the existing fields. He has many distinguished accomplishments in multi-disciplinary project managements and focused strategic business developments. He is passionate in inducting out of the box innovative concepts for operational efficiency and cost optimization. A creative mind and visionary, Kapil is leading the company and the team since its inception.

Dr. Rabi Bastia, President - E&P Business:

Dr. Rabi Bastia, a reputed personality in the Hydrocarbon Industry whose endeavor has put India into international oil & gas map in a very short span of time. Post-graduated in Petroleum Exploration from Norwegian Technological University, Norway and obtained his Doctoral degree in Geology from IIT, Kharagpur. He has been awarded a Doctorate in Science for the first time in the field of Petroleum research in India from ISMU, Dhanbad which was highly applauded by Alberta University, Canada & Oklahoma University, USA. He has been serving the Indian petroleum industry for about 3 decades in different capacities with distinction. Dr. Bastia's contribution in exploring for hydrocarbons in the deep water regions of India is commendable. He has provided a high level of leadership in directing and implementing several major exploration programmes in the deepwater regions of the east coast of India leading to major hydrocarbon discoveries including the world's largest gas discovery of 2002 in Krishna Godavari along with 50 more in other basins like Mahanadi and Cauvery offshore. In recognition to this outstanding contribution in the field of Science and Engineering the Government of India has conferred him the "Padma Shree", one of India's highest civilian awards in the year 2007. In the same year, he has also been awarded The "Bharat Gaurav" from the state of Orissa and "Infraline Service to Nation Award in Energy Excellence". His other significant credentials include "Who's Who in the World" in the year 2008 and "Top 100 Educators – 2009" in the arena of scientific research by IBC, Cambridge, England.



He is currently an Adjunct Professor in ISMU, Dhanbad and is also involved in distinguished and challenging international assignments with operations in the Middle East, South East Asia and North Sea. He has authored a reference book titled “Geologic Settings and Petroleum Systems of India’s East Coast Offshore Basins: Concepts and Applications”. Another book print “Basin Evolution and Petroleum Prospectivity of the Continental Margins of India” is to Elsevier editorial board.

Project Proponent:

Name of the Company	M/s. Oilmax Energy Pvt. Ltd.
Registered Address	3-A, Omkar Esquare, Off Chunnabhathi Signal, Eastern Express Highway, Sion (E) Mumbai – 400022
Address for correspondence	3-A, Omkar Esquare, Off Chunnabhathi Signal, Eastern Express Highway, Sion (E) Mumbai – 400022
Name of the Applicant	Dr. Rabi Bastia
Designation (Owner/ Partner/ CEO)	President – Oil & Gas
E-mail	rabi@oilmax.in
Telephone No.	022-42441100
Mobile No.	9930365025

1.3 NEED FOR THE PROJECT AND ITS IMPORTANCE

India's demand for petroleum products is growing at a rapid rate, having virtually doubled from 30 million tonnes in 1980-81 to about 70 million tonnes in 1995-96 to 155 million tons in 2006-07. The oil and gas sector is among the six core industries in India and plays a major role in influencing decision making for all the other important sections of the economy. In June 2015, total crude oil imports were valued at US\$ 8.7 billion. In FY14, imports accounted for more than 80% of the country’s total oil demand with India developing gas-fired power stations, consumption is up more than 160% since 1995. Gas consumption is likely to expand at a Compound Annual Growth Rate (CAGR) of 21% during FY 08–17 With a view to meeting this growing demand, the new hydrocarbon policy aims at encouraging investments in oil/gas exploration and production. Current projections for demand and supply indicate that the level of self-sufficiency is likely to decline to about 30% over the next few years.

Substantial efforts are, therefore, necessary to boost the level of exploration activity in the country so that new reservoirs can be identified to significantly enhance production of crude oil and gas in the years to come. India today remains one of the least explored regions with oil well density per thousand sq. km being among the lowest. It is also evident that large amounts of capital investments are necessary if exploration efforts are to be substantially augmented. It is therefore required to attract both the national as well as, private sector oil companies to invest in this critical area. With this background, a New Exploration Licensing Policy (NELP) was formulated by the government in 1997-98 to provide a level playing field in which all parties could compete on equal terms for the award of exploration acreage. In the coming time, exploration for oil & gas in critical areas will be based on social, cultural, environmental, recreational, economic, legal, national and international needs and would invite development of innovative and supporting technologies for clean operations. Hence this project of production drilling block will help in establishing the oil/gas prospects in the block for commercial recovery which is a need of the country for its economic development. It is expected that the proposed development drilling activities lead to augment the production of hydrocarbons, in the present scenario of growing demand of oil and gas in the country.

1.4 ENVIRONMENTAL STATUS

In the year 2009 the Central Pollution Control Board (CPCB) has developed a Comprehensive Environmental Pollution Index (CEPI) and revised the same in subsequent year up to April, 2016. It involved a nation-wide environmental assessment of Industrial Clusters based on CEPI and 43 such industrial clusters in 16 States having CEPI greater than 70, on a scale of 0 to 100, has been identified as Critically Polluted Area (CPA).

The proposed development drilling location at Charaideo Block in Charaideo District, Assam does not fall in the list of 43 Critically Polluted Area (CPA) identified by CPCB. Hence, carrying out developmental drilling work at Charaideo Block of in Charaideo District, Assam shall not constitute any statutory binding related to existing environment in and around the proposed project.

1.5 EMPLOYMENT GENERATION

During the site preparation, approximately 10 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 engaged are either from Oilmax drilling services or contractor's crew as applicable. It is anticipated that, at any given time, there will be maximum 100 (approx) personnel working on site including technical staff, drilling crew, security staff etc.

1.6 DEMAND & SUPPLY GAP

Energy, be it conventional or non-conventional is the basic requirement for the mankind. In present day scenario, the consumption of energy has been increased with the growth of population and their demand for improved amenities. Keeping the required growth rate and rising energy demand for hydrocarbons in view, the Government of India has come out with plans to encourage national, private and foreign companies to explore and develop the hydrocarbon prospects. With this objective, the Oilmax Energy Pvt. Ltd. has been awarded a block in Upper Assam Basin of India under the Revenue Sharing Contract (RSC) with the Government of India.

1.6.1 IMPORTS VS. INDIGENOUS PRODUCTION

Not Applicable

1.6.2 EXPORT POSSIBILITY

The Oil & Gas produced will be utilised for domestic purpose only. There is enough demand in domestic market.

1.7 LEGAL ASPECTS

The relevant NOC's and licenses will be obtained from the statutory agencies under the following Acts, Rules and amendments and Oilmax will adhere to the guidelines specified in.

Oilmax will comply with the prescribed limits laid down for air, effluent and noise emissions for protection of the environment under the following Acts, Rules and amendments:

1. The Water (Prevention and Control of Pollution) Act, 1974



2. The Water (Prevention and Control of Pollution) Cess Act, 1977
3. The Air (Prevention and Control of Pollution) Act, 1981
4. The Environment (Protection) Act, 1986 which is also called umbrella act or legislation
5. The Environment Impact Assessment, Notification, 2006 issued under Environment (Protection) Act 1986 and Environment (Protection) Rules 1986 and amendments thereafter to date.

Compliance to State Rules and Notifications will also be ensured.



CHAPTER 2

PROJECT DESCRIPTION

CHAPTER 2: PROJECT DESCRIPTION

2.1 PROJECT DESCRIPTION

I. Type of Project including interlinked and independent projects, if any

There are no interlinked or inter dependent projects.

II. Location (map showing general location, specific location, and project boundary & project site layout) with coordinates:

The total area of Charaideo block is 11.48 Sq. Km and has the coordinates as per given hereunder:

Table 2.1: Coordinates of the Blocks of Charaideo

Name of block	Points	Coordinates	
		Latitude	Longitude
Charaideo Block	A	26°56'41.737" N	94°50'31.863" E
	B	26°57'0.959" N	94°50'49.167" E
	C	26°57'38.375" N	94°51'41.001" E
	D	26°58'09.614" N	94°53'0.779" E
	E	26°58'09.592" N	94°54'02.493" E
	F	26°57'19.791" N	94°54'42.055" E
	G	26°56'26.232" N	94°53'02.814" E
	H	26°56'59.249" N	94°52'41.843" E

The location of the project area is shown in Figure 2.1.

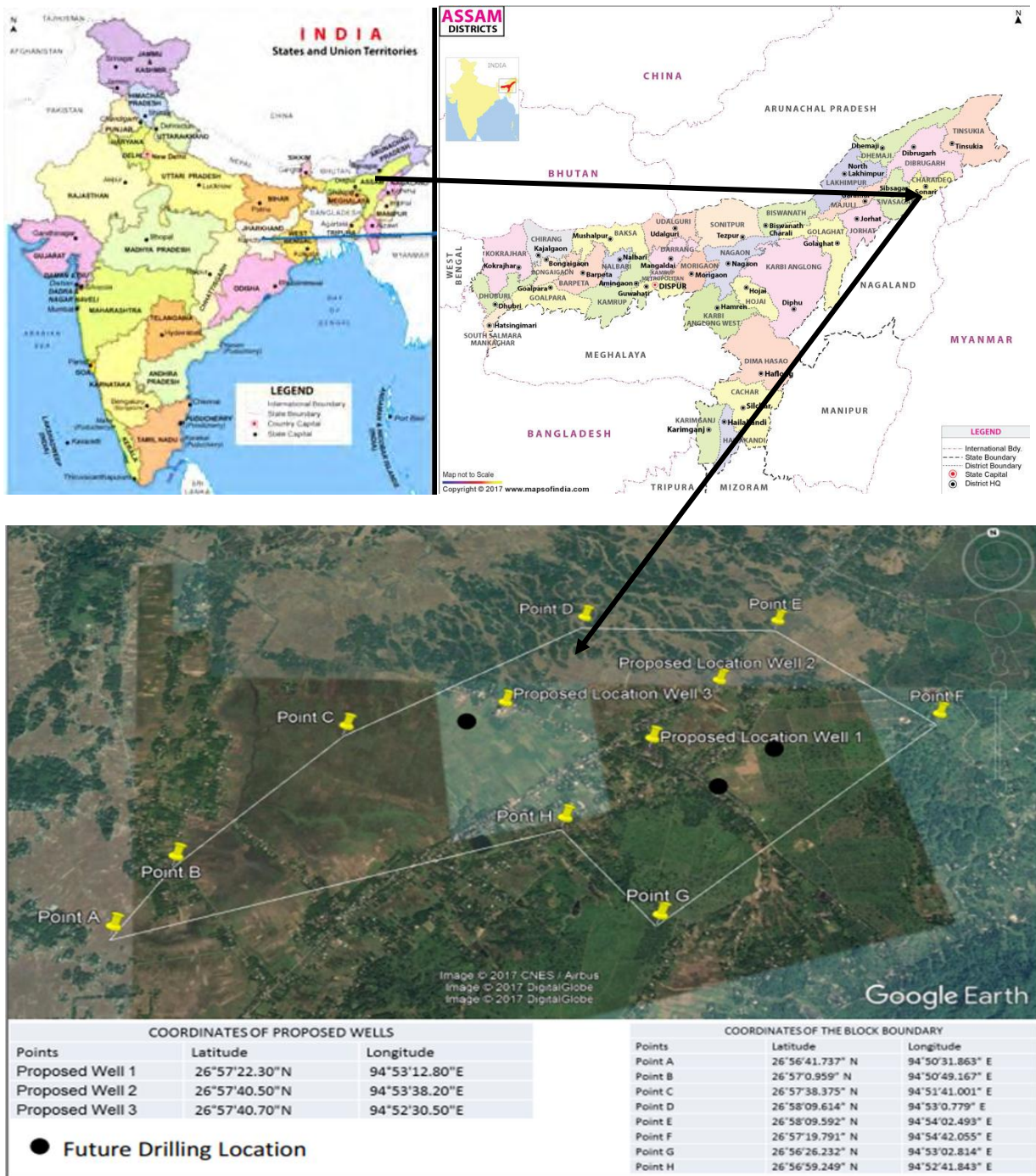


Figure 2.1: Location map of Project site

☐ Communication

Charaideo Block:

- ✓ The Charaideo Block is connected to through Roads (Dodar Ali road which connects to BG Road to NH 37).

- ✓ Nearest Town is Nazira which is 12 Km towards West direction from the block boundary.
- ✓ Disang River is flowing about 7 km on Northern side from block boundary.
- ✓ Nearest Railway Station is Lakwa Railway Station which is about 5.5 Km from the block boundary on northern side.
- ✓ Nearest airport is Dibrugarh which is about 60 km from block boundary towards North East direction.

III. Key Plan

The layout plan for proposed development drilling attached as **Annexure 1**.

IV. Details of alternative site consideration and basis of selecting the proposed site particularly the environmental considerations gone sound be highlighted.

No Alternative Sites are considered as the proposal is for the work over programme of already drilled wells during 1980-2007. Total 6 no. of development wells will be drilled within the 11.48 sq.km of Charaideo Block in Upper Assam Basin of Charaideo Nahophabi PML area.

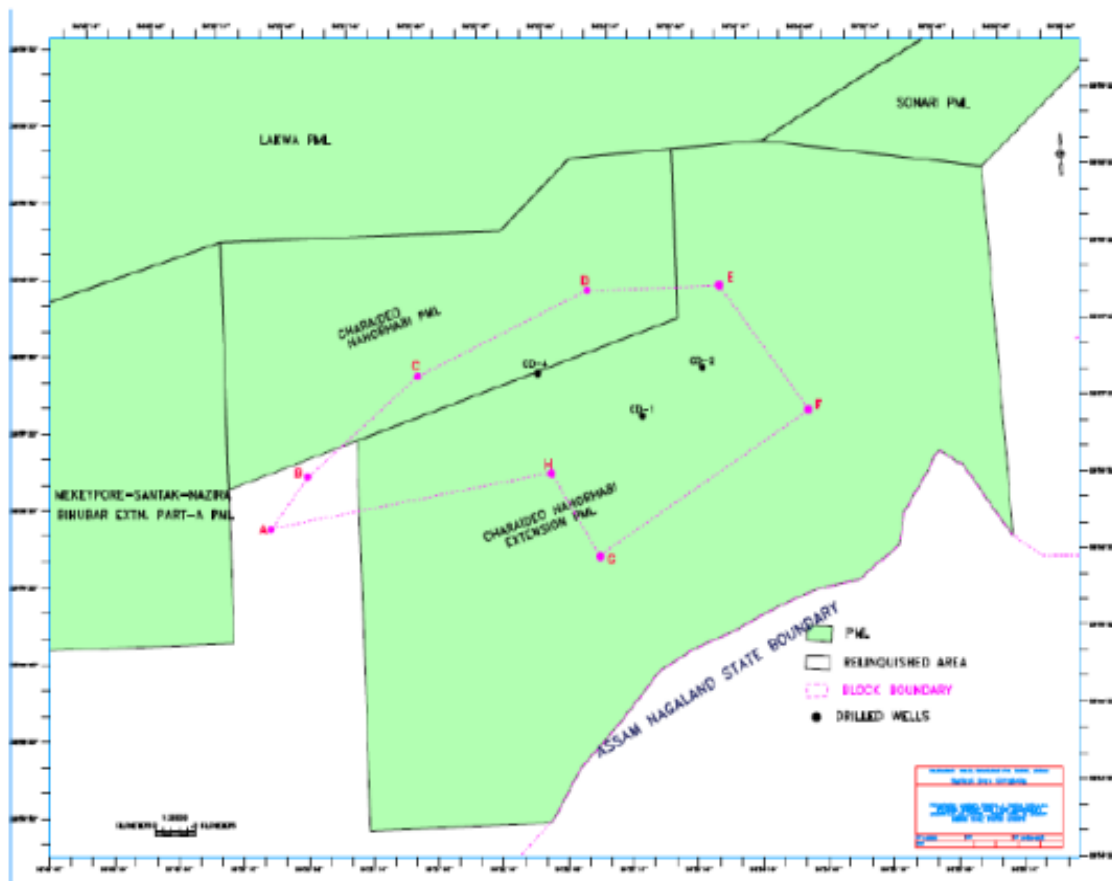
The locations of the wells will be finalized based on the ongoing interpretation of well results and seismic surveys and also the success of each well as they are drilled. The drill sites will be selected away from public utilities and will confirm to the safety and environmental siting criteria.

Consideration of alternate sites is not applicable as the proposed drill sites will be located within the Charaideo Block in Charaideo District, Assam that has been awarded by Government of India for production of hydrocarbons.

V. Size or magnitude of operation

Work Over of the temporarily abandoned wells and drilling of development well in an area 11.48 sq. km of Charaideo Nahophabi in Upper Assam Basin of Charaideo District of Assam for hydrocarbon prospect and gas pipeline (with associated facilities) connecting the production wells to nearest ONGC GGS. Block Coordinates are provided below:

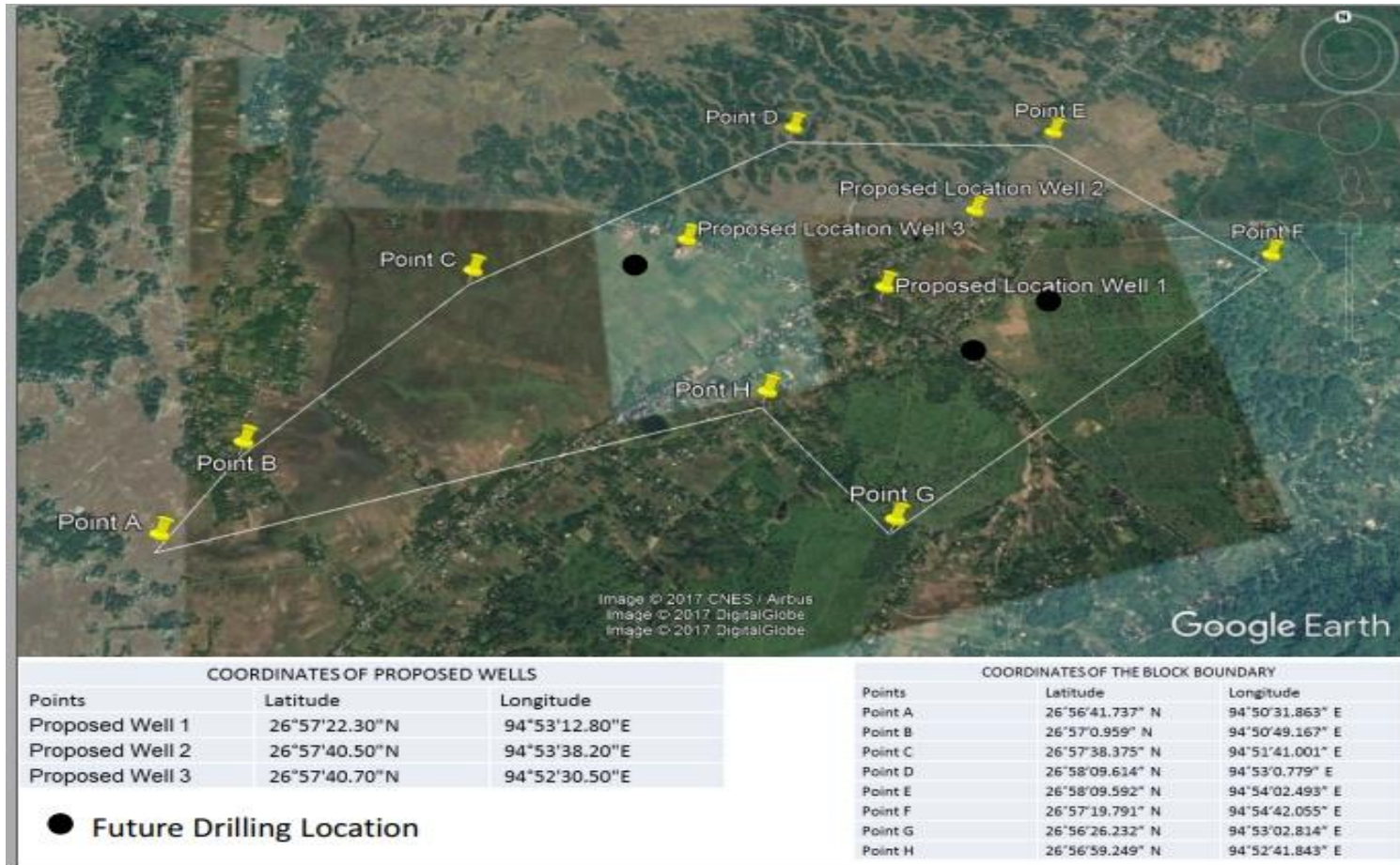
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LOCATION MAP SHOWING THE BOUNDARY OF BLOCK AND LOCATION OF DRILLED WELLS

The proposed development well locations are as follows:

1. Charaideo Block



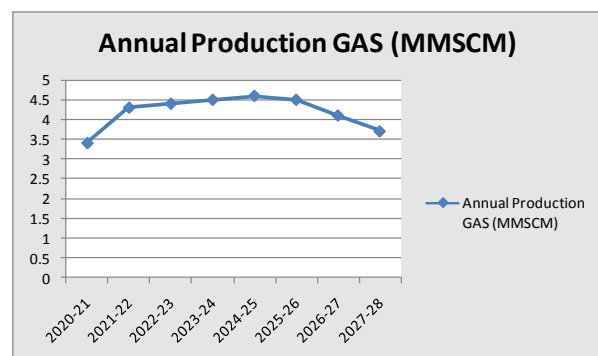
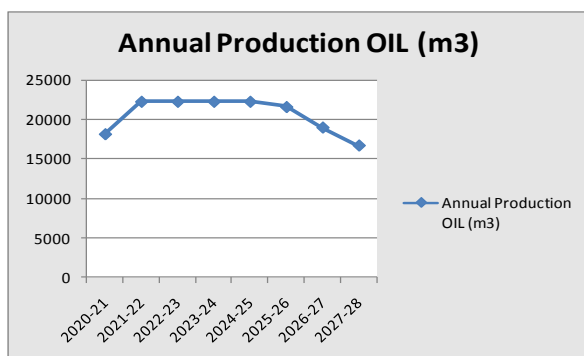
VI. Project description with process details (a schematic diagram/ flow chart showing the project layout, components of the project etc. should be given)

Charaideo Block in Charaideo District, Assam has been awarded to M/s. Oilmax Energy Pvt. Ltd. by GOI during marginal field DSF – 2016 round. The total allocated area of the 1 block under Charaideo Nahophabi PML is 11.48 sq.km. The entire Block (covering the area of 11.48 Sq km) is covered by 3-D seismic in the NAS Mega-merge volume newly re-processed in RCC, Jorhat.

These blocks are explored by ONGC Ltd. during the period 1981, but did not put into production as it was not economically viable for them.

Table 2.2: Projected Production profile

Year	Annual Production (cu. m)	
	OIL (m3)	GAS (MMSCM)
2020-21	18084	3.4
2021-22	22258	4.3
2022-23	22258	4.4
2023-24	22258	4.5
2024-25	22258	4.6
2025-26	21579	4.5
2026-27	18946	4.1
2027-28	16635	3.7



After getting PML from state government and environment clearance from MoEF&CC, Oilmax plan to test the well and put them into production. With the result of existing wells, company may drill 3 more new wells to maximize hydrocarbon exploitation. Government regulations will be taken into account for well spacing. Old data are being

reviewed to know the details of the existing wells. Initially Company will do work over on existing wells to start production.

Development drilling operation will be carried out in accordance and guideline prescribes by OISD and international standards. Waste will be disposed by state register agencies. Proper program of the operations will be prepared and shared to OISD / DGH prior to starting operation for review and guidance. Details of the operation (DPRs) will be sent to DGH /OISD in regular basis.

□ Development Drilling Process

The area proposed to be acquired for well site during drilling will be 150m X 150m =2.25 ha, including site facilities and for camp site it will be 2.0-2.5 ha. Land proposed for acquisition is mainly non-forest land (in case of forest lands clearance from Forest department will be obtained). Well drill site will have the following facilities:

- ✓ Portable office cabins / rest rooms (container type cubicles);
- ✓ Drilling rig foundation and celler;
- ✓ Foundation / Pits for ancillary equipments;
- ✓ Space for drill rig equipment, working area and materials lay down area;
- ✓ Waste storage pits;
- ✓ Cutting disposal (impervious lined) pits;
- ✓ Waste storage pit;
- ✓ Septic tank with soak away pits;
- ✓ Mobile ETP;
- ✓ Paved and contained chemical storage area;
- ✓ Above ground Diesel storage tanks with paved and bunded area;
- ✓ Radio room;
- ✓ Storm water drainage system;
- ✓ Internal roads and fencing; etc

The site will be sized to contain all equipment and buildings, storage, workshops, etc. using distances between various rig components in line with existing rules and regulations for the area of operation and the approved standard operating procedures of the drilling contractor. The typical layout of the well site with ancillary structures is provided in Figure 2.3.

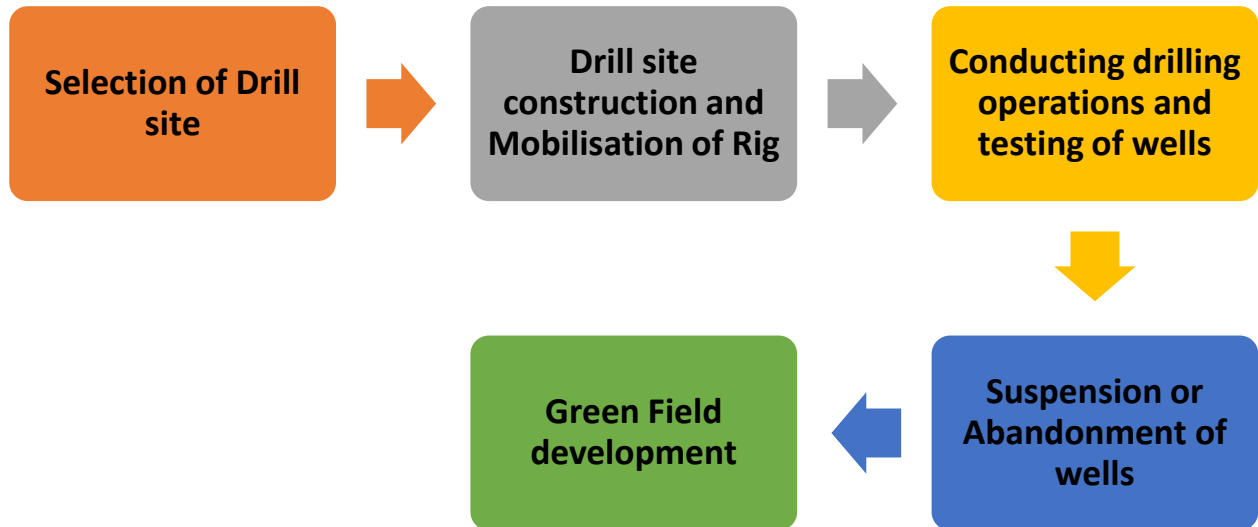


Figure 2.2: Process Flow Chart

2.1.1 PRE-DRILLING ACTIVITY

The pre-drilling phase will involve the following:

❑ Site Preparation and Access

A. Drill Site Construction

Drilling of proposed wells shall be carried out at site and following activities shall be completed:

- ◆ **Fencing:** The proposed well site & campsite will be duly fenced to a height of about 2 m using chain link and barbed wires to restrict unlawful entry into the site.
- ◆ **Leveling:** The depth of the top soil of the entire drill site will be gauged, scraped and stored in designated top soil storage site for future use (site reclamation and rehabilitation).
- ◆ **Construction of Drill Platform:** Once the top soil removal process is completed, the entire drill site will be elevated and leveled and compacted. The drill site may require filling of earth to elevate the drilling platform based on local topography and High Flood Level (HFL). Fill material will be met from excavated material for pit required

for drill site and balance amount will be sourced from authorized quarry area. Pits will be required for storage of mud, drill cutting, waste water, formation water, etc. These include the following:

- **Construction of Drill Pad:** A flat rectangular/square drilling pad of 15X15 m (approximate) at site to facilitate drilling and testing of hydrocarbons will be required. Reinforced Cement Concrete (RCC) will be used for the construction of foundation system.
- Excavation of Pits

The following pits would be excavated within the well site

- ✓ Construction of cellar pit 3m X 3m X 3 m for installation of well head and BOP
- ✓ Construction of 2 HDPE lined pit of dimensions 30'X 33'X 5' at well site for temporary storage and disposal of drill cutting
- ✓ Construction of 2 HDPE lined pit of dimensions, 38'X 33'X 5' and 23'X 20'X 5' for temporary storage and disposal of drilling mud.
- ✓ Construction of 1 Oil pit of dimension of 3'X 3'X 4'
- ✓ Septic tanks and Soak pits will be constructed to dispose the domestic wastewater and sewage at the drill site.
- **Construction of Bunds & Storm Water Drains:** The soil excavated from the pits will be used to build a raised bund/ embankment bordering the periphery of the drill site. A storm water drain is constructed before the bund. Oil-water separator and silt-trap will be constructed at one end of the storm water drain.
- **Construction of Access road:** The proposed site for development wells already has paved access roads. The roads will be strengthened for transporting the rig and ancillary equipments and approximately, 0.02 ha [(50 m) length x 4.0m width] land will be required for extension of existing road to proposed site.

B. Mobilization of Rig

The proposed drilling shall 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 4500 meters (TVDSS) as planned for the project. The typical configuration of a Drilling Rig is shown in the Figure 2.5 and given in Table 2.2. 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.

Table 2.2: Details of the drilling rig

Type of rig	Electrical Rig
Drilling mud composition	Water based Drilling Fluid
Power generator type & nos.	AC – SCR Type. (03 Nos.)
Details of solids handling system on rig	Shale Shakers - 1200 GPM Capacity Desander – 1200 GPM Capacity Desilter – 1200 GPM Capacity

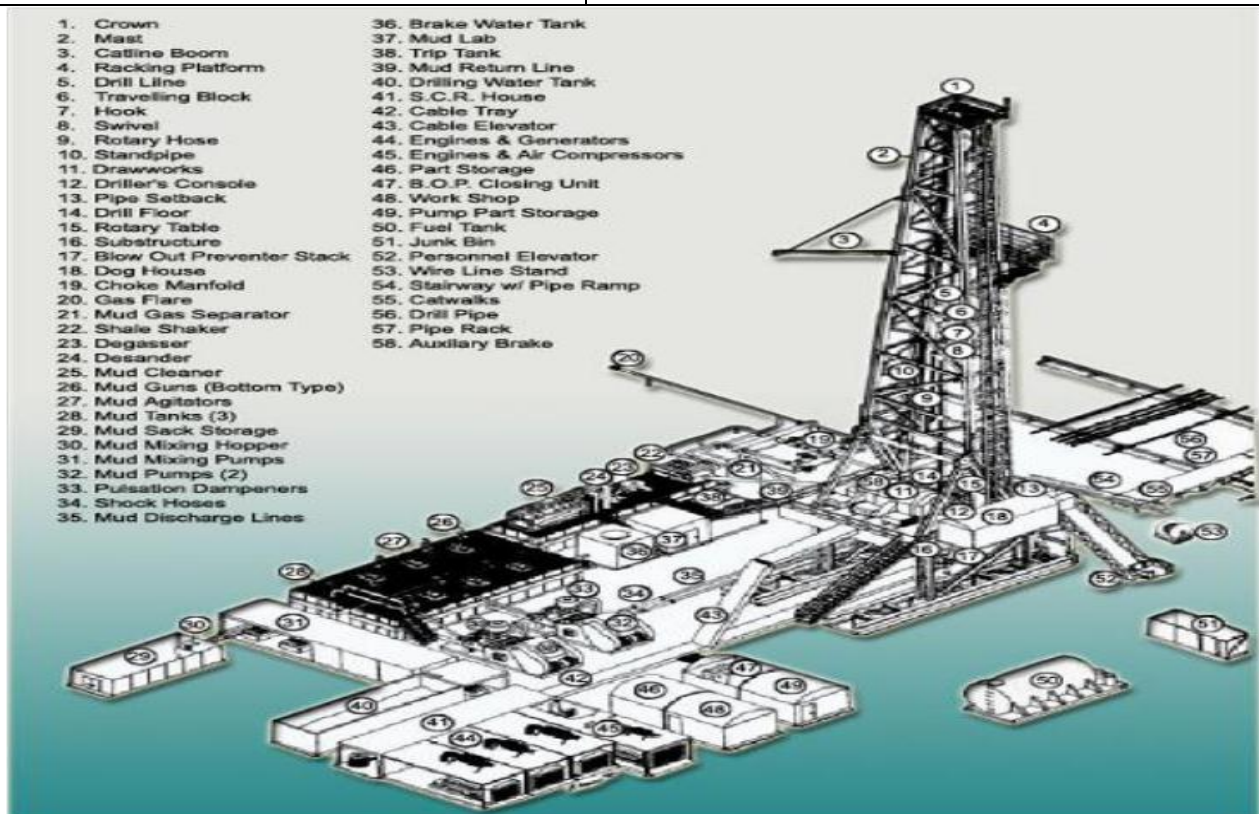


FIGURE 2.5: CONFIGURATION OF DRILLING RIG

2.1.2 DRILLING ACTIVITY

A rig will be installed at the potential site of drilling after thorough inspection for its working capability and quality standards. Well spudding shall be the start of drilling activity. Top-hole section will be drilled to a desired depth based on well design. After drilling top-hole section, it will be cased with a pipe called “Casing”. “Casing” provides support to hole wall and secures hole section. Other than that, it isolates problematic hole

sections such as loss zones, shale sections, over pressurized formations etc. After running casing, space between hole wall and “Casing” (annulus) will be cemented. This process of drilling and casing the hole section continues until the final well depth (target) is achieved. Drilling process is associated with various hazards such as well active situation (kicks), blowouts, H₂S situation etc

Drilling shall be undertaken for a maximum up to 5000m depth and the size starting from around 16” and decreasing in depth up to 6”, area 120mX100m for each well. The process of drilling includes following:

A. 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. 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.

B. 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.

C. 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. Another type of blowout preventer is a “Ram Preventer”. Ram preventers are of two types i.e., Pipe Rams and Shear Rams. Pipe rams also close the annulus between drill string and casing, but they have a fixed size. As such a specific pipe rams can be closed on a specific size of pipe. Shear rams are generally the last choice of preventer to be operated as they shear drill string and shut off the well bore. After determining the existing formation pressure and other geological complexities from the seismic data, appropriate BOP will be used as per standard oil field guideline for the same.

D. Drilling Fluid (Mud)

The role of the drilling fluid (mud) in pressure control is especially important. If the drill bit penetrates a formation containing oil, gas or water under pressure, these fluids 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 rheological 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.

Based on geological prognosis and predicted formation pressures, Water Based Mud (WBM) will be used for all the wells considering environmental constraints and hazards.

The main components of drilling mud are slurry of inert solids suspended in a liquid phase. The main constituents of the WBM are bentonite and barites, both of which are natural minerals. In case if the WBM is not able to be used due to geological formation complexities then low toxic oil base mud with less than 1% aromatic contents can be used after intimating the MOEF and/or State Pollution Board.

The composition of WBM is as per given in Table 2.3 & 2.4.

Table 2.3: Chemical list for KCl-PHPA polymer mud System

Sl.No.	Name of chemicals	Storage
1	BARYTE	Chemicals stored at Central stores and sent to drill sites stores as & when required.
2	BENTONITE	
3	CAUSTIC SODA	
4	CMC (LVG)	
5	CMC (HVG)	
6	PHPA	
7	PAC-LVG	
8	PAC-RG	
9	XC POLYMER	
10	POTASSIUM CHLORIDE	
11	POLYOL GD-I	
12	POLYOL GD-II	
13	BACTERICIDE ALDEHYDE	
14	DRILLING DETERGENT	
15	LINSEED OIL	
16	EP LUBE	
17	SPOTTING FLUID (NW)	
18	ALKALI SODA ASH	

Sl.No.	Name of chemicals	Storage
19	SODA ASH	
20	SODIUM SULPHITE	
21	SULPHONATED ASPHALT	
22	LIMESTONE POWDER	
23	SODIUM CHLORIDE	
24	ALUMINIUM STEARATE	

Table 2.4: Functions of Special additives in WBM

Sl.No.	Chemicals	Functions
1	Sodium bicarbonate	Eliminate excess calcium ions due to cement contamination
2	Sodium chloride	Minimize borehole washout in salt zone
3	Groundnut shells, mica of cellophane	Minimise loss of drilling mud to formation
4	Cellulose polymers or starch	Counter thick, sticky filter cake, decrease filter loss to formation
5	Aluminium stearate	Minimize foaming
6	Vegetable oil lubricant	Reduce torque and drag on drill string
7	Potassium chloride	Stabilisation of shale

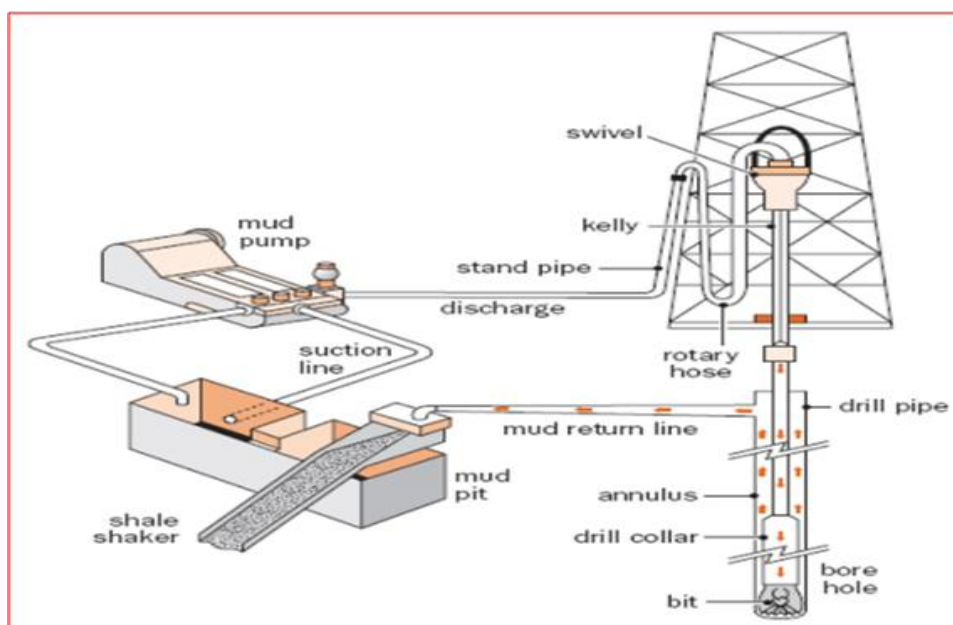
The mud pump takes in mud from the mud pits and sends it out a discharge line to a standpipe. The standpipe is a steel pipe mounted vertically on one leg of the derrick. The mud is pumped up the standpipe into a flexible reinforced rubber hose called the Kelly hose. The Kelly hose is connected to the swivel; goes down the Kelly, drill pipe and drill collars and exits at the bit. The mud then does a sharp U-turn and heads back up the hole in the annulus. The annulus is the space between the outside of the drill string and the wall of the hole. Finally, the mud leaves the hole through a steel pipe called the mud return pipe and falls over a vibrating screen like device called the shale shaker. The shaker screens out the cuttings from the mud. The mud drains back into the mud tanks and is recycled back into the well via the mud pump, while the drill cuttings which are inert materials of shale, sand, and clay fall into the lined waste pits. The drilling fluids left over at the end of the particular well will be discharged into the lined waste pits and dried. The pits will be provided with plastic liners to maintain integrity and prevent any leakage. The drill cuttings cut by the bit are removed from the mud by the shale shakers and other solids removal equipment and transferred to the waste pits. Once the mud is cleaned it is pumped down the drill string again.

The drilling mud, which is pumped through the drill string, through the drill bit and then returns up the annulus between the drill string and bore hole, serves a number of important functions, including:

- Removal of drilled solids (i.e. cuttings) from the bottom of the hole and their transport to the surface for separation from the mud;
- Lubrication and cooling of the drill bit and string;
- Deposition of an impermeable cake on the well bore wall to seal the formation being drilled; and
- Countering the natural formation pressures and preventing uncontrolled flow of fluid from the formations.

Once the cuttings have been separated, the drilling fluid will be reused or processed after further treatment in a Chemically Enhanced Dewatering (CED) system designed to remove suspended solids that are too fine for mechanical separation in solids control package producing inlet particles called 'flocs'. The flocs will be removed in the decanting centrifuges and the resultant sludge disposed off in High Density Polyethylene (HDPE) lined pit (of approximately 2 X 140 m³ area). The cleaned waste water will also be stored in HDPE lined pits and disposed off, after testing and any necessary treatment, to meet the regulatory requirements.

At the end of drilling of each well, whatever the fluid left in the pits will be treated & transported to the next drilling location or disposed off in secured landfill site (pit).



E. Drilling Cutting

Mud used during the operation will flush out formation cuttings from the well hole. These cuttings will be separated from the drilling mud by thoroughly washing. Cuttings will then be stored in the HDPE lined pits (of approximately 2 X 140 m³ capacity) and after completion of the drilling activities, cuttings will be tested for hazardous nature and based on nature of the drill cuttings, final disposal pathway will be finalized by Oilmax as per Sl No 72 C of GSR 546 (E) dated 30th August, 2005. The total amount of cuttings expected during the entire drilling period will be about 250 m³.

F. Drill-stem testing

A drill-stem test is frequently performed to evaluate the formation or zone from which the gas show was observed. Drill-stem tests may also be performed when the driller observes a decrease in the time required to drill a foot of rock, known as a "drilling break." Since porous rock may be drilled easier than nonporous or less porous rock, a drilling break indicates the presence of porosity, one of the qualities of reservoir rock. A drill-stem test enables the exploration company to obtain a sample of the fluids and gases contained in the formation or interval being tested as well as pressure information, which is determined by special gauges within the test tool.

Drill-stem testing is accomplished by removing the drill string from the bore hole. The drill bit is removed and a drill-stem test tool with a packer is attached. The test tool, packer, and drill string are inserted back into the bore hole to the desired depth. The packer, which is an expandable device, is set and expanded at the predetermined depth to isolate the zone to be tested. The test tool contains a valve which may be opened and closed to allow formation fluids to enter the test tool and drill string. If there is sufficient fluid and pressure within the zone being tested, the formation fluid may rise to the surface and flow into special test tanks used for that purpose. If gas is present, it is burned at the surface as a flare. By analyzing the rate of flow or the amount of formation fluid recovered in the drill string and the formation pressures recorded, obtaining a good indication of reservoir characteristics such as porosity, permeability, and the nature of the fluids or gas contained therein is possible.

G. 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. The flaring will be intermittent and

last only for few days and it will not pollute environment. 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. Extremities of flare lines will be located at least 90 m from roads, public works, processing units or tanks. They will be at least 50 m from a well, gas/oil separator, site drainage or other possible source of ignitable vapours. It should be ensured that a flare line will be:

- Equipped with a pilot flame or other ignition device to ensure continuous Ignition of vented gas; and
- Equipped with a guard to protect the flame from being extinguished by the wind.

The zones expected to be Gas bearing will be identified based on the wire line log data and same will undergo testing to confirm the same. Approximately duration of the test flaring is around six hours per day and for four days during developmental drilling. Temporary test separators with facilities for flow metering will be provided which will separate oil, gas and water.

H. 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. This cable contains numerous electrical circuits. Signals detected by the tools are recorded in a recording truck at the surface by means of the electrical circuits contained in the cable.

Electrical logs measure the natural electric potential and the effect of induced electricity on the formations. Radioactivity logs measure the natural radioactivity and the effect of induced radioactivity on the formations. Sonic logs measure the velocity of sound waves in the formations. By analyzing these logs, experienced geologists and engineers can determine the depth from the surface to various formations and intervals, formation characteristics such as rock type and porosity, and indications of the presence of oil or gas and quantity.

I. 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. If, on the other hand, evidence indicates the presence of oil or gas in sufficient quantity to allow the recovery of these costs and provide a profit to the company, an attempt will be made to complete the well as a producer.

If the well is to be plugged and abandoned as a dry hole, the well bore is filled with drilling fluid, which contains additives which give it special properties that prevent its movement from the well bore into the surrounding rock. Cement plugs are required within the well bore at intervals where porosity has been detected to isolate these porosity zones and prevent the movement of formation fluids from one formation to another. The cement is pumped into the well bore through the drill string. The cement is mixed at the surface in special trucks which are equipped with high-volume pumps. The pumps are connected to the drill string which has been inserted into the well bore to a predetermined depth. A quantity of cement is pumped into the well bore through the drill string and displaced out of the bottom of the drill string with drilling fluid. The drill string is then pulled up to the next interval that is to be cemented. This process is repeated until all the required plugs have been set. A cement plug is also set at the base of the surface casing, which remains in the hole, and another plug is set at the surface. In cultivated areas the surface casing is cut off below plow depth. A steel plate is welded at the top of the surface casing. All drilling equipment and materials are removed from the drill site. The pits are allowed to dry up and are backfilled and the site is restored as nearly as possible to its original condition.

J. Restoration of Cutting Containment Area

At the conclusion of drilling, solar drying will dewater the waste pits. All residual solids and liner will be covered with thick column of native soil. As the cutting mud is inert and HDPE (High Density Poly-ethylene) linings of the pit are in place, scope for soil & ground water contamination is insignificant. Grading will take place to ensure natural run-off. Any remaining topsoil that has been stocked during the site clearance will be re-spread over appropriate portions of the site. Plantation/green belt development will be commenced during the next rainy seasons to restore the site.

VII. Raw material required along with estimated quantity, likely source, marketing area of final products, mode of transport of raw material and finished product.

No raw material required for drilling and production activities.

VIII. Resource optimization/ recycling and reuse envisaged in the project, if any, should be briefly outlined.

Maximum care will be taken for resource optimization, wherever possible with an aim of Zero discharge”.

- ✓ Resource Conservation
- ✓ Elimination of Waste Streams
- ✓ Minimizing Waste
- ✓ Reuse of Wastes
- ✓ Recycle of Wastes
- ✓ Treatment and Disposal for making wastes harmless
- ✓ Wash water generated from cleaning of equipment’s will be re-used back into the process. Produced water will be stored and sent to MOEF&CC and ASPCB Authorities Agency for recycling.

IX. Availability of water its source, energy /power requirement and source should be given.

☐ Water requirement

Water is basically required for preparing drilling mud, direct washing of drill cuttings, cooling of gas engines and for meeting domestic needs of the campsite. Typically, the water consumption will be about 20 kilolitres per day (KLD) as per details depicted in Figure 2.7. The camp will normally operate with around 100 personnel. The water requirement will be met from the local sources through water tankers.

Table 2.5: Water Consumption Details (KLD)

Sl. No.	Domestic water requirement (KLD)	Mud Preparation (KLD)	Rig Wash (KLD)
1	12	4	4

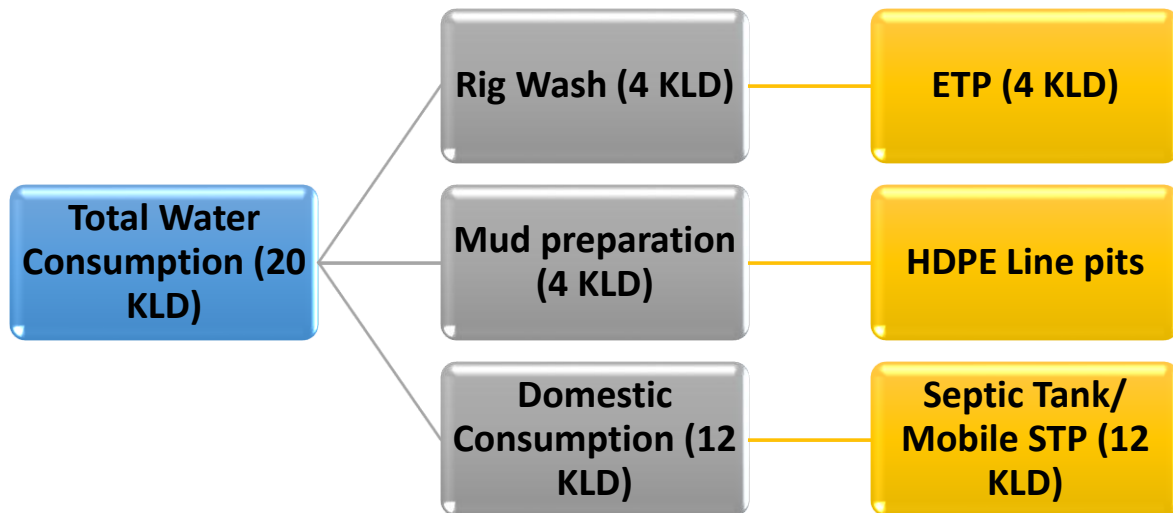


Figure 2.7: Water Balance

❑ Power Requirement

The power requirement of drill rig will be met by three (03) DG sets (including one as standby) with a diesel consumption of about 4 KL/day. DG sets will be used to meet the requirement of power of nearly 2000 KW using nearly 4 KLPD of HSD for drilling and other operations. For production installations, electricity consumption: Around 130 KW for OCS/EPS/QPS per Day. During well testing/flaring one auxiliary 250 KVA DG Set will be in operation.

❑ Fuel Requirements & Storage

Estimated consumption of HSD shall be about 4 KLD and shall be stored in drums of 1000 liters.

Estimated consumption of HSD shall be about 4 KLD and majority of it will be used for power generation via DG sets and stored temporarily only during site preparation or rig building phase till HSD reserve tanks are installed.

During the drilling phase, the consumption of diesel by the drilling rig will be about 4 KLD. 85% of the fuel will be used for rig operation and 15% will be used in the campsite. Two reserve tanks with 10 KL each capacity are installed at site and necessary permission

will be obtained. These are surrounded by dyke wall as a means for containment in case any emergency.

X. Quantity of waste to be generated (liquid and solid) and scheme for their management/disposal

The hazardous waste generated from the drilling site/ process units consists of drill cuttings, drilling mud, brine, Acid, Chemicals, used oil from maintenance activities etc. The wastes will be classified as per the Solid Waste Management Rules 2016 and be collected, stored, treated and disposed as per rules.

Liquid Waste:

During drilling operations, approximately 4 KLD of drilling waste water will be generated as a result of rig wash and dewatering of spent mud, effluents from washing of drill cuttings, floor washings, pump, seal leakages etc. The characteristics of drilling and wash wastewater will be primarily dependent on type and composition of drilling fluid used for drilling.

As Oilmax is proposing the use of water-based drilling mud, the potential for contamination of such waste water is significantly lower. The drilling wastewater will contain spent drilling fluid generated as a result of washings. The rig wash water and drilling wastewater generated is proposed to be recycled through a mobile Effluent Treatment Plant installed at the drilling site. Domestic waste water generated (about 12 KLD for the drilling camp) will be treated through a soak pit/septic tank arrangement. The quantities of the liquid wastes, their characteristics and anticipated disposal methods are given in Table 2.5.

Table 2.5: Liquid Wastes Generated During Drilling and Disposal

Type of wastewater	Amount (KLD)	Disposal method
Drilling and rig wash Wastewater	4	The water will be adequately treated in a mobile ETP to ensure conformance to The water will be adequately treated in a mobile ETP to ensure conformance to the S No. 72 A (ii) Schedule I Standards for Emission or Discharge of Environmental Pollutants from Oil Drilling and Gas Extraction Industry of CPCB

Type of wastewater	Amount (KLD)	Disposal method
Domestic Wastewater (Sewage)	12	Mobile Sewage Treatment Plant of 20 KLD capacity

Solid & Hazardous Waste:

The estimated details of waste that would generate from drilling of well is given in Table 2.6 & 2.7.

Table 2.6: Hazardous waste details per well

Sl.No.	Hazardous waste	Category	Quantity	Method of disposal
1	Sludge containing oil	2.2	Generation is dependent on type and duration of testing operations and well kick / blowout situations (10 m ³)	Disposed to ASPCB/ CPCB registered waste oil reprocessor
2	Drill Cutting	2.1	250 m ³ /well	Drill cuttings will be disposed off in a well designed pit lined with impervious liner located on site as per S No. 72 C.1.a Schedule I Standards for Emission or Discharge of Environmental Pollutants from Oil Drilling and Gas Extraction Industry of CPCB as modified in 2005.
3	Drilling mud	2.3	Drilling Mud : 1500 m ³ /well	Drilling mud will be analysed through MoEF/ ASPCB authorised laboratory and then disposed on-site in HDPE lined pits located on site as per S No. 72 C.1.a Schedule I Standards for Emission or Discharge of Environmental Pollutants from Oil Drilling and Gas Extraction Industry of CPCB as modified in 2005.
4	Used/ spent oil	5.1	2-3 KL per well	Used oil will be collected in metal drums kept in secured dyked area and will be disposed to CPCB/ ASPCB registered used oil reprocessor
5	Wastes/ residues	5.2		Disposed on-site in HDPE lined pits located on site as per S No. 72 C.1.a

Sl.No.	Hazardous waste	Category	Quantity	Method of disposal
	containing oil			Schedule I Standards for Emission or Discharge of Environmental Pollutants from Oil Drilling and Gas Extraction Industry of CPCB as modified in 2005.
6	Lead Acid batteries	17 (Schedule IV)	2-3 Batteries per drilling of well	Will be recycled through the vendors supplying acid - lead batteries as required under the Batteries (Management & Handling) Rules, 2001 and amended thereof.

Table 2.7: Non Hazardous Waste details and disposal methods

Sl.No.	Non Hazardous waste	Quantity	Method of disposal
1	Kitchen Waste	10 - 20 kg per day	Will be stored in compost pits on a daily basis or disposed off nearby municipal disposal site via local vendors
2	Recyclable waste like papers, plastics,	Small	Proper segregation and storage of recyclable waste in designated bins onsite. Recyclables will be periodically sold to local waste recyclers.
3	Packaging wastes	Small	Proper segregation and storage at designated stackyard onsite. Packaging wastes will be periodically sold to local waste recyclers.



CHAPTER 3

SITE ANALYSIS

CHAPTER 3: SITE ANALYSIS

3.1 CONNECTIVITY

The proposed blocks are well connected by road through road and by rail network. The Charaideo Block is located at Charaideo Nahorhabi PML area, Charaideo district of Assam.

Charaideo Block:

- ✓ The Charaideo Block is connected to through Roads (Dodar Ali road which connects to BG Road to NH 37).
- ✓ Nearest Town is Nazira which is 12 Km towards West direction from the block boundary.
- ✓ Disang River is flowing about 7 km on Northern side from block boundary.
- ✓ Nearest Railway Station is Lakwa Railway Station which is about 5.5 Km from the block boundary on northern side.
- ✓ Nearest airport is Dibrugarh which is about 60 km from block boundary towards North East direction.

The map showing the road network around the site is given in Figure 3.1.

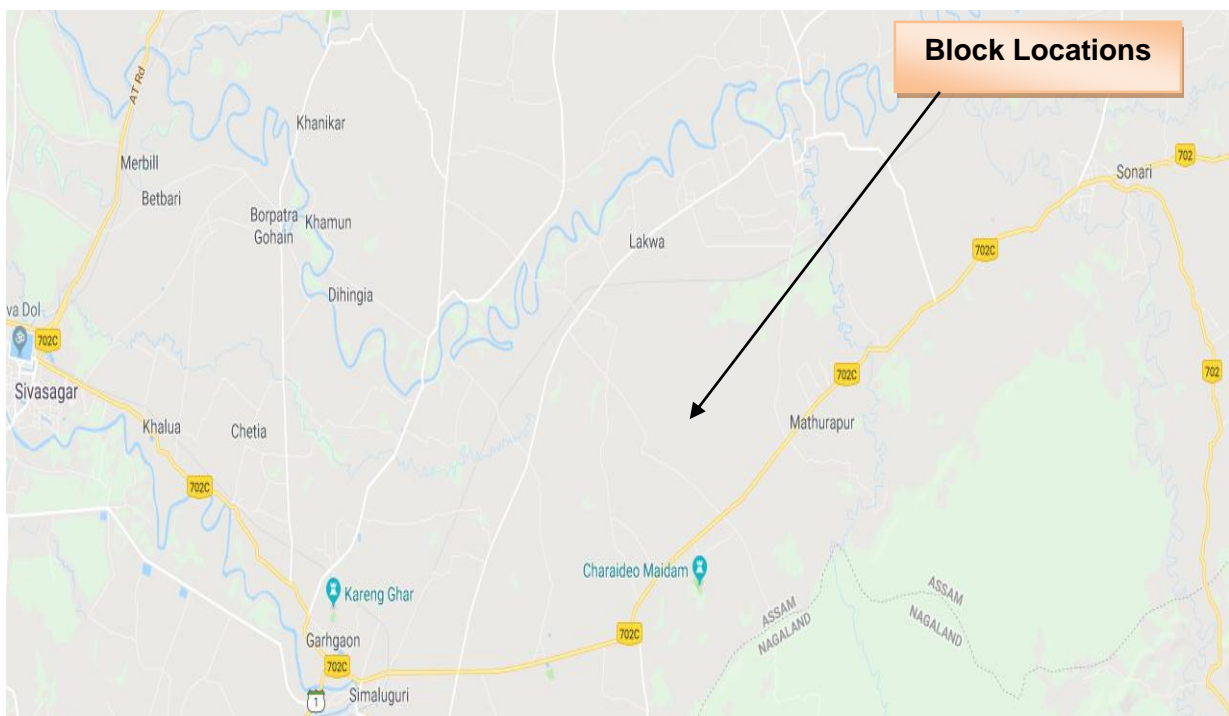


Figure 3.1: Connectivity shows in the map

3.2 LAND FROM LAND USE AND LAND OWNERSHIP

The total area of Charaideo Block is 11.48 Sq. Km. Government of India has awarded one block (Charaideo) under Charaideo Nahorhabi PML within the Upper Assam Basin situated in Charaideo District of Assam to M/s Oilmax Energy Pvt. Ltd and signed a Revenue Sharing Contract (RSC) in DSF round for the same.

The landuse in the area is predominantly agricultural and some area under forest. Habitation and Village settlements are present as clusters. Land required for construction of each well is about 2.25 ha including a campsite which will be acquired on temporary basis. Safe distance from settlements, natural drains, water bodies, public utilities etc. will be maintained. Site preparation activities include clearing of vegetation, leveling and pit construction for storage of water, diesel, drilling mud, brine, acid, produced water and drill cuttings. The land use at the drill site will be temporarily affected during drill operations. However, upon completion of drilling activities, the drill site will be restored to its near original condition and handed over to the land owner. In case of hydrocarbon discovery, the well head will be capped and portion of the area will be cordoned and retained.

Land ownership is presently ONGC Ltd. which has been taken for 20 years lease.

3.3 TOPOGRAPHY

The study area is predominantly plain topography and is located 505 ft above mean sea level and having a gentle slope towards south-westerly direction. However, the area is drained by network of River, canals and the artificial drains (field drains/channels).

The Disang River flows with an east-west trend at the extreme North West corner of the demarcated PML area. The other major river within the area is the River Suffry, which flows from north to the south east direction. The Diroi River flowing through the Block with a northeast to southwest trend is an important tributary of the Disang River. Over the greater part of the area, natural forests have given way to croplands, tea gardens and the built up areas of human settlement. Beels have been drained out or have lost their natural lateral connectivity, either converting to grasslands or being at a successional stage.

The natural forests within the study area are tropical wet evergreen and tropical semi evergreen forests classified as Assam Valley tropical wet evergreen forest and Assam Valley tropical semi evergreen forest.

The proposed project is located in Seismic Zone V as per IS: 1893 and there is possibility of floods in the area.



Fig 3.2: Topo sheet of the Charaideo Nahorhabi PML

3.4 GEOLOGY OF THE CHARAIDEO BLOCK AREA

The area is a part of North Assam Shelf Block (NAS) of Assam and Assam Arakan Basin and geology as well as the general stratigraphy of the area is similar to the other parts of NAS block which has been discussed below.

The area is an integral part of Upper Assam Basin which forms between two distinctive tectono-geological domains, the Upper Assam Shelf and Naga Schuppen Belt. Geologically, Upper Assam Shelf is defined as the Alluvium covered extension of the Shillong and Mikir massifs to the ENE, which is a narrow belt of about 100km wide and bounded by two

mobile belts to the north & south-east. This elongated shelf extends into the sub-thrust block of Naga Schuppen Belt in SE and roughly conforms to the CITZ (Central Indian Tectonic Zone) trend. The Naga Schuppen Belt is also a narrow linear belt of imbricate eight to nine thrust slices along which Paleogenes of Indo-Myanmar mobile belt have moved north-westwards relative to buried basements of Upper Assam Shelf.

Tectonically, this sub-basin is a fore deep to the Indo-Myanmar orogenic belt, where sedimentation took place under single body of water but sediments are fed by different sources under different tectonic regimes (*S.C. Roychoudhury, 2011*). This part of sub basin is filled with at least 5km thick sediments on a Pre-Cambrian basement floor which is evident on correlation of available seismic traces and numerous wells drilled in the Basin.

The regional stratigraphic set up shows development of both shelf and geosynclinal facies of the A&AA basin in the area. The Paleogene sequence was deposited on the flanks of passive continental margin as a fairly simple transgressive (Basal Tura sand, Sylhet limestone & Kopili shales) and regressive (Barails) wedge. It is followed by the Neogene sequences (Tipam Group of sediments), consisting mainly of fresh water sandstone and fresh water clays and sand/clays alternations, and were deposited unconformably over Barail group of sediments after a period of non-deposition in Early Miocene. Tipam Group of sediments is overlain by Namsang bed & Alluvium of high level terraces deposited in fluvial environment.

The general elevation of Charaideo Field is around 110 m above MSL. Topographically, the area is almost plain.

Structure

Charaideo structure is a seismic high located in the Nazira Graben and is about 6 km south east of main Lakwa high. Naga thrust affected the southern part of the structure. To the west of the structure in the strike direction is the Rajabari fault closure and to the east is the Mathurapur low. About 3km north of Charaideo structure is the Nahorhabi fault closure. Charaideo is structurally down at Tipam and Barails levels with respect to Nahorhabi. The structural disposition is depicted in the depth structure contour maps prepared on tops of TS-2, TS-5 and BCS.

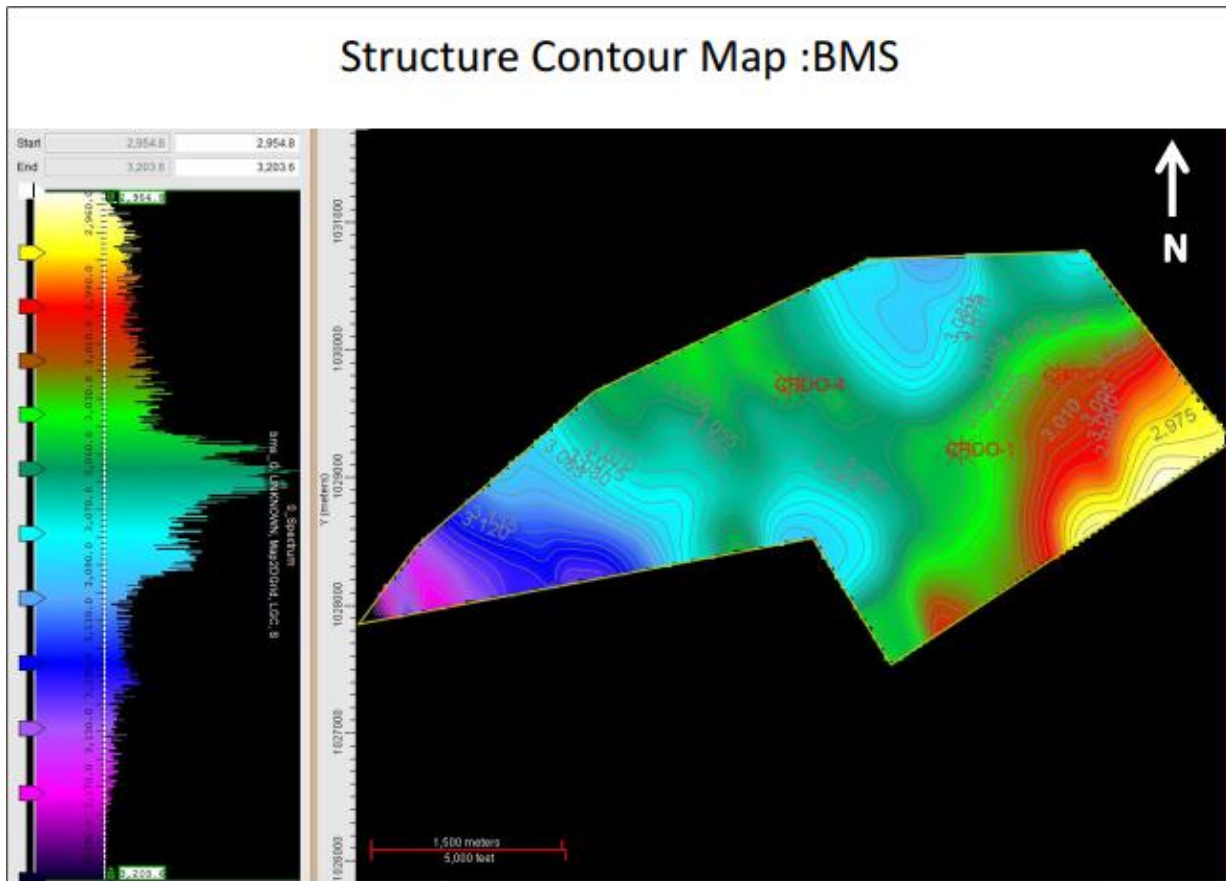


Fig 3.3: Contour Map of the Charaideo Block area

Stratigraphy

The Assam-Arakan Basin is filled with more than 4 to 5 km of mainly terrigenous tertiary sediments above the Pre-Cambrian plutonics and metamorphics, but at some places of the basin like in Himalayan Foot Hills and folded belt, the total sedimentary thickness is expected to be more than 7 km.

The Assam-Arakan Basin is a polycyclic basin with two distinct episodes of tectonosedimentary evaluation. Till the end of Eocene, Assam-Arakan Fold Belt developed independently on the active margin of the Shan plate, whereas Assam foreland shelf existed on the positive margin of Indian plate. Convergence of the two plates resulted in a single heterogeneous basin. This was followed by basin wide gradual negative movement. Carbonates were deposited in shallow open marine condition.

Regressive phase began in the Late Eocene when argillaceous facies formed the dominant deposits in shelf area. In the geosynclinal part Disang group continued to be deposited from Cretaceous age. In the lower part siliceous shale and siliceous radiolarian chert beds

were found with sandstones, siltstones, grey clays and limestone lenses. Some beds are metamorphosed by intrusive igneous rocks. During later part of Paleogene, due to further regression and continued increase in sediment supply, terrigenous clastics were deposited in open marine brackish water and lagoonal environment successively in both foreland shelf area and geosynclinal area.

Neogene sequences consisting mainly of fresh water sandstones and fresh water clays and sandstone-clay alternations were deposited unconformably over Barail group of sediments after a period of non-deposition in Early Miocene.

The period of non-deposition was of longer duration in shelf area where Tipams were deposited unconformably over Barails. The Surmas were deposited unconformably over Barails in the southern part after a relatively shorter period of break in deposition. Coarse to medium grained sandstones alternating with clays of Namsang beds are unconformably overlain on the Tipam group of rocks.

Stratigraphic Column of Charaideo area

Age	Group	Formation	Thickness (m)	Lithological Description
Recent Pleistocene		Alluvium	900	Unconsolidated sands with gravel, silt and minor clays
Pleistocene to Pliocene	Moran	Namsang	550	Intercalated sands and mottled clay
Pliocene –Miocene		Nazira Sst	350	Predominantly sandstone with minor clays
		Girujan	700	Mottled and variegated clays with intercalations of silt/sandstone beds
	Tipam	Lakwa Sst.	550	Massive sandstone with clay/shale alternations
		Geleki Sst.	650	Massive sandstone with clay/shale alternations with minor calcareous matter in the lower part
		Safrai	80	Conglomerate/ grit topped by sandstone shale alternations.
Oligocene –Late Eocene	Barail	BCS	550	Carbonaceous shale and coal with alternations of sand & shale.
		BMS	150	Dominantly sandstone with intercalations of minor shale
Late Eocene Late Palaeocene	Jaintia	Kopili	50+	Dominantly shale with sandstone beds

3.5 ENVIRONMENTAL SETTINGS

Existing land use pattern (agriculture, non-agriculture, forest, water bodies (including area under CRZ)), shortest distances from the periphery of the project to periphery of the forests, national park, wild life sanctuary, eco sensitive areas, water bodies (distance from the HFL of the river), CRZ. In case of notified industrial area, a copy of the Gazette notification should be given

Table 3.2: Environmental Settings of the Area

Particulars	Charaideo Block
Nearest Town/City	Nazira - 12 Km towards West
Nearest highway	Dodar Ali road (through block) which connects to BG Road to NH 37
Nearest railhead / Railway station	Lakwa Railway station is about 5.4 km towards North direction from Charaideo block
Nearest airport	Nearest airport is Dibrugarh about 60 km towards North East direction from Charaideo Block
Defense installations	None
Archaeological important places	None
Wild life sanctuaries	None
Rivers in 10-km Radius	Disang River is flowing about 7 km on Northern side from block boundary
Other water bodies	Canals
Hill ranges	None
Other sensitive areas	None
Seismic Zone	The proposed plant-site area falls in Seismic Zone V as per IS 1893:2002 (Part-1), which is a highly sensitive seismic zone. In case of very severe natural disaster there may be spillage of crude oil from damaged tanks and equipment. However, adequate measures will be taken for safety of men & materials and protection of environment during & after the occurrence of the disaster

3.6 EXISTING INFRASTRUCTURE

Required infrastructure facilities like road, hospital, drinking water, electricity, telephone are prevailing in the proximity of existing project site. Access roads as required for movement of man and machinery will be constructed.

3.7 SAFETY & ENVIRONMENT PROTECTION MEASURES

Operational Safety is the foremost concern while working on drilling rig. Derrick floor is the center stage of all the operations and it is most susceptible to accidents. Safety precaution with utmost care is required to be taken as per the prevailing regulation and practice so that accidents can be avoided. Due to advancement in technology, number of equipment has been developed over a period to cater the need of smooth operation on derrick floor. Various standards are required to be referred to cover the variety of equipment used for safe operation in drilling and become cumbersome at times to refer standards for each equipment as per given hereunder;

- ✓ Twin stop safety device (crown-o-matic and floor-o-matic);
- ✓ Fall prevention device on mast ladder with safety belt;
- ✓ Emergency Escape device for top man;
- ✓ First aid box with Stretcher and Blanket;
- ✓ Fire bell /siren;
- ✓ Emergency vehicle;
- ✓ Fire extinguishers.
- ✓ Flame proof portable hand lamp /safety torch;
- ✓ Railling with toe board;
- ✓ Guards on all moving parts;
- ✓ Breathing apparatus (wherever required);
- ✓ Gas detector for hydrocarbon gas & H₂S gas (if required);
- ✓ Safety lines for power tongs;
- ✓ Rotary brake;
- ✓ Hoisting brake lever with safety chain;
- ✓ Emergency shutoff system for draw works;
- ✓ Safety chain for inclined ramp (to prevent fall of any person);
- ✓ Safety belt for top-man with lane yard;

- ✓ Railing on stair case at mud tank/walkways and derrick floor; etc.

❑ ***General Safe Practices during Drilling Operation***

- ✓ 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;
- ✓ Different type of drill pipes should not be mixed up during making up the string;
- ✓ Protectors should be used on drill pipes while lifting and laying down the pipes on catwalk;
- ✓ Drill pipe rubber protector should be installed on drill pipes body while being used inside the casing;
- ✓ 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;
- ✓ Continuous monitoring of the gain/loss of mud during;
- ✓ BOP mock drill should be carried during drilling / tripping and under mentioned operations;
- ✓ Safe Working Conditions and Practices to be adopted During Drilling Operations; etc.

❑ ***Fire Fighting Facility for Drilling Rig***

For the drilling rigs following fire fighting system/equipments should be provided:

Fire water system:

- ✓ One water tank/pit of minimum capacity of 50 KL should be located at the approach of the drilling site.
- ✓ For experimental production testing, one additional tank/pit of 50 KL should be provided.
- ✓ One diesel engine driven trailer fire pump of capacity 1800 lpm should be placed at the approach area of drilling site.
- ✓ One fire water distribution single line with minimum 4 " size pipe/casing should be installed at drilling site with a minimum distance of 15 m from the well.

Medical Facilities

- ✓ First aids facilities should be made available at the core drilling site

- ✓ 24 hour standby vehicle (ambulance) will also be available at the well site for quick transfer of any injured personnel to the nearest hospital, in case an accident occurs and medical emergency arises.
- ✓ Prior arrangements should be made with the nearby hospitals to look after the injured persons in case of medical emergency during core hole drilling and experimental production testing operations.

Health Safety and Environment (HSE)

The HSE aspects of the project will be managed under a set of business principles supported by policies, standards and business controls. All the HSE aspects of the projects will be monitored, as per Operator's HSE policy. The HSE Policy details the commitment of the Contractor towards Health, Safety, Environment and Sustainable Development. The basic elements of the policy are:

- ✓ Conduct activities in such a manner as to avoid harm to employees, contractors and community.
- ✓ Improve continuously in environment practices and performance.
- ✓ Comply with all statutory requirements and mandatory procedures;
- ✓ Intervene to stop unsafe acts or business decisions;
- ✓ Respect our neighbours.

Since significant amount project activities will be undertaken through contractors, it is necessary that contractor's HSE policies and practices align with Operator's HSE Management System. The same will be achieved through formulating necessary bridging documents.

HSE philosophy

The HSE philosophy of the project will be guided by the following principles:

1. Hazard identification in various phases of the project execution.
2. Risk reduction/minimization through incorporation of suitable mitigation measures in the design.
3. Incorporation of necessary pollution preventive measures in the project design following a precautionary approach.

4. Complying with the applicable laws, rules, regulations and statutory directives / conditions of the Government.
5. Operational control through Good International Petroleum Industry Practices (GIPIP) with the latest available technologies / procedures.
6. Monitoring and audits with internal and external (third party) expertise.

Project HSE Management

Project HSE Management frame work will be based on the principle that all risks are identified as early as possible in the project and a Risk Register developed to actively manage those risks throughout the various phases such that they are reduced to ALARP levels. Risk reduction is most effective during the early stages of the project when changes may be made relatively easily and hence it is important to identify and integrate all the elements (health, safety, and environment) of HSE risks as early as possible.

In order to mitigate HSE risks, it is imperative that the projects to be undertaken go through all the relevant studies and activities to ensure that all the HSE risks related to the project are identified and controlled. These activities will be captured in a Project HSE plan and monitored throughout the project.

Contractor HSE Management

Contracted work accounts for a significant amount of exposure hours and much of it involves high HSE risk / opportunity activities. Hence, early planning and cooperation with contractors is essential to manage and improve HSE performance.

Process, procedures and plans are in place to manage and supervise all contractor HSE activities. Management controls shall be appropriate for the level of risk, the organisational relationship and the capabilities of the contractor.

HSE qualifications are assessed for every contract prior to the invitation to tender and contractor HSE competence is assessed before contract award. Potential contractors are screened to establish that they have the necessary experience and capability in the particular work category. HSE inspection and audit programmes are in place for all contracts to monitor the effective implementation of the contractor HSE MS and the interface arrangements between the contractor and the principal.

3.8 SOIL CLASSIFICATION

The area is basically younger and older alluvium. Younger alluvium is grey colored sand, medium to coarse, clay and silt with gravel and older alluvium is yellow colored sand, medium to coarse, silt, clay with gravel and pebble mainly observed in the block region.

3.9 CLIMATIC DATA FROM SECONDARY SOURCES

The climate of the district is humid and sub-tropical with maximum temperature ranging from 27° to 38°C in the summer and minimum winter temperature varying between 3.4° and 11°C. Humidity is very high ranging from 74 to 87 per cent. The extreme humidity causes sweltering conditions during June to September. The district experiences predominant influence of southwest tropical monsoon which persists from April to October with occasional winter showers. The low clouds of the southwest monsoon after being intercepted by the North Cachar Hills and Naga-Patkai range, cause heavy rainfall in the southern part of Assam and the clouds which pass over this 1800m ridge, precipitate in the Brahmaputra valley, their intensity increasing towards the foothills of the Himalayas. The approach of the monsoon is marked by strong winds, overcast skies and occasional thunder showers, hailstorm and cyclones during April and May. It starts its full play of heavy showers from June. Distribution of rainfall pattern reveals that it is negligible during the period January to March and November to December. On an average the total rainfall during these winter months hardly exceeds 100 mm. Otherwise; the average annual rainfall of the district is of the order of 2400mm.

Social Infrastructure available

Social Infrastructure facilities (both public and private) such as schools, hospitals, community halls, markets, colleges, railway station and religious buildings are located at Nazira, which is located at a distance of 12 km from the proposed blocks.



CHAPTER 4

PLANNING BRIEF

CHAPTER 4: PLANNING BRIEF

4.1 PLANNING CONCEPT

Well sites and roads will be build or upgraded for transportation of rig and its equipment for work over. Pressure testing of the casing will be done to check well integrity. Well intervention job will be carried out to find out held up depth and record current BHP. During depressurizing well hot flaring will be carried out. Well completion methods and production strategy will be designed for longer duration of production life. Pipelines will be layed upto nearby ONGC GGS for oil and gas sales. Natural gas compressor shall be install as per sales pressure requirement which also adds water unloading of well, decrease in flow line pressure and increase in drawdown. After completing the production lifecycle of wells, wells will be permanently abandoned, capped and land will be restored back to its original form.

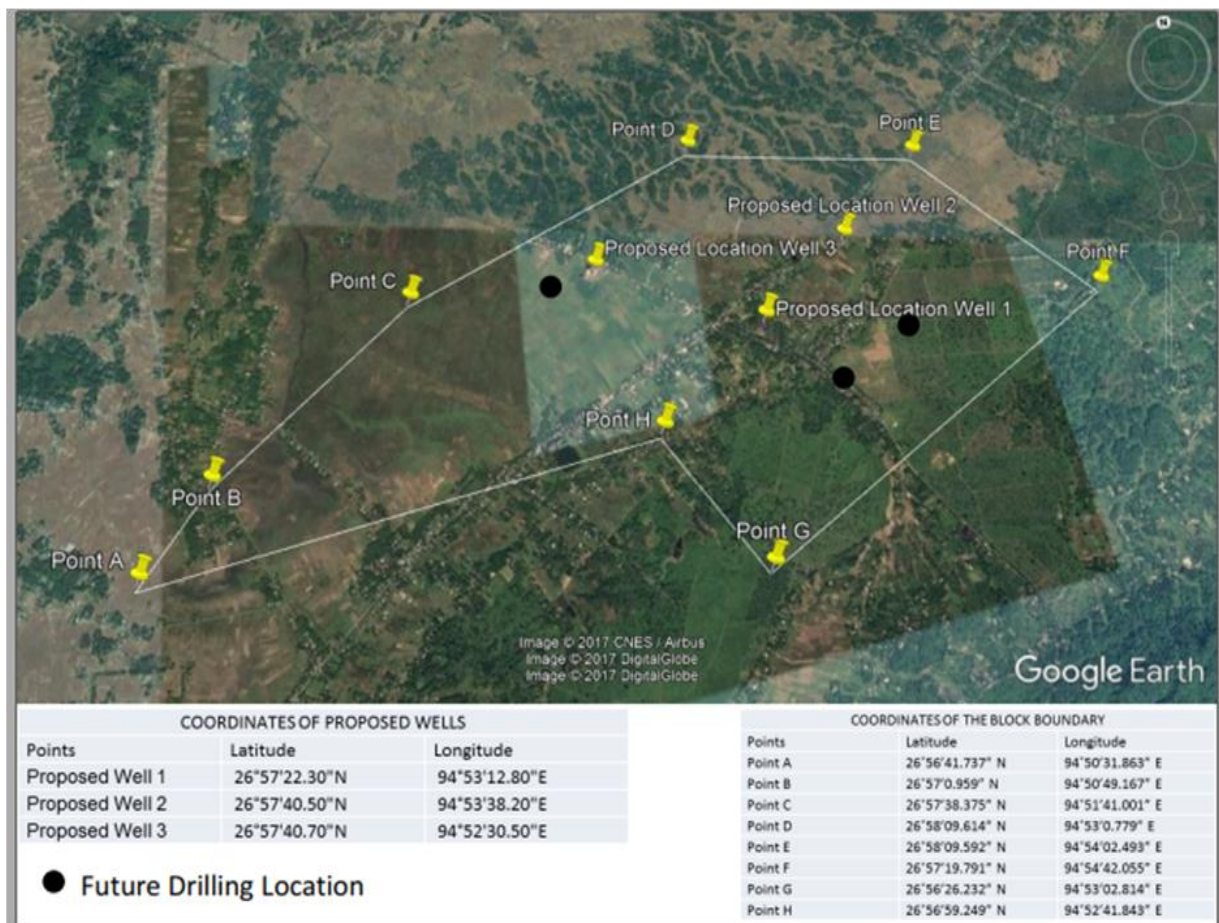


Figure 4.1: Proposed Well locations at Charaideo Block

4.2 POPULATION PROJECTION

Direct and indirect employment will be created due to project. Temporary influx of people will be there as the managerial and supervisory staff will generally be outsider.

4.3 LAND USE PLANNING

The land required for each well site would be approximately 2.25 ha. This will be required on a temporary basis during the drilling phase and if hydrocarbon found then for the production phase.

4.4 ASSESSMENT OF INFRASTRUCTURE DEMAND (PHYSICAL & SOCIAL)

The Infrastructure demand will be very less as the number of employee at drilling wells is about 100. Temporary road facility will be taken up by Oilmax for the drilling well site for the movement of heavy equipment.

4.5 AMENITIES/FACILITIES

The amenities/ facilities will be in the scope of Contractor.

- Potable drinking water
- Firefighting/ alarm system and ambulance is available in case of emergency
- Drinking water, canteen and electricity facilities is provided
- Separate sanitation facilities will be provided for men and women.
- PPE's and facilities related to safety will be provided.
- Occupational Health Centre with qualified doctor is available for periodical health check-up of employees.
- Greenbelt is development.

4.6 PROPOSED INFRASTRUCTURE

Drilling operations will be carried out using electrical rig for onshore well. Drilling unit for drilling of oil and gas wells consists of a derrick at the top of which is mounted a crown block and a hoisting block with a hook. From the swivel is suspended a Kelly stem which passes through a square or hexagonal Kelly bush which fits into the rotary table. The rotary table receives the power to drive it from an electric motor. The electric motor rotates the rotary table, through which passes the Kelly bush, and the rotations are transmitted to the bit as the drilling progresses, the drill pipes in singles are added to

continue the drilling process. At the end of the bit life, the drill pipes are pulled out in stands and stacked on the derrick platform. A stand normally has 3 single drill pipes.

After changing the bit, the drill string is run back into the hole and further drilling is continued. This process continues till the target depth is reached.

During the course of drilling, cuttings are generated due to crushing action of the bit. These cuttings are removed by flushing the well with duplex/triplex mud pumps. The mud from the pump discharge through the rotary hose connected to stationary part of the swivel, the drill string and bit nozzles. The mud coming out of the bit nozzles pushes the cuttings up hole and transports them to the surface through the annular space between the drill string and the hole. The mud not only carries away crushed rock from the bottom of the hole but it also cools the bit as it gets heated due to friction with formation while rotating. The mud also helps in balancing subsurface formation pressures and by forming a cake on the walls of the well also diminishes the possibility of crumbling or caving of the well bore.

At the surface, the mud coming out from well along with the cuttings falls in a trough, passes through the solids control equipment's i.e. shale shaker, de-sander/ de-silter and mud cleaner. This equipment's remove the solids of different sizes, which get mixed with the mud during the course of drilling. The cleaned mudflows back to the suction tanks to be again pumped into the well. The drilling mud/fluid circulation is thus a continuous cyclic operation. The most suitable clay for mud preparation is bentonite, which is capable of forming highly dispersed colloidal solutions. Various other chemicals are also used in mud preparation as per requirements dictated by the temperature/pressure conditions of the wells. The mud is continuously tested for its density, viscosity, yield point, water loss, pH value etc. to ensure that the drilling operations can be sustained without any complications.

4.6.1 DRILLING FACILITIES

Drilling is a temporary activity, which will continue for about 4-5 months and testing period of 15-30 days for well drilled in the block. The rigs are self-contained for all routine jobs. Once the drilling operations are completed, and if sufficient indications of hydrocarbons are noticed while drilling, the well is tested by perforation in the

production casing. This normally takes 2-3 days. If the well is found to be a successful hydrocarbon bearing structure, it is sealed off for future development, if any.

4.6.2 GENERAL REQUIREMENTS OF DRILLING

Development drilling programme requires the following common facilities:

1. Drilling Mud

Drilling of wells requires specially formulated mud, which basically comprise inert earth materials like bentonite, barite in water with several additives to give mud weight, fluidity and filter cake characteristics while drilling. The drilling muds have several functions like lubrication and cooling of the drill bit, balancing subsurface formation, bringing out the drill cuttings from the well bore, thixotropic property to hold cuttings during non operations, formation of thin cake to prevent liquid loss along well bore etc. Several additives are mixed into the mud system to give the required properties. Water based mud will be used to the possible extent in exploratory drilling but use of synthetic based mud may require due to complexities associated with the geological formations and associated hole stability problems.

2. Power Generation

The drilling process requires movement of drill bit through the draw works, which require power. The power requirement of the drilling rig will be met by using the three Diesel Generator with diesel consumption of about 12 KLD. The exhaust stacks of the DG sets of land based rigs vent the emissions.

3. Water Requirements

The water requirement in a drilling rig is mainly meant for preparation of drilling mud apart from washings and domestic use. While the former consumes the majority of water requirement, the water requirement for domestic and wash use is very less. The daily water consumption will be 20 KLD of which 4 KLD will be used for mud preparation, 4 KLD for rig washing and 12 KLD will be used for domestic purposes including drinking.

4. Domestic Wastewater

The operating personnel in onshore drilling site accommodation (DSA) are housed in the vicinity of the location. Mobile STP will be provided to treat and dispose off the domestic wastewater in the base camps.

5. Solids Removal

The rock cuttings and fragments of shale, sand and silt associated with the return drilling fluid during well drilling will be separated using shale shakers and other solids removal equipment like de-sanders and de-silters. The recovered mud will be reused while the rejected solids will be collected and disposed of in a line waste pit in the drill site.

6. Drill Cuttings and Waste Residual Mud

During drilling operations, approximately 500 tonnes and 2500-3000 m³ of drill cuttings and waste residual muds per well are expected to be generated depending on the type of formation and depth of drilling. In addition to the cuttings 15-20 KLD of wastewater is likely to be generated during well drilling. The waste residual muds and drill cuttings, which contain clay, sand etc., will be processed by employing drilling Waste Management System (DWM) and dewatering system. Clear uncontaminated water will be disposed and solid will be buried in concrete pit in the well plinth after operations are completed.

7. Testing

Testing facilities will be available at drilling rig for separation of liquid phase and burning of all hydrocarbons during testing. The test flare boom will be located at a distance from the drilling rig.

8. Chemical Storage

The drilling rig will have normal storage facilities for fuel oil, required chemicals and the necessary tubulars and equipment. The storage places will be clearly marked with safe operating facilities and practices.

9. Manpower

The drilling rig will be operated by approx. 100 persons on the rig at anytime. The manpower will operate in two shifts with continuous operations on the rig.

10. Logistics

Crew transfers to and from the drilling rig, materials, diesel and chemicals will be made through light vehicles, trucks and trailers.

11. Residential Area (Non – Processing Area)

The campsite will encompass an area of approximately 0.5 Ha.

12. Greenbelt

The entire area will be restored back to its original form and tree plantation will be carried out to further increase the density of plantation.

13. Drinking Water Management

The source of water will be provided by Contractor of Oilmax.

14. Sewerage System

Proper Sewage system with STP will be provided by Contractor of Oilmax.

15. Drilling Waste Management

Waste management plans will be prepared in-line with the best international practices for the project and the same will be implemented during the project execution stage. A separate waste management plan will be prepared and implemented for the steady state operational phase of the project in line with the regulatory requirements and best international practices. All the waste will be segregated and disposed as per the applicable Indian regulatory requirements and best international practices.

All hazardous wastes shall be securely stored, under a shed for eventual transportation to the authorized TSDF, the solid domestic waste shall be stored within the premises temporarily and then sent to common solid waste disposal facility.

16. Solid Waste Management

All the solid waste generated will be collected and given to nearby municipal facility.

17. HSE Plan

Project HSE plans will be prepared prior to start of each phase of the project (FEED, detailed engineering, fabrication, construction, installation, pre-commissioning and commissioning stages) to address the health, safety, environmental, and fire protection issues associated with execution of the project.

The HSE plans will aim to:

- a. Address health, safety, environment as well as social performance issues as appropriate to the Project Stage;
- b. Define HSE targets;
- c. Support an implementation strategy;
- d. Address any deficiencies identified during the review process;

- e. Include any improvement arising from audits and reviews;

Apart from the HSE Plan, necessary bridging documents will be prepared between Operator and vendor, wherever necessary to address project specific interfaces.

18. Emergency and Crisis Management

Risk based 3 tiers approach, in case of emergency or crisis, is followed for Emergency and Crisis Management. Immediate response to the emergency is handled by Emergency Response Team (ERT), depending on the escalation of the emergency; Emergency Management Team (EMT) and Crisis Management Team (CMT) are involved during tier 2 and 3 emergencies/crisis. Roles, procedures, communication, escalation protocols are clearly defined and documented. An Emergency Response and Crisis Management Plan, which comply with relevant local legislation, will be developed, will be tested on regularly basis and it will be maintained properly.

CHAPTER 5

REHABILITATION AND RESETTLEMENT (R & R) PLAN

CHAPTER 5: REHABILITATION AND RESETTLEMENT (R & R) PLAN

I. Policy to be adopted (Central/State) in respect of the project affected persons including home oustees, land oustees and landless labourers

No R&R as the land will be taken on lease or will buy from ONGC Ltd.

CHAPTER 6

PROJECT SCHEDULE AND COST

ESTIMATES

CHAPTER 6: PROJECT SCHEDULE AND COST ESTIMATES

6.1 PLANNING OF ACTIVITIES

Careful planning of all the activities is one of the pre-requisite for timely completion of the project. Following activities will be given special attention. In house technical studies are in progress for log interpretation and evaluation of the formation and potential zone. Petro-physical and reservoir studies will be done by domain experts.

After getting PML from state government and environment clearance from MoEF&CC, Oilmax's plan is to test the well and put them into production. With the result of existing wells, company may drill total 6 wells more new wells to maximize hydrocarbon exploitation. Government regulations will be taken into account for well spacing. Old data are being reviewed to know the details of the existing wells. Prior to start of our operation Oilmax will acquire the land and inform government about starting of our operation.

6.2 PRE PROJECT ACTIVITIES

- ✓ Management Approvals.
- ✓ Selection of location
- ✓ Statutory Clearances
- ✓ Financial Approvals
- ✓ Conceptual Design
- ✓ Preparation of main machinery tender
- ✓ Evaluation of tenders

6.3 PROJECT ACTIVITIES (IMPLEMENTATION STAGE)

- ✓ Firm up basic design
- ✓ Main Machinery Order placement
- ✓ Detailed engineering of the project
- ✓ Statutory approvals of Layout Plans.
- ✓ Preparation of tender, evaluation of tenders received and order placement for balance machinery
- ✓ Completion of procurement activities on time
- ✓ Release of civil drawing for civil construction
- ✓ Civil construction

- ✓ Supply of mechanical & electrical equipment
- ✓ Inspection of major machinery at supplier's works
- ✓ Erection of all plant & machinery

6.4 STATUTORY CLEARANCES

The proposed project will require various statutory approvals and clearances from various State and Central Government authorities.

The applicable statutory approvals / NOC's to be obtained for the proposal Development drilling of wells at Charaideo Block in Charaideo district, Assam are as under;

1. Environment Clearance from Ministry of Environment & Forests
2. Consent to Establish from Assam Pollution Control Board
3. Forest Clearance from State Forest Department

6.5 TIME SCHEDULE FOR THE PROJECT

The zero date for start of construction will be after grant of Environmental Clearance (EC) from MoEF&CC. The proposed development drilling activities will be completed within 5-6 months after issuance of EC. The external agencies such as consultant, machinery suppliers, contractors of civil construction and equipment will be selected carefully well in advance. An effective project team has been formulated with an experienced project manager as its leader.

6.6 STRATEGIES FOR TIMELY EXECUTION OF THE PROJECT

The following strategies will be adopted for smooth functioning as well as timely execution of the development drilling activities:

- ✓ The task of implementing the development drilling activities in time will be achieved by ensuring a well coordinated project implementation task force in-house and from external agencies
- ✓ A well chosen team of experienced personnel for development drilling activities will coordinate the implementation from in-house
- ✓ Experienced engineering consultants with proven track records will be selected for detailed engineering of the development drilling activities.

- ✓ Reputed and experienced contractors with adequate resources of finance, men, material and tools and tackles, will be engaged for execution of the construction and erection work.
- ✓ Effective project monitoring including project planning schedule and monitoring will be employed in this project. Timely execution and resources will be monitored using computer based project monitoring tools.

6.7 PROJECT COST

□ Estimated project cost along with analysis in term of economic viability of the project

The total investment for the proposed project works out to approximately INR 60 Crores. The estimated Investment Cost for the project is based on the requirement of fixed and non fixed assets.

CHAPTER 7

ANALYSIS OF PROPOSAL

CHAPTER 7: ANALYSIS OF PROPOSAL

7.1 FINANCIAL AND SOCIAL BENEFITS

❑ Financial and social benefits with special emphasis on the benefit to the local people including tribal population, if any, in the area

Proposed development drilling activities will result in growth of the surrounding areas by increasing direct and indirect employment opportunities in the region including ancillary development and supporting infrastructure. Special emphasis on financial and social benefits will be given to the local people in the area.

- ✓ Development of social amenities will be in the form of medical facilities, education to under privileged and creation of self-help groups.
- ✓ Medical facilities: Medical facilities will be provided for employee as well as people of nearby villages through medical camps.

7.2 SOURCES OF POLLUTION AND MANAGEMENT

❑ Air Pollution

Air emissions from point sources are expected mainly from combustion of diesel in the diesel engines for power generation. The principal pollutants will comprise of Particulate Matter (PM), Sulphur dioxides, Nitrogen oxides and other hydrocarbons (HC). Additionally, flaring of gas during testing of the well will also lead to release of some pollutants such as Nitrogen Oxides and un-burnt hydrocarbons to the atmosphere. SO₂ is not anticipated as H₂S presence in gas to be flared is nil. Some fugitive emissions of dust and air pollutants from vehicular exhaust will also happen during the project lifecycle, mostly during the construction and decommissioning activities.

Emission from DG sets will comply the emission standard prescribed and test flaring as per S No. 72, Schedule I-Standards for Emission or Discharge of Environmental Pollutants from various industries.

❑ Noise Pollution

Sources of noise will be limited to generators, well test flaring, vehicles etc during the proposed project activities. By careful design of well test flaring and regular maintenance of all vehicles and other machines shall keep noise to a minimum. Average cumulative noise from DG sets and drilling equipment will be in the range of ~ 70 to 80 dB.

❑ Waste water treatment and disposal

During drilling operations, approximately 4 KLD of drilling waste water will be generated as a result of rig wash and dewatering of spent mud, effluents from washing of drill cuttings, floor washings, pump, seal leakages etc. The characteristics of drilling and wash wastewater will be primarily dependent on type and composition of drilling fluid used for drilling. As Oilmax is proposing the use of water-based drilling mud, the potential for contamination of such waste water is significantly lower. The drilling wastewater will contain spent drilling fluid generated as a result of washings. The rig wash water and drilling wastewater generated is proposed to be recycled through a mobile Effluent Treatment Plant installed at the drilling site. Domestic waste water generated (about 12 KLD for the camp) will be treated in a mobile STP arrangement.

