BEFORE NATIONALGREEN TRIBUNAL

PRINCIPAL BENCH, NEW DELHI

I.A. NO. 533 OF 2025

IN

O.A. NO. 19 OF 2014

IN THE MATTER OF:

Dr. Kashmira Kakati ....Applicant

Versus

Union of India & Ors. ....Respondents

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RESPONDENT NO. 7

THROUGH

For, **Trust Legal Advocates & Consultants**
Petal Chandhok
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Date: 21.11.25

Place: N. D.

BEFORE NATIONAL GREEN TRIBUNAL
NEW DELHI
I.A. NO. 533 OF 2025
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IN THE MATTER OF:

Dr. Kashmira Kakati ...Applicant

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REJOINDER TO REPLY AFFIDAVIT BY RESPONDENT NO. 1 - MOEF TO I.A. NO. 533 OF 2025 FILED BY RESPONDENT NO. 7, I.E. OIL INDIA LIMITED

MOST RESPECTFULLY SHOWETH:

1. This Rejoinder is being filed by the Respondent No. 7/ Respondent Applicant, i.e. Oil India Limited to the Reply Affidavit of the Respondent No. 1 - MoEF to the above mentioned I.A. No. 533 of 2025.

2. By way of the present Application, the Respondent Applicant is seeking leave of this Hon'ble Tribunal to direct the Ministry of Environment, Forest and Climate Change ("**MoEF & CC/Respondent No. 1**") to consider the pending Application with respect of the Environmental Clearance of Respondent No. 7/ Respondent Applicant, i.e. Oil India Limited.

3. It is humbly submitted that Respondent Applicant applied for the grant of Environmental Clearance (EC) of the Project Onshore Oil & Gas development drilling and production in Dumduma Pengeri Area in Tinsukia

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District under Petroleum Mining Lease (PMLs) namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML Tinsukia Assam ("**Proposed Project**"). It is submitted that the project is an expansion of the Environmental Clearance priorly granted vide Ministry's clearance letter dated 01.11.2011, bearing no. F No. J-11011/1251/2007-IA II (I). A copy of the Application seeking EC is annexed with the Application along with a copy of the clearance letter dated 01.11.2011.

4. The contents of the Application being I.A. no. 533 of 2025 be read as part and parcel of this instant rejoinder as the same are not being repeated herein for the sake of brevity.

Preliminary Submissions

5. Before delving into the para-wise response of the Reply affidavit of the Respondent No. 1, the Respondent Applicant hereby makes the following preliminary submissions for the consideration of this Hon'ble Tribunal:

5.1 No concealment w.r.t. the Proposed Project falling within the Dehing Patkai Elephant Reserve and South Arunachal Elephant Reserve:

a) It is submitted that the Respondent Applicant's EIA report provides a clear

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mentioning of elephant corridors under the section titled *"Fauna – Wildlife Habitat."*

b) The said EIA report explicitly states that two elephant corridors—located between the Upper Dehing Reserve Forest East and West Blocks at Bogapani and Golai-Powai, as well as the Kotha-Buridihing Elephant Corridor—fall within the Dumduma Pengeri area.

c) Further, Box 3.2 of the EIA report, titled *"Elephant Corridors within Dumduma-Pengeri Area,"* provides detailed descriptions of these corridors, noting the Bogapani Corridor as 2.5–3 km in length and 0.5–1 km in width with regular usage from September to February; the Golai-Powai Corridor as 3 km long and 0.5 km wide with regular but limited use; and the Kotha-Buridihing Corridor as 3 km long and 1–1.5 km wide with occasional usage.

d) These abovementioned disclosures conclusively demonstrate that the Respondent / Applicant, i.e. OIL expressly acknowledged and documented the presence of elephant corridors in its EIA.

A copy of the EIA report of the Respondent / Applicant is enclosed herewith and marked as **Annexure-R1**.

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e) During the 42nd meeting of the Expert Appraisal Committee (EAC) held on 21 October 2021, the Committee specifically noted that the Bogapani Elephant Corridor is situated within 1 km of one of the proposed well locations, as recorded under Agenda Item No. 42.10 of the meeting minutes. A copy of the Minutes of the 42nd meeting of the Expert Appraisal Committee (EAC) held on 20-22nd October 2021 by Respondent No. 1 is enclosed herewith and marked as **Annexure-R2.**

f) Subsequently, the Ministry of Environment, Forest and Climate Change (MoEF&CC), i.e. Respondent No. 1 vide its Additional Details Sought (ADS) letter dated 08 March 2022 (F. No. IA-J-11011/1251/2007-IA II (I)), highlighted that the proposed site falls within a critical elephant habitat and forms part of a transboundary elephant corridor linking Assam and Arunachal Pradesh. A copy of the letter dated 08.03.2022 issued by Respondent No. 1 to the Ld. Principal Chief Conservator of Forests, Assam, enclosed herewith and marked as **Annexure-R3.**

g) In view of the ecological sensitivity of the area, the Ministry specifically sought comments from the Principal Chief

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Conservator of Forests (PCCF), Assam, regarding the potential impacts of the proposed project activities on elephant populations and their associated habitats.

h) In response to the above, the Respondent / Applicant, vide its letter dated 27.01.2023, submitted its reply to Respondent No. 1, stating that the proposed well located near the Bogapani elephant movement route had been removed from the project scope. The response further reiterated OIL's commitment to impact mitigation measures, including installation of acoustic enclosures for DG sets and fence-line noise barriers, deployment of appropriate light-shielding systems, and development of paved approach roads to minimize dust generation.

A copy of the letter dated 27.01.2023 submitted by the Respondent Applicant to Respondent No. 1 is enclosed herewith and marked as **Annexure-R4**.

i) In view of the above, it is evident that Oil India Limited / Respondent Applicant did not conceal or suppress any material information.

j) In fact, the presence and relevance of the elephant corridor were duly disclosed



during the EIA process, public hearing, and subsequent EAC deliberations.

k) Further, the statements made by the Respondent Applicant were factually accurate, as the said corridor did not carry the status of a legally notified corridor at the relevant time.

5.2 No concealment with respect to the pendency of O.A. 19 of 2014 before this Hon'ble Tribunal pertaining to the elephant conservation in the same area.

a) The said matter was disposed of by this Hon'ble Tribunal vide order dated 08.12.2017, wherein this Hon'ble Tribunal *inter alia* issued operative directions to the MoEF & CC and State authorities and to OIL for ensuring compliance in the Digboi Oilfield area.

b) It is clarified that no separate or fresh petition was pending against OIL as of April 2018, when Form-I for Terms of Reference (ToR) was filed for the Dumduma–Pengeri EC proposal.

c) It is further clarified that the referred matter was filed against 12 respondents including Union of India Through the Secretary Ministry of Environment and Forests, OIL,



IOCL, PCBA, District Magistrate, Tinsukia District, etc.

d) Admittedly, the public hearing held on 13.03.2020 was conducted by PCBA, which itself was a respondent in the said litigation before this Hon'ble Tribunal.

e) Therefore, all the concerns raised by the participants in the public consultation had been adequately addressed by the project proponent/ Respondent Applicant herein and the same was reiterated before the expert appraisal committee ("EAC").

f) Further, during the 42nd EAC meeting held on 21.10.2021, the Committee had also discussed elephant-corridor and wildlife-related concerns while recommending the project for EC.

g) Hence, there was no suppression of material facts from the statutory authorities in any manner whatsoever.

5.3 Respondent Applicant/ PP has complied with / responded to the observations of the Joint Committee:

a) It is hereby submitted that all the issues highlighted by the Joint Committee have been comprehensively addressed in OIL's previous replies. These replies were sent to MoEF&CC vide letters dated 09.10.2023,

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23.02.2024, 19.06.2024, 14.10.2024, 30.10.2024 and in the compliance affidavit filed before the Hon'ble Supreme Court in Civil Appeal Nos. 9710-9711 of 2018.

A copy of the letter dated 09.10.2023 is enclosed herewith and marked as **Annexure-R5.** A copy of the letter dated 23.02.2024 is enclosed herewith and marked as **Annexure-R6.** A copy of the letter dated 19.06.2024 is enclosed herewith and marked as **Annexure-R7.** A copy of the letter dated 14.10.2024 is enclosed herewith and marked as **Annexure-R8.** A copy of the letter dated 30.10.2024 is enclosed herewith and marked as **Annexure-R9.** A copy of the compliance affidavit filed before the Hon'ble Supreme Court in Civil Appeal Nos. 9710-9711 of 2018 by the Respondent Applicant is enclosed herewith and marked as **Annexure-R10.**

b) It is re-clarified that the Joint Committee's claim of leaking underground pipelines is unsubstantiated inasmuch as the sites visited (Pits 512, 513 and 139) have no underground crude pipelines.

c) Further, all pipelines of the Respondent Applicant are regularly monitored and audited by Oil Industry Safety Directorate



(OISD) periodically and found to be in good condition and no leakage or seepage has occurred in the Reserve Forest. It is pertinent to mention that OISD as established in 1986 is a technical directorate under the Ministry of Petroleum and Natural Gas that formulates and coordinates the implementation of a series of self-regulatory measures aimed at enhancing the safety in the Oil & Gas industry in India.

d) The oily sludge pits observed in the area are legacy remnants from pre-nationalization operations conducted by the Assam Oil Company, established in 1889. Following the nationalization of the oil sector in 1981, these historical pits were inherited by Oil India Limited (OIL). It is reiterated that no operations were carried out by the Respondent Applicant ever since.

e) Over time, the accumulation of oily material in these pits has primarily resulted from the natural phenomenon of crude seepage, a well-documented and long-recognized occurrence in the Digboi Oilfields. The unique historical and geographical characteristics of the Digboi Oilfield have also been acknowledged by the Hon'ble National Green Tribunal in its Order dated

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08.12.2017. The said Order expressly records the Committee's observation of natural oily seepage in Drain No. 1 of the Digboi Oilfield-an observation that has remained unchallenged by any party to date.

f) Acting on its own accord, OIL has undertaken several rounds of bioremediation of these legacy pits using *Oil Zapper* microbial technology. These eco-friendly interventions have consistently achieved significant reduction of Total Petroleum Hydrocarbons (TPH) to negligible levels, thereby demonstrating OIL's proactive and responsible environmental management approach.

g) Admittedly, the Joint Committee's findings are not backed by any photographs or field reports. In case of any oil spill, OIL immediately takes action to clean and restore the affected area as per its internal SOPs.

h) The wells are spread over a wide area, and many are abandoned in dense forest regions, regular physical monitoring of every site is extremely difficult. Further, iron fencing has been provided around well sites, but due to repeated thefts, some wells may occasionally remain without fencing.



Needless to say, OIL continues to fix such issues whenever they arise.

i) Furthermore, the oilfield has been operational since 1889, and OIL took over in 1981. Since then, OIL has maintained the records of wells, which are regularly audited by independent and statutory agencies. There are around 982 wells in total and about 644 are shut-in, 293 are abandoned, and 45 are currently producing.

j) OIL has been carrying out bioremediation of oily sludge even before the Hon'ble Tribunal's judgment on the matter. Whenever oil sludge or seepage is found due to natural causes, OIL undertakes bioremediation work from time to time. Despite these regular efforts, oil seepage continues to occur naturally in some areas.

k) It may also be noted that not every abandoned well has an associated pit, and the exact origin of some pits is undocumented; however, these are not the result of any activities carried out by OIL.

l) The Divisional Forest Officer, Digboi Division, through Letter No. B/NGT/2022/2743-45 dated 16.11.2022, had requested details of sludge pits and contaminated water bodies around the Dehing Patkai Elephant Reserve. In

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response, OIL submitted a detailed reply on 28.11.2022, providing geo-coordinates and maps showing both natural and artificial pits in the Digboi Oilfield.

A copy of the letter dated 16.11.2022 is enclosed herewith and marked as **Annexure-R11**. A copy of the reply dated 28.11.2022 to the letter dated 16.11.2022 is enclosed herewith and marked as **Annexure-R12**.

m) Further, the oily sludge observed in these areas is the result of natural seepage and not due to any activity or negligence by OIL.

n) Bioremediation work in the region has been carried out since 2010, and all oil-contaminated material has already been treated through bioremediation measures. Since the seepage is naturally recurring, traces of oily sludge may occasionally reappear.

o) In fact, the tests conducted on soil samples collected from pits (visited by the Joint Committee) near wells-before and after the use of Oil Zapper technology showed a significant reduction in Total Petroleum Hydrocarbon (TPH) levels. In view thereof, it is found that the bioremediation process using Oil Zapper has successfully reduced



hydrocarbon content to negligible levels around the affected sites.

p) This Hon'ble Tribunal has already observed that OIL is not releasing any untreated oil effluent into open sludge pits, and that the oily sludge found in some areas is due to natural seepage, not because of any action or negligence by OIL.

q) The bioremediation process at these sites has now been completed. OIL continues to monitor the area regularly and undertakes fresh bioremediation whenever required to ensure that the sites remain clean and environmentally safe.

5.4 This instant matter has no bearing on the EC application pending with the Respondent No. 1

a) On 04.12.2023, MoEF & CC/Respondent No. 1 issued a letter/ communication to Respondent No. 7, after a period of two (2) years from the EAC recommendation with respect to the Environmental Clearance with certain conditions, requesting Respondent No. 7 to approach the Ministry after the outcome of the captioned matter pending before this Hon'ble National Green Tribunal.

b) However, it becomes pertinent to mention that there is no stay in the captioned matter

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pending before this Hon'ble Tribunal. The MoEF & CC/Respondent No. 1 is thereby implying unreasonable impositions to hinder and unlawfully hold the grant of Environmental Clearance to the Respondent No. 7.

c) It is reiterated that during the entire duration of three (3) years from filing of the EC Application, the Respondent No. 7 has been diligent, compliant and sincere in providing all the documents, compliance reports and in complying with all the statutory requirements for the grant of Environmental Clearance.

d) Respondent No. 7 also tendered an undertaking to drop the well no. 833 which falls within 1 Km distance from the Bogapani Elephant corridor and clarified that none of the locations are falling within 10 Km Eco Sensitive Zone (ESZ) areas of Dehing-Patkai National Park (NP) and all other locations are more than 1 Km away from the Bogapani Elephant corridor.

e) It becomes pertinent to mention herein that the captioned matter pending before this Hon'ble Tribunal was well within the knowledge of the Pollution Control Board, Assam, i.e., Respondent No. 4, which, in fact,



carried out public consultation for the Respondent No. 7 on 13.03.2020.

f) The Respondent No. 4 was also a party in O.A. No. 19 of 2014 since the very inception, gave a positive recommendation of a successful public consultation to the EAC.

g) The EAC, while dealing and deciding the Application seeking Environmental Clearance during the public consultation, was well versed with the issues connecting with elephant population as well as continuation of O.A. No. 19 of 2014 before this Hon'ble Tribunal. Since the Respondent No. 1/ MoEF&CC had been involved in O.A. No. 19 of 2014 from the outset, the issues relating to wildlife and the status of the said proceedings were already within the institutional framework of the MoEF &CC as they are also a Respondent party before this Hon'ble Tribunal.

h) As the ongoing petitions and all their concerns had been adequately addressed by the Respondent No. 7, EAC probably realized that Respondent No. 7 has adequate strength and an Environmental Management Plan to take care of all issues connected with forest reserves, elephant corridor and biodiversity in general.



i) It is a matter of fact that Respondent No. 7 has a fundamental duty to ensure energy security of our country. As natural gas is a cleaner source of energy and its timely extraction further helps climate restoration, access to energy and India's commitment to International Treaties for promoting clean energy.

j) Respondent No. 7 has always been at the forefront of embracing new technologies and concepts for opening new vistas and putting a stride forward towards sustainable energy security of the nation.

k) This delay hampers Respondent No. 7's progress towards energy self-sufficiency and the economic growth of the country.

Para-wise Reply

6. The contents of paras-1, 2 & 3 of the Reply Affidavit is a matter of record and merit no response.

7. The contents of para -4 are incorrect, misinterpreted and hence denied. The contents of para 5.1 and 5.2 of the Preliminary Submissions hereinabove may be read as part of the response to the instant paragraph under response as the same are not being repeated for the sake of brevity. It is clarified that no concealment whatsoever was done by the Respondent Applicant, either with

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respect to the proposed activity area falling within the critical elephant habitat and corridor or with respect to the pendency of a litigation.

8. The contents of para -5 are incorrect, misinterpreted and hence denied. The contents of para 5.3 of the Preliminary Submissions hereinabove may be read as part of the response to the instant paragraph under response as the same are not being repeated for the sake of brevity. It is reiterated that the Respondent Applicant has complied with / responded to the observations of the Joint Committee from time to time as also recorded in multiple communications as enclosed hereto.

9. The contents of paras-6 -7 of the Reply Affidavit is a matter of record. However, emphasis is made on the submissions made in paragraph 5.1 and 5.2 of the Preliminary Submissions hereinabove.

10. The contents of paras- 8 to 10 of the Reply Affidavit is a matter of record and merit no response. However, it is submitted that the decision of the committee to withhold the EC application till the pendency of the instant litigation is unsubstantiated and baseless. Emphasis is made on paragraph 5.4 of the Preliminary Submissions hereinabove as the same are not being repeated for the sake of brevity.



11. In view of the above, it is humbly submitted that the instant application made by the Respondent Applicant / OIL may be allowed in the larger interest of the energy sector of the country.

12. It is submitted that in an event the instant Application is not allowed then it will cause prejudice to the Respondent No. 7.

13. This Application is made bona fide and in the interest of justice.

PRAYER

In view of the facts and circumstances mentioned hereinabove, the Respondent No. 7 humbly prays that this Hon'ble Tribunal may be graciously pleased to:

a. Allow the instant Application and set aside the communication dated 04.12.2023 issued by the Respondent No. 1 to the Respondent No. 7;
b. Direct MoEF & CC/Respondent No. 1 to decide the pending application number IA/AS/IND/220363/2007, J-11011/1251/2007-IA II (I) for grant of Environmental Clearance to Respondent No. 7;
c. Issue directions in respect of OA No. 19 of 2014, ensuring that the ongoing court proceedings do not hinder or affect any ongoing or proposed forest clearance, wildlife clearance, or Exploration and

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Production (E&P) projects in the surrounding areas in the interest of the country; and

d. Pass such further and other orders/ directions as deemed fit and proper in the facts and circumstances of the case.

RESPONDENT NO. 7

Dr. Kumudani Sharma
GM (Legal)
Oil India Limited
Authorised Signatory

THROUGH

For, **Trust Legal Advocates & Consultants**

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Defence Colony, New Delhi-110024
Ph.: (+91) 9654025754; (+9111) 40525619
Email: petalchandhok@trustlegal.in

Place: N.D.
Date: 21.11.25

BEFORE NATIONAL GREEN TRIBUNAL
NEW DELHI
I.A. NO. 533 OF 2025
IN
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IN THE MATTER OF:

Dr. Kashmira Kakati ...Applicant

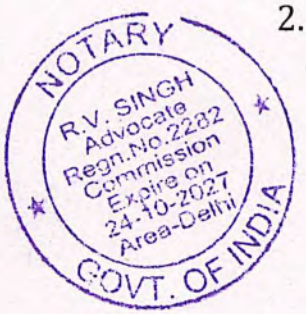
Versus

Union of India & Ors. ...Respondents

AFFIDAVIT ON BEHALF OF THE RESPONDENT NO. 7

I, Dr. Kumudani Sharma, General Manager (Legal), the Authorized Representative of the Respondent No, 7, having its Corporate Office at Plot No. 19, Sector 16 A, Film City, Noida 201301, Uttar Pradesh, today present at Delhi, do hereby solemnly affirm and submit:

1. I state that I am the authorised representative of the Respondent No. 7 in the present case and am well conversant with the facts and circumstances of the case and as such competent to swear this affidavit.



2. I state that the contents of the Rejoinder are true and correct to my knowledge and based on the records maintained and made available by the Respondent No. 7, which may be read as a part and parcel of the present Affidavit.

3. I state that all the Rejoinder being filed along with the accompanying Application are true copies of their

respective originals and annexures are attached herewith

DEPONENT

Dr. Kumudani Sharma
GM (Legal)
Oil India Limited
Authorised Signatory

VERIFICATION:

Verified at on this 21 NOV 2025 day of November 2025 that the contents of the above Affidavit are true and correct to the best of my knowledge and derived from the records maintained by the Respondent No. 7, no part of it is false and nothing material has been concealed therefrom.

I Identified the deponent/executant who has signed in my presence

DEPONENT

Dr. Kumudani Sharma
GM (Legal)
Oil India Limited
Authorised Signatory

NOTARY
R.V. SINGH
Advocate
Regn.No.2282
Commission
Expire on
24-10-2027
Area-Delhi
GOVT. OF INDIA

Solemnly affirmed before me, read over & explained to the deponent.

Notary Public DELHI

21 NOV 2025

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Annexure -R1



ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

under PMLs namely Mechaki PML, Borhapjan PML , Dumduma PML and Digboi PML

Tinsukia District, Assam

Final EIA Report

10 February 2021

Project No. 0426932

www.erm.com

NABET Certificate No.: NABET/EIA/1922/RA 0177 dated August 31, 2020 and valid upto October 30, 2022

Document details	The details entered below are automatically shown on the cover and the main page footer. PLEASE NOTE: This table must NOT be removed from this document.
Document title	Onshore Oil & Gas Development drilling and production in Dumduma-Pengeri Area in Tinsukia District
Document subtitle	Final Report
Project No.	0426932
Date	10 February 2021
Version	1.0
Author	Salil Das and Team of FAEs
Client Name	Oil India Limited

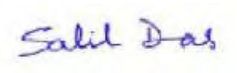
Signature page

10 February 2021

Onshore Oil & Gas Development drilling and production in Dumduma-Pengeri area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML

Tinsukia District, Assam

Final Environmental Impact Assessment Report



Name: Salil Das
Job title: EIA Coordinator



Name: Debanjan Bandyopadhyay
Job title: Partner

ERM India Private Limited

Building 10 I Tower A I 4th Floor I

DLF Cyber City I

Gurgaon I INDIA - 122002

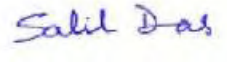
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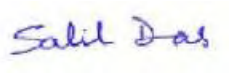
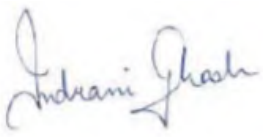
Declaration by expert contributing to the EIA Report for Onshore Oil & Gas development drilling and production in Dumduma-Pengeri area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML.

EIA Coordinator

I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA. I also confirm that the prescribed ToR have been complied with and that the data submitted is factually correct.

EIA Coordinator:	**Salil Das**
Signature and Date	
Period of involvement:	October 2017--Ongoing
Contact Information :	ERM India Private Limited, Building No.10, Tower B, 3rd Floor, DLF Cyber City Gurgaon -122002 India,Tel:+91-124-4170300; Fax: +91-124-4170301

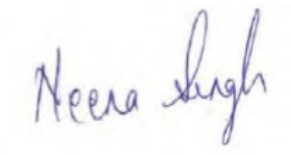
Functional Area Experts (FAEs)

S.N	Functional Area	Name of the Expert	Involvement	Signature
1	EIA Coordinator	Salil Das	Coordination with experts; compilation of EIA report. QA/QC of the EIA report. (October 2017-ongoing)	
2	Air Pollution	Dr. Debanjan Bandyopadhyay	Selection of air quality monitoring stations, discussion with client on various air pollution control aspects, inputs for impact assessment from the proposed project and development of EMP. (October 2017-ongoing)	
3	Water Pollution	Dhritiman Ray	Selection of water monitoring stations, interpretation of analysis results, , inputs for impact assessment and development of EMP. (October 2017-ongoing)	
4.	Air Quality Modelling	Dr. Indrani Ghosh	Modelling. Model input data related to emissions and micrometeorology interpretation of modelling results and development of EMP	

S.N	Functional Area	Name of the Expert	Involvement	Signature
5.	Noise Quality	Dr. Indrani Ghosh	Undertaking Noise Quality Modelling; Selection of noise sampling locations for baseline monitoring, model input data, interpretation of modelling results and development of EMP. (October 2017-ongoing)	
7.	Socio-economic environment	Tufail Khan	Support for socio economic baseline, stakeholder consultations and impact assessment. (October 2017-ongoing)	
8.	Ecology and Biodiversity	Dr. Abhishek Roy Goswami	Ecological survey and assessment of flora and fauna and related impact assessment and development of EMP. (October 2017-ongoing)	
9.	Land use	Dr. Karunakaran Nagalingam	Assessment of land use impacts (October 2017-ongoing)	
		Dibyendu Chakraborty	Preparation of all maps including LU/LC and impact assessment. (October 2017-ongoing)	
10.	Risk Assessment	Debanjan Bandyopadhyay	Conducting risk assessment including frequency analysis, consequence analysis; development of Disaster Management Plan. (October 2017-ongoing)	

I, Neena Singh, hereby, confirm that the above mentioned experts prepared the EIA Study for EIA Study for Onshore Oil & Gas development drilling and production in Dumduma-Pengeri Area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML. I also confirm that the consultant organization shall be fully accountable for any misleading information mentioned in this statement.

Signature:



Name: Neena Singh
Designation: Managing Director
Name of the EIA consultant organization: ERM India Private Limited
NABET Certificate No. & Issue Date: **NABET/EIA/1922/RA 0177 valid upto 30th October 2020.**

Compliance of Approved Terms of Reference (ToR) for EIA Study

The terms of reference (ToR) for conduct of EIA study as approved by EAC of MoEF&CC are included in **Annexure 1.1**. The ToR requirements and their inclusion in the EIA study have been described in ***Table 0.1***.

Table 0.1 ToR Compliance

Sl No.	ToR Point	Compliance	Reference Section in the EIA Report
	Standard ToR		
1.	Executive summary of a project.	Incorporated at the beginning of the report.	-
2.	Project description, project objectives and project benefits.	*Project Description*- Drilling of 26 onshore exploratory and developmental wells, 3 nos. of production installations and laying of interconnecting pipelines in Dumduma-Pengri Area (DPA). The land required for the well sites and production facility will be procured from the local villagers through direct purchase. Generally, OIL will procure the required land through private negotiation. In few cases, OIL may request district authority to acquired land under LARR act 2013, if private negotiation is not successful. Land procurement will be done including crop compensation. No physical displacement will occur. *Site Preparation & Construction of Drill site* Site preparation will involve levelling, filling and consolidation of the site for staging equipment and machinery. Individual sites will be duly fenced. Preparation and construction of drill sites and production facilities will involve top soil scraping and storage for future use, elevating the drill platform by excavated material from the site and material brought from authorized quarry area. Reinforced Cement Concrete (RCC) will be used for the construction of foundation system. For making foundations of the main rig structure, cast in-situ bored under- reamed piles of specified lengths will also be used. *Drilling & Testing* The wells will be drilled upto 3900 m using a standard land rig or a “Mobile Land Rig” with standard water based drilling fluid treatment system. During drilling operations, drilling fluid (or ‘mud’) is pumped through the drill string down to the drilling bit and returns between the drill pipe–casing annulus up to surface back into the circulation system after separation of drill cuttings /solids through solids control equipment.	Project Description: Refer Chapter 2

Sl No.	ToR Point	Compliance	Reference Section in the EIA Report
		Drill cuttings and wash wastewater generated will be stored on-site in HDPE lined pits. There will be other ancillary facilities like Drilling mud system, Effluent Treatment 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. Logging operations will be undertaken to provide information on the potential type and quantities of hydrocarbons present in the target formations. *Production Installations* Three Production installations are planned within the Dumduma-Pengeri Area. The production installation will include Oil Collection System (OCS), Gas Compressor Station (GCS), Field Group Gathering Station (FGGS) or Early Production System (EPS).	
		Project Objectives- • To explore and produce hydrocarbons' safely • To augment national production of oil and gas	Project Objectives- Refer Section 2.2
		Project benefits- • Provision of more royalty to Assam Government and more cess to Govt. of India • Provision of more employment opportunity to local people • Development of infrastructure (roads, culverts, bridges, schools etc.) in the area • Increase in business opportunity for the local people • Energy security for the country	Project benefits- Refer Chapter 8
3.	Cost of project and period of completion.	Total cost of the project would be Indian Rupees 1109.40 crore. Drilling of a well at each location is expected to take three to four months. After development phase the wells if converted to production wells will continue till the life of the well. The production facilities are permanent facilities. The developmental drilling, construction of production facilities and pipelines would be conducted within 7 years.	The cost of Project is provided in Section 2.12. Project timeline is provided in Section 2.11.
4.	Site details within 1 km of the each proposed well, any habitation, any other installation/activity, flora and fauna, approachability to site, other activities including agriculture/land, satellite imagery for 10 km area. All the geological	Site Details within 1 km of wells and production installations were identified interpretation of satellite imagery, 1: 50000 SoI toposheet and site surveys. Among the 26 wells, 4 wells are located in agricultural land, 8 wells located in homestead plantation area and 14 wells are located in tea garden. All three production facilities are located in tea garden area.	Site details provided in Section 2.4. Floral/Faunal species recorded/reported in proximity to the proposed locations and production facilities are

Sl No.	ToR Point	Compliance	Reference Section in the EIA Report
	details shall be mentioned in the Tope sheet of 1:40000 scale, superimposing the well locations and other structures of the projects. Topography of the project site.		presented in Section 3.4.
		NH 37, NH38 and NH 52 B are the main connecting roads of the block. Apart from that Digboi-Pengeri road, Phillobari – Pengeri road, Pengeri – Bordumsa road and Pengeri- Margherita road are also present in this block for transportation.	Accessibility map of DPA is provided in Figure 2.4
		The DPA Block with proposed well locations superimposed on Toposheet and Satellite Imagery are presented in Figure 2.2 and Figure 2.3 respectively.	Refer Section 2.3
		Land Use and Land Cover (10 km study area)- The land-use and land-cover of the Dumduma-Pengeri Area has been interpreted from the satellite data, toposheet of the area, and subsequently by ground truthing during field surveys. Settlement with homestead plantation covers 29.22% of the total area of Dumduma-Pengeri followed by reserve forest (28.93%), agricultural land (19.51%) and tea gardens (15,57%). Unclassified forest areas cover 2.68% of the total area. River, streams and waterbodies approximately 2% of the total area.	Land use and land cover within DPA is presented in Section 3.3.2.
		Topography- Topography of the site is relatively flat. From southwest to northeast elevation profile varies between 205m-155m. From northwest to southeast the elevation profile varies between 143-227m. There is a ridge at the southwestern corner of the block which is included under the Upper Dihing R.F.	
5.	Details of sensitive areas such as National Park, Wildlife sanctuary and any other eco-sensitive area along with map indicating distance.	The ecological sensitive areas in proximity to DPA are enquired from Assam forest department website and ENVIS website (http://www.wiienvis.nic.in).	Details of sensitive areas such as Wildlife sanctuary and any other eco-sensitive areas along with maps are provided in Figure 3.17. Details are presented in Section 2.4.1 Environmental Setting of the Dumduma-Pengri Area.
6.	Approval for the forest land from the State/Central Govt. under Forest (Conservation) Act, 1980 as project involves forest land.	Forest areas within the DPA were identified from Survey of India (SoI) 1:50000 scale toposheet and discussion with forest department officials.	Refer Section 2.4

Sl No.	ToR Point	Compliance	Reference Section in the EIA Report
		All wells are plotted in 1:50000 toposheet scale (nos. 83M10, 83M11, 83M14, 83M15) and it is found that no well is located within forest land.	
7.	Recommendation of SCZMA/CRZ Clearance as per CRZ Notification, dated 6th January 2011 (if applicable)	Not Applicable	-
8.	Distance from nearby critically/severely polluted area as per Notification, if applicable. Status of moratorium imposed on the area.	There is no critically/severely polluted area within 10 km of the Dumduma-Pengri Area.	-
9.	Does proposal involve rehabilitation and resettlement? If yes, details thereof.	The drill sites will be located in agricultural land, homestead plantation, tea garden areas and forest area and will not involve displacement of people. Hence, the proposal does not involve any rehabilitation and resettlement.	Refer Section 2.6.2
10.	Environmental considerations in the selection of the drilling locations for which environmental clearance is being sought. Present any analysis suggested for minimizing the foot print giving details of drilling and development options considered.	Environmental considerations for selection of the drill sites are stated below: Outside the boundary of National Park/Wildlife Sanctuary Beyond 10 km from any National Park or Wildlife Sanctuary Non-forest area Area with low vegetation; Away from organized human habitats; Easy access to area of interest.	Refer Section 2.6.1 for Environmental considerations for selection of the drill sites
11.	Baseline data collection for air, water and soil for one season leaving the monsoon season in an area of 10 km radius with centre of Oil Field as its centre covering the area of all proposed drilling wells.	Baseline data has been collected for the winter and pre-monsoon seasons (January-March 2019). Ambient air-8 locations for one season, noise at 8 locations, surface water at 4 locations, groundwater at 4 locations and soil at 5 locations. Air Quality: Refer to point 12 of ToR Compliance table Groundwater and Surface water Quality: Refer point 13 of ToR Compliance table Soil Quality: Refer point 14 of ToR Compliance table	The data has been provided in Section 3.3.
12.	Climatology and Meteorology including wind speed, wind direction, temperature, rainfall relative humidity etc.	Baseline data has been collected for winter and pre-monsoon seasons (January-March 2019). The maximum and minimum temperature reported during the study period was 30.3°C and 10.1°C. The average relative humidity was 70.20% during the study period. Total rainfall recorded during the study period was 38.18 mm. Pre-dominant wind direction	Refer Section 3.3.4.

Sl No.	ToR Point	Compliance	Reference Section in the EIA Report
		was from the North-East with an average speed of 1.3 m/s. Long term IMD data on climatology is also presented.	
13.	Details of Ambient Air Quality monitoring at 8 locations for PM2.5, PM1o, S02, NOx, CO, VOCs, Methane and non-methane HC.	Baseline data has been collected for the winter and pre-monsoon seasons (January-March 2019). Ambient air quality was monitored at eight locations within the Block. Average PM10 values varied from 76.17 to 80.57 µg/m3; PM2.5 varies from 37.46 to 40.11 µg/m3. PM_{10}, $PM_{2.5}$ and other gaseous parameters like SO2, NOx, CO were observed to be well within the levels specified in the National Ambient Air Quality Standards (NAAQS) for industrial, residential and other areas. The average total methane hydrocarbon concentration in the study area ranged between 1.57 and 1.93 ppm. All the values for non-methane hydrocarbons were recorded to be below detection limits (<0.1 ppm). Almost all the values for VOCs were recorded to be below detection limits (<4.2 µg/m3) for all the samples.	Refer Section 3.3.5.
14.	Soil sample analysis (physical and chemical properties) at the areas located at 5 locations.	Baseline data has been collected for the winter and pre-monsoon seasons i.e. January-March 2019 from five locations spread across different types of land cover. Soil samples were collected from five locations spread across different types of land cover such as agricultural field, homestead plantation, tea garden and forest land. The soil samples were found to be clay loam, sandy clay loam and clayish in nature with acidic pH. The macronutrient contents viz. phosphorous and potassium values of the soil samples were found to be low. Heavy metals contamination has not been observed in soil samples.	Refer Section 3.3.3.
15.	Ground and surface water quality in the vicinity of the proposed wells site.	Baseline data was collected for the winter and pre-monsoon seasons i.e. January-March 2019. Groundwater Quality: The concentration of all the parameters analysed were within the acceptable limit of IS: 10500, 2012 standard. Absence of coliform indicates that, the water is safe to consume for drinking purpose.	Ground quality-Refer Section 3.3.8
		Surface Water Quality: Surface water samples were analyzed from Dibru River, Burhi Dihing River, Dibru River near Sandang T.E.and Nala within Upper Dihing R.F. The analyzed values reveal that all the samples were in compliance to the CPCB Class B i.e. Propagation of Wild life and Fisheries.	Surface water quality-Refer Section 3.3.10
16.	Measurement of Noise levels within 1 km radius of the proposed wells.	Baseline data was collected for the winter and pre-monsoon seasons i.e. January-March 2019.	Refer Section 3.3.6.

Sl No.	ToR Point	Compliance	Reference Section in the EIA Report
		The ambient noise was monitored at 8 locations within the Block. The equivalent noise level as measured at the residential areas range from 40.1 to 53.2dB(A) at day time and from 37.5 to 46.9 dB(A) at night time. The equivalent day time noise values in all the locations were in compliance to the day time standard of 55 dB(A) for residential areas.	
17.	Vegetation and land use; flora/fauna in the block area with details of endangered species, if any.	Vegetation- Vegetation type in the region are primarily of Tropical Evergreen Forest and Tropical Semi-Evergreen Forest. Forest within the DPA include the reserve forests *viz*. Buridihing RF, Duarmara RF, Tarani RF, Dumduma RF, Nalani RF, Phillobari, RF, Takowani RF, Kakojan RF, Digboi RF, Bogapani RF and Upper Dihing RF. Habitat wise general tree species resented below: Forest area *Dipterocarpus macrocarpus, Amoora wallichii, Terminalia myriocarpa, Artocarpus chaplasha etc. Middle canopy is dominated by Mesua ferrea, Terminalia belerica, Terminalia chebula, Myrsine capitellata, Osbeckia Laportea creanulata, Phrynium placentarium, Alpinea allughas*, etc. Roadside Plantation: *Alstonia scholaris, Aegle mermelos, Melia azedarach, Bombax ceiba, Ficus religiosa, Lagerstroemia speciosa*. Village Woodlot: *Mangifera indica, Bambusa sp., Delonix regia, Ficus benghalensis, Ailanthus grandis, Ficus religiosa, Syzygium cumini, Gmelina arborea*, etc. Tea Garden: *Albizia* sp. *Cassia siamea, Shonka arvenis* etc. Riparian Vegetation: *Syzygium cumini Anthocephalus sinensis, Alstonia scholaris, Bombax ceiba, Ficus hispida* etc.	Information on flora and fauna has been provided in Section 3.4.
		Land Use and Land Cover (10 km study area)- Settlement with homestead plantation covers 29.22% of the total area of Dumduma-Pengeri followed by reserve forest (28.93%), agricultural land (19.51%) and tea gardens (15.57%). Unclassified forest areas cover 2.68% of the total area. River, streams and waterbodies approximately 2% of the total area.	Land use and land cover has been provided in Section 3.3.2.
		Flora and fauna- 253 numbers of plant species was reported from the area, which includes 129 species of trees, 68 species	Information on flora and fauna has been provided in Section 3.4.

<table>
<tr><th>Sl No.</th><th>ToR Point</th><th>Compliance</th><th>Reference Section in the EIA Report</th></tr>
<tr><td></td><td></td><td>of shrubs and herbs, 8 species of climbers, 16 species of grasses and 32 species of epiphytes.</td><td></td></tr>
<tr><td></td><td></td><td>Secondary information and primary surveys revealed presence of thirty six of Schedule I animals which includes 6 species of reptiles, 19 species of birds and 11 species of mammals.</td><td></td></tr>
<tr><td>18.</td><td>Incremental GLC as a result of DG set operation, flaring etc.</td><td>In order to predict the Ground Level Concentrations (GLCs) for the air pollutants (particulate matter, SO_2, NO_2, hydrocarbons etc.) at various distances from the source (generator sets, flaring etc.) at the drill sites/production installations, an air modelling exercise using AERMOD-ISC ST3 was undertaken.

<table>
<tr><th rowspan="2">Pollutants</th><th colspan="3">Predicted maximum GLC (µg/m^3)</th></tr>
<tr><th>Incremental Maximum Concentration</th><th>Distance from well /production facility(m)</th><th>Direction</th></tr>
<tr><td colspan="4">DG Set +Flaring (Well testing)</td></tr>
<tr><td>NOx</td><td>15.38</td><td>685</td><td>W</td></tr>
<tr><td>PM</td><td>0.07</td><td>611</td><td>W</td></tr>
<tr><td>HC</td><td>0.1</td><td>626</td><td>W</td></tr>
<tr><td>SO_2</td><td>0.18</td><td>610</td><td>W</td></tr>
<tr><td colspan="4">Flare Stack and GG Set (Production facility)</td></tr>
<tr><td>NOx</td><td>3.78</td><td>620</td><td>W</td></tr>
<tr><td>HC</td><td>0.16</td><td>610</td><td>W</td></tr>
</table></td><td>Refer Section 4.2.5</td></tr>
<tr><td>19.</td><td>Potential environmental impact envisaged during various stages of project activities such as site activation, development, operation/ maintenance and decommissioning.</td><td>Air Quality: The operation of DG sets, movement of vehicles and machineries during construction and drilling at drill sites, flaring etc. will result in the generation of air pollutants viz. PM, NOx and SOx which may affect the ambient air quality temporarily. Detailed impact assessment included in Section 4.2.

Noise Quality: Operation of rig and associated equipments, vehicular movement will result in generation of noise. Detailed impact assessment included in Section 4.2.6.

Soil Quality: Stripping of top soil will affect the soil fertility of the well sites temporarily. Potential adverse impacts on soil quality may also result from improper storage and handling of fuel, lubricants, drilling mud and drill cuttings. Detailed impact assessment included in Section 4.2.3

Water Quality and Hydrogeology: All wastewater from the drilling operations will be treated in the Effluent Treatment Plant (ETP) and will be reused. As the treated water will be recycled, no impact is anticipated in the surrounding water bodies.
Biological Environment: Noise, light generated from drilling operations and vehicular movement within the</td><td>Refer Section 4.2.</td></tr>
</table>

Sl No.	ToR Point	Compliance	Reference Section in the EIA Report
		drill sites and approach roads is likely to affect the fauna adversely and may result in their moving away from the project area for a temporary period. Biological Environment: The existing vegetation at the proposed drill sites, production installations, approach roads and RoU of the pipeline will be felled for site development. Noise generated from drilling operations and vehicular movement within the drill sites, production facilities and approach roads may affect the reptiles, birds and mammals adversely and may result in their moving away from the project area for a temporary period. Surface runoff from the drill sites and production facilities contaminated with sediment, may reach surface water channels and increase the suspended solids load of the channel water. Increase of suspended solid will increase the turbidity of river water that ultimately will adversely affect the DO level in the water. The turbid water and lower DO may affect the primary productivity of the impacted areas of the streams and rivers. The process effluent will be adequately treated in the ETP to meet the industrial effluent discharge standards and will be reused. Detailed impact assessment included in Section 4.2.11 and 4.2.12. Socio-Economic Environment: In the proposed project activity. However, local level disruption of infrastructure, dis-comfort due to dust and noise to adjoining communities, influx of people are likely to occur. Detailed impact assessment included in Section 4.2.13.	
20.	Actual source of water and 'Permission' for the drawal of water from the Competent Authority. Detailed water balance, wastewater generation and discharge.	Water is planned to be withdrawal from groundwater. During the drilling operations, water requirement at a drill site is expected to be include 39 m^3 per day fresh water. Approximately 20 m^3 per day water is required for the operation of production installations. Application for groundwater withdrawal submitted to CGWA. Drilling and Wash wastewater: 13.8 m^3 per day per well. The wastewater will be adequately treated in an ETP and will be reused Domestic wastewater: 8.0 m^3 per day from drilling site. Disposal through septic tank followed by soak pit.	Section 2.10.3 covers source and quantity of water required for each drill site. Water balance have been provided in Figure 2.11. The volume of The volume of wastewater generation and recycle options are provided in Section 2.10.3.
21.	Noise abatement measures and measures to minimize disturbance	Siting of drilling rig and facilities away from sensitive receptors viz. schools, settlements Installing acoustic enclosures and muffler on engine exhaust of DG sets.	Measures to mitigate light and noise related disturbances are given in Section

<table>
<tr><th>Sl No.</th><th>ToR Point</th><th>Compliance</th><th>Reference Section in the EIA Report</th></tr>
<tr><td></td><td>due to light and visual intrusions.</td><td>Measurement of source noise. Measurement of noise at the receptor areas.</td><td>4.2.1 and 4.2.6 respectively.</td></tr>
<tr><td>22.</td><td>Details on wastewater generation, treatment and utilization /discharge for produced water/ formation water, cooling waters, other wastewaters, etc. during all project phases.</td><td>Details provided in the table below :
<table><tr><th>Waste Type</th><th>Quantity</th><th>Disposal Method</th></tr><tr><td>Drilling and Wash wastewater discharge from wells</td><td>13.8 m^3 per day well</td><td>The wastewater will be adequately treated in a mobile ETP and reused.</td></tr><tr><td>Domestic wastewater discharge from labour camp</td><td>8 m^3 per day</td><td>Septic tank followed by soak pit</td></tr><tr><td>Formation Water</td><td>Unquantified</td><td>Will be stored temporarily and treated in ETP and will be reused.</td></tr></table></td><td>Volume of wastewater generation is provided in Section 2.10.3. Water balance have been provided in Figure 2.11.</td></tr>
<tr><td>23.</td><td>Details on solid waste management for drill cuttings, drilling mud and oily sludge, produced sand, radioactive materials, other hazardous materials, etc. including its disposal options during all project phases.</td><td>Details provided in the table below
<table><tr><th>Waste Type</th><th>Quantity</th><th>Disposal</th></tr><tr><td>Kitchen Waste</td><td>10 – 20 kg per day</td><td>Will be disposed in compost pits on daily basis that will be buried during site closure.</td></tr><tr><td>Drill Cuttings</td><td>350-400 m^3/ well</td><td>Will be disposed at onsite HDPE lined pit</td></tr><tr><td>Waste Drilling Mud (Fluid)</td><td>900-1200 m^3 / well</td><td>Will be tested for hazardous contaminants and disposed at onsite HDPE lined pit</td></tr><tr><td>Acid – Lead Batteries</td><td>2 – 3 Batteries / well</td><td>Will be recycled through the vendors</td></tr><tr><td>Oily waste- used oil & spent Oil</td><td>0.5 m^3

5-10 Kg</td><td>Will be collected in metal drums & disposed through approved used oil recycling facility</td></tr><tr><td>Recyclables viz. packaging wastes, paper, plastic</td><td>Depending on usage</td><td>Storage of recyclable waste in designated bins onsite. Recyclables will be periodically sold to local waste recyclers.</td></tr></table></td><td>Refer Table 2.9 and Section 10.1.7 Waste Management Plan.</td></tr>
<tr><td>24.</td><td>Disposal of spent oil and lube.</td><td>Spent oil to be stored in properly labelled and covered bins and periodically sent to Pollution Control Board of Assam (PCBA) registered recyclers.</td><td>Refer Section 10.1.7</td></tr>
<tr><td>25.</td><td>Storage of chemicals and diesel at site. Hazardous material usage, storage and accounting.</td><td>OIL has central chemical storage facility at Duliajan. Some chemicals and diesel will also be stored at paved and bunded areas within the drill site.

Chemicals and diesel to be stored in paved and bunded areas having proper spill control measures and containment facilities.</td><td>Refer Section 10.1.7</td></tr>
</table>

Sl No.	ToR Point	Compliance	Reference Section in the EIA Report
26.	Commitment for the use of water based mud (WBM) only	Water based mud will only be used. However, eco-friendly polymer based mud will also be used if required for deeper sections after providing intimation to the Pollution Control Board.	Refer Section 2.5.2
27.	Oil spill emergency plans for recovery/ reclamation.	• All chemicals will be stored in designated areas away from drainage channels; • The flooring of the area would be impervious (paved or HDPE lining) and bunding to be provide on all sides of the chemical storage areas to ensure containment of the any spill.; • In case of any spill incident has occurred, identify the chemical involved and check hazardous property of the chemical from the Material Safety Datasheet (MSDS); • Person wearing required PPE will apply necessary absorbent like saw dust for a liquid spill to ensure that the spill does not spread over a wide area; • Thereafter, the substance will be properly collected, stored and disposed in accordance with Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.	Refer Section 10.1.8
28.	H_2S emissions control.	Earlier explorations show the absence of H_2S in the area. However, If hydrogen sulfide is found then appropriate measures will be taken in accordance to Industrial Best Practice. H_2S detector and self-containing breathing apparatus will be available at the drilling site of OIL.	Refer Section 10.1.1
29.	Produced oil/gas handling, processing and storage/transportation.	Three production facilities are planned to be established within the Dumduma-Pengri Area. The production installation will include Oil Collection System (OCS), Gas Compressor Station (GCS), Field Group Gathering Station (FGGS) or Early Production System (EPS).	Refer Section 2.7 for production Installations
		Two production tanks (795 KL capacity) are planned for storage of crude oil. Height of the tanks are approximately 10 m with safe storage height of 5.7 m. Crude is generally stored at 1 atmospheric pressure and at 60°C.	Refer Section 2.8 - Interconnected Pipelines
30.	Details of control of air, water and noise pollution during production phase.	Air Quality Management Plan • Vehicles delivering raw materials like fine aggregates will be covered. • Sprinkling of water on earthworks, material haulage and transportation routes will be done 2-3 times per day at site and unpaved approach road during dry season. • Flare stacks and DG stacks (7m) of adequate height would be provided. • Periodic monitoring of DG set stack emission	Section 10.1.1 Air Quality Management Plan
		Noise Management Plan • Selection and use of low noise generating equipment with in-built engineering controls viz. mufflers, silencers, etc.	Section 10.1.2 Noise Quality Management Plan

Sl No.	ToR Point	Compliance	Reference Section in the EIA Report
		• DG sets would be provided with acoustic enclosures. • All vehicles utilized in transportation of raw materials and personnel will have valid Pollution under Control Certificates (PUC).	
		Water Quality Management Plan • Levelling and grading operations will be undertaken with minimal disturbance to the existing site contours thereby maintaining the general slope and topographical profile of the sites. • Sediment filters and oil-water separators will be installed to intercept run-off and remove sediment before it enters watercourses. • Domestic wastewater generated from drill site will be treated through septic tank and soak pit system and then reused. • Process wastewater would be treated in Effluent Treatment Plant (ETP) at drill sites. • OIL committing to the use of primarily water based mud and eco-friendly polymer based mud (will also be used if required for deeper sections after providing intimation to the Pollution Control Board), the drill cuttings and waste drilling mud generated are likely to be non-hazardous in nature. • The drill cutting along with spent mud will be stored in HDPE lined pit.	Section 10.1.5 Surface water Quality Management Plan Section 10.1.6 Groundwater Quality Management Plan
31.	Measures to protect ground water and shallow aquifers from contamination.	Proper casing and cementing plan while drilling will protect the contamination of shallow aquifers. Formation water will be stored in HDPE lined pits that will be treated in onsite ETP and will be reused. Domestic wastewater generated from drill site will be treated through septic tank and soak pit system and will be reused. Periodic groundwater monitoring near the well sites	Section 10.1.6 Groundwater Quality Management Plan
32.	Whether any burn pits being utilized for well test operations.	Burn pits will not be utilized for well test operations.	-
33.	Risk assessment and disaster management plan for independent reviews of well designed construction etc. for prevention of blow out. Blowout preventer installation.	Potential hazards identified • Blowouts leading to uncontrolled well flow, jet fires, pool fires; • Hydrocarbon leaks due to loss of containment while drilling; • Non-process fires / explosions, release of a dangerous substance or any other event resulting from work activity resulting in death or serious injury to people within the site; and • Any event which may result in major damage to the structure of the rig. Risk assessment include • Blow Outs/Loss of Well Control • Hydrocarbons Leaks due to Loss of Containment while Drilling & Testing	Chapter 7 Risk assessment and at Annexure 7.1.

Sl No.	ToR Point	Compliance	Reference Section in the EIA Report
		• Hydrocarbon Pipeline Rupture • OCS Tank Failure A disaster management plan has been devised for safe, timely, effective response by the Onsite Emergency Response Team for prevention of blow out. Necessary active barriers (e.g., Well-designed Blowout Preventer) be installed to control or contain a potential blowout. Weekly blow out drills be carried out to test reliability of BOP and preparedness of drilling team. Installation of hydrocarbon detectors. Periodic monitoring and preventive maintenance be undertaken for primary and secondary barriers installed for blow out prevention, including third party inspection & testing	
		A disaster management plan has been devised for safe, timely, effective response by the Onsite Emergency Response Team for prevention of blow out. • Necessary active barriers (eg. Well-designed Blowout Preventer) be installed to control or contain a potential blowout. • Weekly blow out drills be carried out to test reliability of BOP and preparedness of drilling team. • Installation of hydrocarbon detectors. Periodic monitoring and preventive maintenance be undertaken for primary and secondary barriers installed for blow out prevention, including third party inspection & testing	
34.	Environmental management plan.	The EMP is an overview document that will guide environmental management of all aspects of OIL's activities i.e. construction of well sites and, well drilling, construction and operation of productions facilities and pipeline in DPA. The EMP is backed up by more specific Environmental Action Plans, Procedures and Bridging Documents. Air Quality Management Plan, Water Quality Management Plan , Noise Management Plan presented in Point no. 30 of the ToR compliance table	Refer Chapter 10.
		Soil Quality Management Plan • Drip trays to be used during vehicular/equipment maintenance and during re-fuelling operations. • Spill kits will be made available at all fuel and lubricant storage areas. All spills/leaks contained, reported and cleaned up immediately. • Dedicated paved storage area will be identified for the drilling chemicals, fuel, lubricants and oils within the drill sites and production facilities.	

Sl No.	ToR Point	Compliance	Reference Section in the EIA Report
		1.5 mm HDPE lined pits will be considered for the disposal of unusable drilling mud cuttings.	
		Waste Management Plan • Use of low toxicity chemicals for the preparation of drilling fluid. • Management of drill cuttings, waste drilling mud, waste oil and domestic waste, wastewater in accordance with Standards for Emission or Discharge of Environmental Pollutants from Oil Drilling and Gas Extraction Industry of CPCB as modified in 2005. The waste water will be treated in an ETP and will be reused. • The hazardous waste (waste and used oil) will be managed in accordance with Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2016. • The kitchen waste will be disposed in nearest municipal/village dumping site on a daily basis through approved waste handling contractors. • The sewage generated will be treated through septic tank and soak pit system. • Used batteries will be recycled through the vendors supplying lead acid batteries as required under the Batteries (Management & Handling) Rules, 2001. • The drill cuttings pit will be bunded and kept covered using tarpaulin sheets during monsoon.	
		Blowout Prevention Management Plan covers installation of Well-designed Blowout Preventer to control or contain a potential blowout. Weekly blow out drills be carried out to test reliability of BOP and preparedness of drilling team. In case of blowout, OIL will engage its own resource along with hired services from organizations of national repute to minimize impacts. A number of actions planned by OIL to mitigate the impacts which include: i) Environmental and vibration assessment, ii) Spillage cleaning and bio-remediation, iii) Picking up of spilled oil manually and by turbo pump, iv) Assessment of environmental contamination caused, v) Assessment of impact/ damage to the biodiversity, vi) Assessment of Health Hazards, vii) Damage assessment, corrective actions, remediation and compensation for damages.	
		Greenbelt Plan • The peripheral area of the production installations will be used for greenbelt plantation. • Selection of plant species will be done based on their adaptability to the existing geographical conditions and the vegetation composition of the topography of the region.	

Sl No.	ToR Point	Compliance	Reference Section in the EIA Report
		• In the present case an area of about 25% (1.75 ha.) of the total area of each production installation (7 ha. each) has been allocated for development of the green belt. • Approximately 1600 saplings will be planted per hectare of land. Total number of saplings to be planted is 2800 nos. per production installation	
		Wildlife Conservation Plan • Contributing to Forest Departments habitat improvement program • Contribution to forest department for tracking of elephant movement • Capacity building of forest department staffs • Awareness Generation Meetings at villages • Engaging a NGO for Identification of Hoolock Gibbon roosting sites and vulture nests.	
		Road Safety & Traffic Management Plan • The condition of roads and bridges identified for movement of vehicles and drilling rig will be assessed and if required strengthened by OIL to ensure their safe movement. • Precautions will be taken by the contractor to avoid damage to the public access routes including highways during vehicular movement. • Traffic flows will be scheduled wherever practicable during period of increased commuter movement.	
		Occupation Health & Safety Management Plan • All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be kept in good working order, will be regularly inspected and properly maintained as per IS provisions and to the satisfaction of the site Engineer. • Hazardous and risky areas, installations, materials, safety measures, emergency exits, etc. shall be appropriately marked.	
35.	Total capital and recurring cost for environmental control measures.	EMP Budget includes budget for Public Hearing Action Plan, Wildlife Conservation Plan, Greenbelt Budget and Budget for Environmental Conservation Measures. Budget for Public Hearing Action Plan for socioeconomic development is planned to be INR 177.5 lakhs for 7 years. Budget for Greenbelt Plan will be INR 5.25 lakhs. Budget for Wildlife Conservation Plan for Schedule-I species for 7 year will be INR 58 lakhs. Environmental Control measures for each well would be 14.645 lakhs and for each production installation per year would be INR 6.43 lakhs. Capital cost of EMP would be INR 104 lakhs and recurring cost for EMP would be approximately INR 93.41 lakhs per annum.	The capital and recurring costs are presented in Section 10.4
36.	Emergency preparedness plan.	*Emergency Preparedness Plan:* • Identification of coordinators and their role. • Communication of the crisis down the line to concerned personnel.	Refer Section 7.1.6.

Sl No.	ToR Point	Compliance	Reference Section in the EIA Report
		• Setting up of control rooms. • Action plan for rescue, relief, salvage, repair and restoration taking the assistance from all the people including Mutual Aid from nearly industries. • OIL Team onsite and offsite emergency team- HSE department *Emergency Response Plan* • Drilling rig and related equipment to be used for drilling will conform to international standards specified for such equipment. • Blow-out preventers and related well control equipment shall be installed, operated, maintained and tested generally in accordance with internationally recognized standards. • Appropriate gas and leak detection system will be made available at each of the drill sites and production facilities. • Adequate fire-fighting equipment shall be provided at each drilling site.	
37.	Decommissioning and restoration plans.	Dismantling of rig, associated equipment, and transporting it out of the project area. All concrete structures to be broken up, debris disposed as per regulatory requirements. Solid and liquid wastes will be disposed in accordance to the CPCB guidelines and Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 All pits will be backfilled and closed out. After decommissioning of site, it will be de-compacted and stored top soil will be overlain on the de-compacted site with certain moisture conservation measures and seeding of leguminous plant for restoration soil nutrient level. Site will be reclaimed and planted with vegetation before it is abandoned.	Refer Section 10.1.4.
38.	Documentary proof of membership of common disposal facilities, if any.	Common disposal facility does not exist in Assam.	-
39.	Details of environmental and safety related documentation within the company including documentation and proposed occupational health and safety Surveillance Safety Programme for all personnel at site. This shall also include monitoring programme for the environmental.	Regular health check-up of OIL personnel conducted as per OIL HSE Policy. Drilling activity contractor- how OIL manages Surveillance safety programs carried at regular intervals and documented.	Refer Section 10.3
40.	A copy of Corporate Environment Policy of the	The Environment Policy of OIL attached.	Refer to Boxes 10.1, in Chapter 10

Sl No.	ToR Point	Compliance	Reference Section in the EIA Report
	company as per the Ministry's O.M. No. J-11013/41/2006-IA.II(I) dated 26th April, 2011 available on the Ministry's website.		
41.	Any litigation pending against the project and or any direction/order passed by any court of law against the project. If so details thereof.	No litigation is pending against the project.	
Additional ToR			
42.	Public Hearing to be conducted	Public Hearing (PH) for the project was conducted by Pollution Control Board of Assam (PCBA) at Tinsukia district of Assam on 13.03.20. The local stakeholders were informed about the public hearings through advertisements in Assamese and English newspapers. People from nearby villages and representative from Civil Society attended the PH meetings at Dibrugarh district. Major concerns and issues discussed in the PH was related to; • Protection of ecology and environment • Development activities - improvement of infrastructure in schools, health initiatives, social initiatives • Funds for construction of toliets	Refer Section 7.2

EXECUTIVE SUMMARY

Introduction

Oil India Ltd. (OIL) is currently planning for drilling of 26 onshore developmental wells and 3 nos. of production installations and assorted Oil & Gas flowlines/delivery lines (from 50mm to 300mm NB) of total length 100km at Dumduma-Pengeri Area of Tinsukia Districts of Assam.

During the ToR application stages OIL applied for 27 wells and 3 production installations are planned as part of the Project. Out of 27 wells, 1 well (XA) is located in forest areas hence as part of this proposal the XA well is dropped and the current proposal includes 26 wells and 3 production installations.

The exploration of oil and gas is included under activities has been categorized as "A" level project in EIA Notification, 2006 that requires an Environmental Clearance (EC) from the Ministry of Environment, Forests and Climate Change (MoEF&CC). MoEF&CC has issued an approved ToR **vide No. J-11011/1251/2007 - IA II (I)** dated 1st June, 2018 to OIL for conducting the EIA study.

The scope of the EIA study will be to establish the likely effect of drilling and production activities in Dumduma-Pengeri Area on the physical, social and biological environment of the surrounding areas. The scope of the EIA is delineated in line with the approved Terms of Reference (ToR) received from MoEF&CC.

Project Description

Location and Accessibility

The Dumduma-Pengeri Oil and Gas Field is located in Tinsukia District, Assam. Total area of Dumduma-Pengeri Oil and gas Field is 876 sq. km. NH 38 and NH 52B, being the most prominent road in this region. Nearest town is Tinsukia, 26.6 km from the proposed area. Nearest railway station to Dumduma-Pengeri Area is Tinsukia Junction Railway station, which is almost 24.9 km from the proposed location. Nearest commercial airport is Dibrugarh airport, 64.2 km.

Environmental Settings of Dumduma-Pengeri Area

The Dumduma – Pengeri Area is spreads over 876 sq. km and is located in Tinsukia district of Assam. Geomorphologically most of the area is within Brahmaputra river plain between the two large river systems viz., the Burhi Dihing towards south east and the Noa Dihing towards the northeast. The project area covers agricultural land/ tea gardens/ Katha Reserve Forest (RF), Burihiding RF, Duarmara RF, Tarani RF, Dumduma RF, Nalani RF, Philobari RF, Takowani RF, Kakojan RF, Digboi RF, Bogapani RF and Upper Dihing RF. No national park/wildlife sanctuary/eco-sensitive area are located within 10 km radius of the drilling locations and production installations.

Environment setting of the Well sites and Production Facilities

Among the 26 wells, 4 wells are located in agricultural land, 8 wells located in homestead plantation area and 14 wells are located in tea garden area. Among the three production facilities all three (3) are located in tea garden.

Project Activities

Land Lease

The land required for the well sites and production facilities will be procured from agricultural lands, homestead plantation areas and tea garden areas. The land required for the well sites and production facility will be procured from the local villagers through direct purchase. Generally, OIL will procure the required land through private negotiation. In few cases, OIL may request district authority to acquired land under LARR act 2013, if private negotiation is not successful. Land will be procured in a way that physical displacement will not occur and the crop compensation will be included during procurement. Land from the tea garden would be taken on long-term lease from the tea garden authority.

Construction of Access road

Majority of the proposed wells are located adjacent to the existing road; the distance of the proposed well pad will be of 100- 200 m (maximum) from existing road. Construction of site access road will not involve displacement of any household. As far as possible, existing roads will be used. Cutting of trees will be avoided. If necessary, existing road will be developed by widening, etc. Culverts and drainage channel will be maintained during site preparation.

Site Preparation & Construction of Drill site

Site preparation will involve levelling, filling and consolidation of the site for staging equipment and machinery. Individual sites will be duly fenced to a height of about 2 m using jingle wired fencing or Xpm fencing.

Preparation and construction of drill sites and production facilities will involve top soil scraping and storage for future use, elevating the site by excavated material from the site and material brought from authorized quarry area. Reinforced Cement Concrete (RCC) will be used for the construction of foundation system at drill sites. For making foundations of the main rig structure, cast in-situ bored under- reamed piles of specified lengths will also be used.

Drilling & Testing

The exploitation of hydrocarbons requires the construction of a conduit between the surface and the reservoir. This is achieved by the drilling process. The exploration wells will be drilled 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 3900 metres as planned for the project.

During drilling operations, a fluid known as drilling fluid (or ‘mud’) is pumped through the drill string down to the drilling bit and returns between the drill pipe –casing annulus up to surface back into the circulation system after separation of drill cuttings /solids through solids control equipment. Drilling fluid is essential to the operation and helps in controlling down hole pressure, lift soil/rock cuttings to the mud pit, prevent cuttings from settling in the drill pipe, lubricate, cool and clean the drill bit.

Drill cuttings generated will be collected and separated using a solid control system and temporarily stored on-site in HDPE lined pits. Drilling and wash wastewater generated will also be stored at an onsite HDPE lined pit. 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 and will be reused.

There will be other ancillary facilities like drilling mud system, Effluent Treatment 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.

Between drilling operations for different zones, logging operations will be undertaken to provide information on the potential type and quantities of hydrocarbons present in the target formations.

Well Site decommissioning

On completion of activities, the wells will be either plugged and connected with flow lines or suspended. In the event of a decision to suspend the well, it will be filled with a brine solution containing very small quantities of inhibitors to protect the well. After the activities, the well will be sealed with a series of cement plugs, all the wellhead equipment will be removed leaving the surface clear of any debris and site will be restored.

Production Installations

Three Production installations are planned within the Dumduma-Pengeri Area. The production installation may include Oil Collection System (OCS), Gas Compressor Station (GCS), Field Group Gathering Station (FGGS) or Early Production System (EPS).

Utilities and Resource Requirements

Power: The power requirement for each drill site construction will be met through the 100 KW/125 kVA DG Sets. During drilling, DG sets of 1000KW/1250 KVA KW capacities, will be used to meet the power requirement for drilling. Lighting and other power requirements at drill sites will met through 200KW/250 KVA DG sets. It is estimated that 3.5 KLD of diesel will be required during drilling phase. Power requirement for the production installations will be met through Gas Generator (GG) sets of 216 KW capacity.

Water: During the drilling operations, water requirement at a drill site is expected to be 39 m^3 per day fresh water and 11 m^3 per day recycled water. The water requirement at the drilling sites during construction and drilling phase will be met groundwater after obtaining necessary permission. Potable water requirement at site will be met through packaged drinking water. In addition, a water storage pit of around 1000 m^3 is proposed to store water for fire water supply the likely source being surface water. For production facility approximately, 5 m^3 per day water will be required for construction and 3 m^3 per day for workers during construction phase. Approximately 20 m^3 per day water is required during the operation of the production installations. The water requirement will be met groundwater after obtaining necessary permission.

Manpower: The estimated employment would be approximately 80 un-skilled temporary workers during the peak construction phase that will be primarily sourced from nearby villages. Additionally, 20 permanent OIL employees will supervise the construction phase. The drilling rig will be operated by approximately 40-50 persons on the rig at any particular time. Approximately 10 persons per shift will be hired during operation phase of production facility. Production facilities are operated in three shifts with approximately 10 persons operating per shift. Personnel involved in a production facility include the Installation Manager, supervisors and other technical staffs.

Pollution Sources

- *Air emissions*: Point source air emissions will be generated from DG/GG sets. Fugitive emissions will occur from vehicles involved in the drilling operations and from windblown dust from storage and staging areas within the drill sites and production facilities.

- *Noise & Vibrations*: Noise and vibration will be generated due to operation of drilling rig, DG/GG sets and vehicles.
- *Liquid wastes:* During the drilling phase, wastewater generation will be approximately 6.8 m^3 per day as a result of rig wash and dewatering of spent mud and washing of drill cuttings. The wastewater will be treated in an Effluent Treatment System (ETP) at site. The treated water would be reused. Domestic wastewater approximately 8 m^3 per day will be generated from the drill sites would be treated in septic tanks and soak pits. In production facilities, produced formation water will be reused after necessary treatment; surface Runoff after treatment through Oil Water Separator (OWS) and sedimentation tank will be reused.
- *Drill cuttings & spent mud:* Approximately 350-400 m^3 of drill cuttings and 900-1200 m^3 of spent mud will be generated per site. Drill cuttings and spent mud will be disposed off in a well-designed pit lined with impervious liner located on site.

Baseline Environmental Status

Land use and land cover: The land-use and land-cover of the Dumduma-Pengeri Area has been interpreted from the satellite data, toposheet of the area, and subsequently by ground truthing during field surveys.

Settlement with homestead plantation covers 29.22% of the total area of Dumduma-Pengeri followed by reserve forest (28.93%), agricultural land (19.51%) and tea gardens (15,57%). Unclassified forest areas cover 2.68% of the total area. River, streams and waterbodies approximately 2% of the total area.

Soil Quality: Soil samples were collected from five locations spread across different types of land cover such as agricultural field, homestead plantation, tea garden and forest land. The soil samples were found to be clay loam, sandy clay loam and clayish in nature with acidic pH. The macronutrient contents *viz*. phosphorous and potassium values of the soil samples were found to be low. Metal contamination has not been observed in soil samples.

Climate and Meteorology: The study area experiences a sub-tropical to temperate climate. The maximum and minimum temperature reported during the study period was 30.3°C and 10.1°C. The average relative humidity was 70.2% during the study period. Relative humidity ranged between 30.9% and 97.8% during the study period. Rainfall occurred on few days of the study period. Total rainfall recorded during the study period was 38.18 inch. Only 1 rainy day (rainfall>2.5 mm/day) was recorded during the study period. Hourly micro-meteorological data collected during the post monsoon season reveal that the pre-dominant wind direction is from the north-east with an average speed of 1.3 m/s.

Air Quality: Ambient air quality was monitored at eight locations within the Block. Average PM_{10} values varied from 76.17 and 80.57 µg/m^3; $PM_{2.5}$ varies from 37.46 and 40.11 µg/m^3. Other gaseous parameters like SO_2, NOx, CO were observed to be well within the levels specified in the National Ambient Air Quality Standards (NAAQS) for industrial, residential and other areas. The average total methane hydrocarbon concentration in the study area ranged between 1.57 and 1.93 ppm. All the values for non-methane hydrocarbons were recorded to be below detection limits (<0.1 ppm). Almost all the values for VOCs were recorded to be below detection limits (<4.2 µg/m^3) for all the samples.

Noise Quality: The ambient noise was monitored at 8 locations within the Block. The equivalent noise level as measured at the residential areas range between 40.1-53.2dB(A) at day time and between 37.5-46.9 dB(A) at night time. The equivalent day time noise values in all the locations were in compliance to the day time standard of 55 dB(A) for residential areas.

Groundwater Quality: The concentration of all the parameters analysed were within the acceptable limit of IS: 10500, 2012 standard. Absence of coliform indicates that, the water is safe to consume for drinking purpose.

Surface Water Quality: Surface water samples were analyzed from Dibru River, Burhi Dihing River, Dibru River near Sandang T.Eand Nala within Upper Dihing R.F. The analyzed values reveal that all the samples were in compliance to the CPCB Class B i.e. *Propagation of Wild life and Fisheries*.

Biological Environment: A significant part of the study area falls within the Upper Dihing Reserved forest. Three Elephant Corridors between Upper Dihing R. F. East and West Blocks at Bogapani and Golai-Powai and Kotha-Buridihing are located within the Dumduma Pengeri Area. Apart from the protected areas tea garden plantation covers huge tracts of land within the study Area as well as in the surrounding region. 253 numbers of plant species was reported from the area. Secondary information and primary surveys revealed presence of thirty six of Schedule I animals which includes 6 species of reptiles, 19 species of birds and 11 species of mammals. Dehing Patkai National Park is located at the south west corner of the Block; however, no well or production installation located within 10 km of Dehing Patkai National Park.

Socioeconomic Environment: Twenty one villages lie within 1 km of proposed well locations and production facilities. Major population in the study area villages either are cultivators or tea garden workers. Water requirement is catered through household bore well/tube well facility in the village areas whereas tap water supply present in 13 of the study area villages. Almost every village has a primary school; however, percentage of students pursuing higher education is comparatively less. Four primary health centres and 10 Community Health centers are present in the influenced area villages.

Impact Assessment

The potential impacts arising due to the construction and operation of the drilling activities are given below:

Air Quality: The operation of DG/GG sets, movement of vehicles and machineries during construction and drilling at drill sites and production operations will result in the generation of air pollutants *viz*. PM, NOx and SOx that may affect the ambient air quality temporarily.

Noise Quality: Operation of heavy machinery/equipment and vehicular movement during site preparatory and road strengthening/construction activities may result in the generation of increased noise levels. Operational phase noise impacts are anticipated from the running of drilling rig and ancillary equipment *viz*. shale shakers, mud pumps and diesel generators, gas generators etc.

Soil Quality: Stripping of top soil will affect the soil fertility of the well sites temporarily. Potential adverse impacts on soil quality may also result from improper storage and handling of fuel, lubricants, drilling mud and drill cuttings.

Water Quality and Hydrogeology: All wastewater discharged from the drilling and production operations will be treated in the ETP and reused in drilling operations. All the treated water from ETP will be recycled. As no water will be discharged is small, it will not increase the pollution load of different surface waterbodies. Uncontrolled surface runoff from the drill sites and production facilities may compose of waste fluids or storm water mixed with oil and grease and may pollute the surface water quality. However, the surface runoff will be treated with sedimentation tank and oil water separator at site and will be reused.

Biological Environment: The existing vegetation at the proposed drill sites, production installations, approach roads and RoU of the pipeline will be felled for site development. Noise generated from drilling operations and vehicular movement within the drill sites, production facilities and approach roads may affect the reptiles, birds and mammals adversely and may result in their moving away from the project area for a temporary period. Surface runoff from the drill sites and production facilities contaminated with sediment, may reach surface water channels and increase the suspended solids load of the channel water. Increase of suspended solid will increase the turbidity of river water that ultimately will adversely affect the DO level in the water. The turbid water and lower DO may affect the primary productivity of the impacted areas of the streams and rivers. The process effluent will be adequately treated in the ETP and will be reused.

Socio-Economic Environment: Approximately 3 ha. land would be required for each well and 7 ha . land would be required for each production facility and 10m RoU for pipelines. New land will be leased from forest department for the proposed drilling and production activity. The land is also used by locals as agriculture, tea plantation areas and settlement area however, no physical displacement due to land lease is envisaged at drill site and production facility installation. Additionally, land will also be procured for construction of 100-200 m approach road to the drill sites and production facilities from existing roads. Anticipated number of families directly impacted would be limited to 2-5 nos. for each of the drill sites. The dependency of the landowner in case of generation of livelihood is limited as the land is classified as monocropped agricultural land.

OIL/its contractors would endeavour to provide maximum employment to the local people; however, certain percentage of semi-skilled and highly skilled migrant labour would be used by contractors for manning technical activities. It is anticipated that occasional conflicts would arise with the local community over the recruitment of migrant workers. Discomfort due to dust and noise to adjoining communities, influx of people are likely to occur.

The construction phase of the project is likely to generate both direct and indirect opportunities for employment. The estimated direct employment would be approximately 50 un-skilled workers during the peak construction phase that will primarily source from nearby areas. Indirect employment would be primarily in the supply chain as vendors, which are anticipated to be set up to support the construction.

Impact on Community Health & Safety: Community health and safety of inhabitants residing close to the proposed well sites and production facilities stand to get affected from frequent heavy vehicular movements along village access roads and due to noise from drilling rig operations, movement of heavy vehicles during construction etc.

Environment Monitoring Program

Environmental monitoring Program for each well will include the following

- Ambient Air Quality Monitoring – at 3 monitoring location; once during construction, twice during drilling and once during site decommissioning phase
- Stack emission monitoring at 3DG sets during drilling
- Ambient Noise Monitoring – 3 locations, once during construction, twice during drilling and once during site decommissioning phase
- Workplace noise monitoring -5 locations, twice during drilling
- Surface Water Quality Monitoring- 2 locations, once during construction, once during drilling and once during site decommissioning phase
- Treated water -2 from ETP and 1 from oil/water separator- once each during drilling phase

- Ground Water Quality Monitoring, three location, once during drilling phase
- Soil Quality Monitoring - three locations, once each during pre-construction, drilling and post drilling phase

At the production facilities ambient air, stack emission monitoring from GG sets, ambient and workplace noise monitoring, surface and groundwater quality monitoring, treated wastewater monitoring and soil quality monitoring would be conducted twice a year.

Risk Assessment and Mitigation

Risk Assessment (RA) aims to provide a systematic analysis of the major risks that may arise as a result of drilling and production activities in Dumduma-Pengeri Area. The RA process outlines rational evaluations of the identified risks based on their significance and provides the outline for appropriate preventive and risk mitigation measures.

Three major categories of hazards that can be associated with proposed Project which includes:

- Blowouts leading to uncontrolled well flow, jet fires, pool fires;
- Hydrocarbon leaks due to loss of containment while drilling;
- Non-process fires / explosions, the release of a dangerous substance or any other event resulting from a work activity which could result in death or serious injury to people within the site; and
- Any event which may result in major damage to the structure of the rig.

Risk assessment results

Blow Outs/Loss of Well Control

The blow out frequency for the proposed project for oil and gas wells have been at 2.35 X 10^{-4} and 1.94 X 10^{-4} per well drilled per year respectively i.e. the likelihood of its occurrence is identified to be as “Not Likely”

The probability of ignition of blow out releases of hydrocarbons for the proposed development project for both oil and gas is computed to be around ~0.0021% and 0.0017% respectively and can be considered to be as negligible.

Hence for a worst case scenario (10kg/s) the flammable vapour cloud zone/flame pockets’ resulting from accidental release of natural gas will be covering a radial zone of 77m from source with the flammable gas concentration within this zone being 26,400 ppm.

Hydrocarbons Leaks due to Loss of Containment while Drilling & Testing

For a worst case scenario (50 mm leak) the ignition of natural gas release will be resulting in generation of thermal radiation which will be lethal within a maximum radius of 10m within 1 minute of its occurrence.

Hydrocarbon Pipeline and GCS Rupture

The worst hazard for release and ignition of natural gas from 300mm dia pipeline rupture will be experienced to a maximum radial distance of 41m from the source with potential lethal effects within 1 minute.

OCS Tank Failure

The worst hazard for release and ignition of crude oil from storage tank leak (300mm) will be experienced to a maximum radial distance of 67m from the source with potential lethal effects within 1 minute.

Risk Reduction Measures

Blow Out Risk reducing measures include:

- Kick simulation training for personnel;
- Presence of well-trained engineers;
- Appropriate well design;
- Good well control procedures;
- Appropriate mud weight formulations;
- Installation of primary and secondary blow out preventors; and
- Trained and skilled operation staff.

Accidents related to leaks from equipment can be minimised by:

- Ensuring that equipment is designed, installed and maintained as per international standards;
- Implementing a robust preventive maintenance system of all safety critical equipment; and
- Efficient test separator;

Risk from storage areas can be minimized by;

- Proper preventive maintenance and robust safety management and security systems.
- For the storage tank, secondary containment to be provided.

Other risk management can be achieved by;

- A hydrocarbon gas detection system with suitable alarm system will be provided at the drilling sites and production facilities.
- Management of Oil Spills/Leaks and Soil contamination

Public Hearing

Public Hearing (PH) for the project was conducted by Pollution Control Board of Assam (PCBA) at Tinsukia district of Assam on 13.03.20. The local stakeholders were informed about the public hearings through advertisements in Assamese and English newspapers. People from nearby villages and representative from Civil Society attended the PH meetings at Dibrugarh district. Major concerns and issues discussed in the PH was related to;

- Protection of ecology and environment
- Development activities - improvement of infrastructure in schools, health initiatives, social initiatives
- Funds for construction of toilets.

OIL will earmark INR 177.5 lakhs for Social Development in Tinsukia district for Dumduma Pengri Area in line with the comments and suggestions made by the local public during Public Hearing.

Project Benefits

- Provision of more royalty to Assam Government and more cess to Govt. of India;
- Provision of more employment opportunity to local people;
- Development of infrastructure (roads, culverts, bridges, schools etc.) in the area;
- Increase in business opportunity for the local people;
- Energy security for the country;

Environmental Management Plan

Air Quality Management Plan

- Vehicles delivering raw materials like fine aggregates will be covered to prevent fugitive emissions.
- Sprinkling of water on earthworks, material haulage and transportation routes on a regular basis during construction and decommissioning phase of the wells.
- Storage and handling of construction material and debris to be carefully managed to prevent generation of fugitive dust;
- All vehicles utilized in transportation of raw material and personnel will have valid Pollution under Control Certificate (PUC). Vehicular exhaust will be complying with the CPCB specified emission norms for heavy diesel vehicles;
- The top soil generated from site clearance activities will be stored in designated area and stabilized to prevent fugitive dust emissions;
- Flare stacks of adequate height would be provided.
- DG/GG set stacks would have adequate height, as per statutory requirements, to be able to adequately disperse exhaust gases
- Periodic monitoring of DG/GG set stack emission will be carried out in accordance with the Environmental Monitoring Plan to assess compliance with CPCB DG set exhaust standards.

Noise Management Plan

- Selection and use of low noise generating equipment with in-built engineering controls viz. mufflers, silencers, etc.
- All DG/GG sets would be provided with acoustic enclosures.
- Appropriate PPEs (e.g. ear plugs) will be used for by workers while working near high noise generating equipment.
- All vehicles utilized in transportation of raw materials and personnel will have valid Pollution under Control Certificates (PUC).
- All high noise generating equipment will be identified and subjected to periodic preventive maintenance.
- Use of noise barriers

Soil Quality Management Plan

- Drip trays to be used during vehicular/equipment maintenance and during re-fuelling operations.
- Spill kits will be made available at all fuel and lubricant storage areas. All spills/leaks contained, reported and cleaned up immediately.
- Fuel and lubricant storage areas will be paved and properly bunded. Bunded areas will be designed to accommodate 110% of the volume of spilled material;
- Dedicated paved storage area will be identified for the chemicals, fuel, lubricants and oils within the drill sites and production facilities.
- 1.5 mm HDPE lined pits will be considered for the disposal of unusable drilling mud cuttings.

Surface Water Quality Management Plan

- Levelling and grading operations will be undertaken with minimal disturbance to the existing site contours thereby maintaining the general slope and topographical profile of the site.
- Construction work close to the streams will be avoided during monsoon;
- During site preparation and construction, surface water run-off will be channelized through appropriately designed drainage system.
- Sediment filters and oil-water separators will be installed to intercept run-off and remove sediment before it enters water courses.
- Domestic wastewater generated from drill sites and production facilities will be treated through septic tank and soak pit system.
- Process wastewater would be treated in Effluent Treatment Plant (ETP) at drill sites and production facilities.

Ground Water Quality Management Plan

- Water based mud would be used as a drilling fluid for the proposed project.
- Eco-friendly synthetic based mud if required for deeper sections, will be used after providing intimation to the Pollution Control Board;
- The drill cutting along with spent mud will be stored in HDPE lined pit.

Waste Management Plan

- Use of low toxicity chemicals for the preparation of drilling fluid.
- Management of drill cuttings, waste drilling mud, waste oil and domestic waste, wastewater in accordance with Standards for Emission or Discharge of Environmental Pollutants from Oil Drilling and Gas Extraction Industry of CPCB as modified in 2005. The waste water will be treated in an ETP and will be reused.
- The hazardous waste (waste and used oil) will be managed in accordance with Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2016.
- The kitchen waste will be disposed in nearest municipal/village dumping site on a daily basis through approved waste handling contractors.
- The sewage generated will be treated through septic tank and soak pit system.
- Used batteries will be recycled through the vendors supplying lead acid batteries as required under the Batteries (Management & Handling) Rules, 2001.
- The drill cuttings pit will be bunded and kept covered using tarpaulin sheets during monsoon.

Greenbelt Plan

- The peripheral area of the production installations will be used for greenbelt plantation.
- Selection of plant species will be done on the basis of their adaptability to the existing geographical conditions and the vegetation composition of the topography of the region.
- In the present case an area of about 25% (1.75 ha.) of the total area of each production installation (7 ha. each) has been allocated for development of the green belt.
- Approximately 1600 saplings will be planted per hectare of land. Total number of saplings to be planted is 2800 nos. per production installation

Wildlife Conservation Plan

- Contributing to Forest Departments habitat improvement program
- Contribution to forest department for tracking of elephant movement
- Capacity building of forest department staffs
- Awareness Generation Meetings at villages
- Engaging a NGO for Identification of Hoolock Gibbon roosting sites and vulture nests.

Road Safety & Traffic Management Plan

- The condition of roads and bridges identified for movement of vehicles and drilling rig will be assessed and if required strengthened by OIL to ensure their safe movement.
- Precautions will be taken by the contractor to avoid damage to the public access routes including highways during vehicular movement.
- Traffic flows will be scheduled wherever practicable during period of increased commuter movement.

Occupation Health & Safety Management Plan

- All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be kept in good working order, will be regularly inspected and properly maintained as per IS provisions and to the satisfaction of the site Engineer.
- Hazardous and risky areas, installations, materials, safety measures, emergency exits, etc. shall be appropriately marked.

Emergency Response Plan

- Drilling rig and related equipment to be used for drilling will be conformed to international standards specified for such equipment.
- Blow-out preventers and related well control equipment shall be installed, operated, maintained and tested generally in accordance with internationally recognized standards.
- Appropriate gas and leak detection system will be made available at each of the drill sites and production facility.
- Adequate fire-fighting equipment shall be provided at each site.

Project Cost

Based on OILs previous experience of drilling in the area, cost for drilling of 26 wells (including drilling rates, consumables and well accessories etc.) and three production facilities is approximately INR 1109.40 crores.

EMP Budget includes budget for Public Hearing Action Plan, Wildlife Conservation Plan, Greenbelt Budget and Budget for Environmental Conservation Measures. Budget for Public Hearing Action Plan for socioeconomic development is planned to be INR 177.5 lakhs for 7 years. Budget for Greenbelt Plan will be INR 5.25 lakhs. Budget for Wildlife Conservation Plan for Schedule-I species for 7 year will be INR 58 lakhs. Environmental Control measures for each well would be 14.645 lakhs and for each production installation per year would be INR 6.43 lakhs. Capital cost of EMP would be INR 104 lakhs and recurring cost for EMP would be approximately INR 93.41 lakhs per annum.

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Acronyms and Abbreviations

ALARP	As Low as Reasonably Possible
BOD	Biochemical Oxygen Demand
CER	Corporate Environmental Responsibility
CGWB	Central Ground Water Board
COD	Chemical Oxygen Demand
CPCB	Central Pollution Control Board
CSR	Corporate Social Responsibility
DG	Diesel Generator
DNV	Det Norske Veritas
DPA	Dumduma Pengeri Area
DPNP	Dehing Patkai National Park
DPWLS	Dehing Patkai Wildlife Sanctuary
DO	Dissolved Oxygen
EC	Environmental Clearance
EGIG	European Gas Pipeline Incident Data Group
EIA	Environmental Impact Assessment
EMP	Environment Management Plan
ICAR	Indian Council of Agricultural Research
IMD	Indian Meteorological Department
ITOPF	International Tanker Owners Pollution Federation Limited
IUCN	International Union for Conservation of Nature
KLD	Kilo Liter per Day
LEL	Lower Explosive Limit
MoEF&CC	Ministry of Environment, Forest and Climate Change
MoPNG	Ministry of Petroleum and Natural Gas
MSDS	Material Safety Data Sheet
MWP	Minimum Work Programme
NAAQS	National Ambient Air Quality Standards
NABET	National Accreditation Board for Education and Training
NABL	National Accreditation Board for Testing and Calibration Laboratories
NH	National Highway
NOx	Oxides of Nitrogen
OGP	International Association of Oil & Gas Producers
OIL	Oil India Limited
OISD	Oil Industry Safety Directorate
PEL	Petroleum Exploration License

PM	Particulate Matter
PPE	Personnel Protective Equipment
PSC	Production Sharing Contract
PUC	Pollution Under Control
QCI	Quality Council of India
QPS	Quick Production System
RA	Risk Assessment
RCC	Reinforced Cement Concrete
RF	Reserved Forest
SO_2	Sulphur Dioxide
SPCB	State Pollution Control Board
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
UEL	Upper Explosive Limit

1. INTRODUCTION

1.1 Background

Oil India Limited (OIL), a Government of India Navaratna Enterprise, is engaged in carrying out exploration and development activities for hydrocarbon in its operational areas of Upper Assam, Arunachal Pradesh and Mizoram in the north-eastern part of India. OIL has significant presence in pan-India and overseas.

Govt. of India and Assam has awarded Petroleum Mining Lease (PML) for exploration and development of oil & gas namely Mechaki, Borhapjan, Dumduma (Block – B & C), Digboi and adjoining areas to Oil India Limited in Tinsukia district of Assam.

Earlier, OIL obtained Environmental Clearance (EC) from MoEF&CC for drilling of one well within Dumduma-Pengry Area vide letter no. F. No. J-11011/1251/2007 - IA II (I) dated 1st November 2011. The Environmental Clearance is presented in **Annexure 1.1**.

During the ToR application stages OIL applied for 27 wells and 3 production installations are planned as part of the Project. Out of 27 wells, 1 well (XA) is located in forest areas hence as part of this proposal the XA well is dropped and the current proposal includes 26 wells and 3 production installations.

Oil intends to drill 26 (twenty six) onshore exploratory and developmental wells, 3 Nos. of production installations and laying of interconnecting pipeline at Dumduma-Pengeri Area of Tinsukia Districts [hereinafter referred as the proposed expansion Project or the Project].

1.2 Objective of the EIA Study

The exploration/development of oil and gas is included under activities specified in Schedule (Activity 1b) of the Environmental Impact Assessment (EIA) Notification dated 14th September 2006 and amended hereafter and categorized as “A” level project that requires an Environmental Clearance (EC) from the Ministry of Environment, Forests and Climate Change (MoEF&CC).

OIL had submitted application for issue of Terms of Reference (ToR) to MoEF&CC conducting EIA study on 20th April, 2018. MoEF&CC has issued an approved ToR **vide No. J-11011/1251/2007 - IA II (I)** dated 1st June, 2018. The approved ToR is attached as **Annexure 1.2**.

ERM India Pvt Ltd., a NABET-QCI accredited (NABET/EIA/1922/RA 0177) EIA consultant organization, has been entrusted with the task of conducting an EIA study and assisting OIL in appraisal of the proposed expansion Project for obtaining clearance from MoEF&CC.

1.3 Scope of the Study

The scope of the EIA study considers the impact assessment due to drilling of 26 onshore developmental wells, construction & operation of 3 nos. of production installations and laying of interconnecting pipelines in Dumduma-Pengeri Area on physical, biological and socioeconomic environment of the surrounding areas as per the MoEF&CC approved ToR. The objectives of the EIA study are as follows:

- Establish the prevailing environmental, biological and socio-economic condition of the area;

- Assess environmental, biological and socioeconomic impacts arising out of the proposed exploratory and development activities;
- Recommend appropriate preventive and mitigation measures to eliminate or minimize pollution, environmental and social disturbances during the preparatory and drilling phase of the project, ensuring compliance with environmental laws and regulation as applicable;
- Identify and propose management plans in terms of good practices that may help in abating adverse environmental, biological or socio-economic impacts due to the Project.

1.4 Limitations

This EIA study is based on certain scientific principles and professional judgment to certain facts with resultant subjective interpretation. Professional judgment expressed herein is based on the available data and information.

This report has been developed based on the Project related information provided by OIL. If information to the contrary is discovered, the findings in this EIA may need to be modified accordingly. The impact assessment for the Project is based on the project configuration as described in ***Section 2*** on Project Description.

ERM is not engaged in the impact assessment and reporting for the purposes of advertising, sales promotion, or endorsement of any client's interests, or other publicity purposes. The client acknowledges that any report prepared by ERM are for the exclusive use of the client and agrees that ERM's reports or correspondence will not be used or reproduced in full or in part for such promotional purposes, and may not be used or relied upon in any prospectus or offering circular for commercial purposes.

1.5 Layout of the Report

The report has been structured as per guidelines stated in EIA Notification, 2006 and its amendments thereof. The following sections form part of the report:

Table 1.1 Content of the Report

Sl. No.	Section	Brief Description
	Executive Summary	Executive Summary of EIA report.
1.	Introduction	This section covers project background; regulatory requirement and overview of the project.
2.	Project Description	Presents a Description of the Existing and proposed expansion Project.
3.	Environmental Baseline Study	Includes a description of existing environmental, biological and socio-economic baseline conditions prevailing within and surrounding the PML areas.
4.	Impact Assessment and Mitigation Measures	Includes impact identification through scoping, assessment of impacts, mitigation measures and evaluation of significance of residual impacts.
5.	Analysis of Alternatives	This section includes analysis of alternatives analysis with respect to site and technology
6.	Environmental Monitoring Program	The environmental monitoring to be scheduled during construction and operation phase is provided

Sl. No.	Section	Brief Description
7.	Additional studies	Risk assessment and Emergency Response Plan of the plant. Stakeholder assessment as per primary consultation and Public hearing related issues.
8.	Project Benefits	Benefits arising due to the proposed Project.
9.	Environmental Cost Benefit Analysis	Assessment of environmental costs and benefits associated with the Project
10.	Environmental Management Plan	This section covers introduction and elements of EMP i.e. planning, implementation, checking and management review.
11.	Summary and Conclusion	Presents the overall findings of the EIA study and includes overall justification for implementation of the Project and provides explanation of how, adverse effects have been mitigated.
12.	Disclosure of Consultants	Provides brief information about ERM and professionals who were engaged for completion of this study.
	Annexure (Volume 2)	Annexure to EIA study

2. PROJECT DESCRIPTION

2.1 Overview of the Project

Oil India Limited is presently producing crude oil and gas from the Dumduma Pengeri Area, which is under Tinsukia district of Assam. In order to enhance further production activities in the said area OIL proposes to drill additional 26 locations along with construction of production facilities covering Borhapjan Dumduma PMLs under Tinsukia districts covering a project area of around 876 sq. km. In the event of successful completion of drilling of the additional wells, it is expected to further augment the production of crude oil from the said block by around 700 Mbbl per year. Accordingly, the state of Assam will also be benefitted in terms of Royalty payment from Oil India Limited. Further, OIL is planning to construct associated production installations such as Field Gas Gathering Stations (FGGS) and gas Compressor Systems (GCS) for processing and storing oil and gas and interconnecting pipelines (of sizes varying from 6" to 30"). Laying of gas pipelines for the transportation of oil and gas in Dumduma-Pengeri Areas will be considered as part of this project.

2.2 Project objectives

The project will ultimately cater to fulfil the energy requirement of India. The dependency of India on import of crude oil will be lessened to an extent. Additionally, the project will benefit people living in neighbouring villages in relation to direct & indirect employment associated with various project activities and will boost the local economy.

The specific objective of the project is as follows:

- To explore, develop, process and produce hydrocarbon's safely; and
- To augment National Production of oil and gas.

2.3 Area Location and Accessibility

2.3.1 Area Location

The Dumduma – Pengeri Area is defined by the geographical co-ordinates $95^0$35'00" - $95^0$53'00" N Longitude and $27^0$20'00" - $27^0$37'00" E Latitude and spreads over 876 sq. km and is located in Tinsukia districts of Assam. Geomorphologically most of the area is within Brahmaputra river plain between the two large river systems viz., the Burhi Dihing towards south east and the Noa Dihing towards the northeast. The project area covers agricultural land/ tea gardens/ Katha Reserve Forest (RF), Buri Dihiing RF, Duarmara RF, Tarani RF, Dumduma RF, Nalani RF, Philobari RF, Takowani RF, Kakojan RF, Digboi RF, Bogapani RF and Upper Dihing RF. Newly located Dehing Patkai National Park (DPNP) is located at the south west corner of the Block however, no well or production installation is located within 10 km of the DPNP. Regional Setting map of the Dumduma-Pengeri Area is presented in **Figure 2.1**. Location of the proposed wells and associated production facilities on toposheet (nos. 83M10, 83M11, 83M14, 83M15; scale 1:50000) and satellite imagery is shown in **Figure 2.2** and **Figure 2.3**.

Table 2.1 Details of Coordinates of Dumduma Pengri Area

Point	Latitude	Longitude
A	27°37'40.296"N	95°35'50.892"E
B	27°37'12.00"N	95°47'34.800"E
B'	27°24'46.800"N	95°52'22.800"E
C	27°19'19.812"N	95°52'6.528"E
D	27°19'59.988"N	95°35'60.024"E

Note: Points b to b' follows Assam –Arunachal Pradesh State boundary.

Figure 2.1 Regional Setting Map of the Dumduma-Pengeri Area

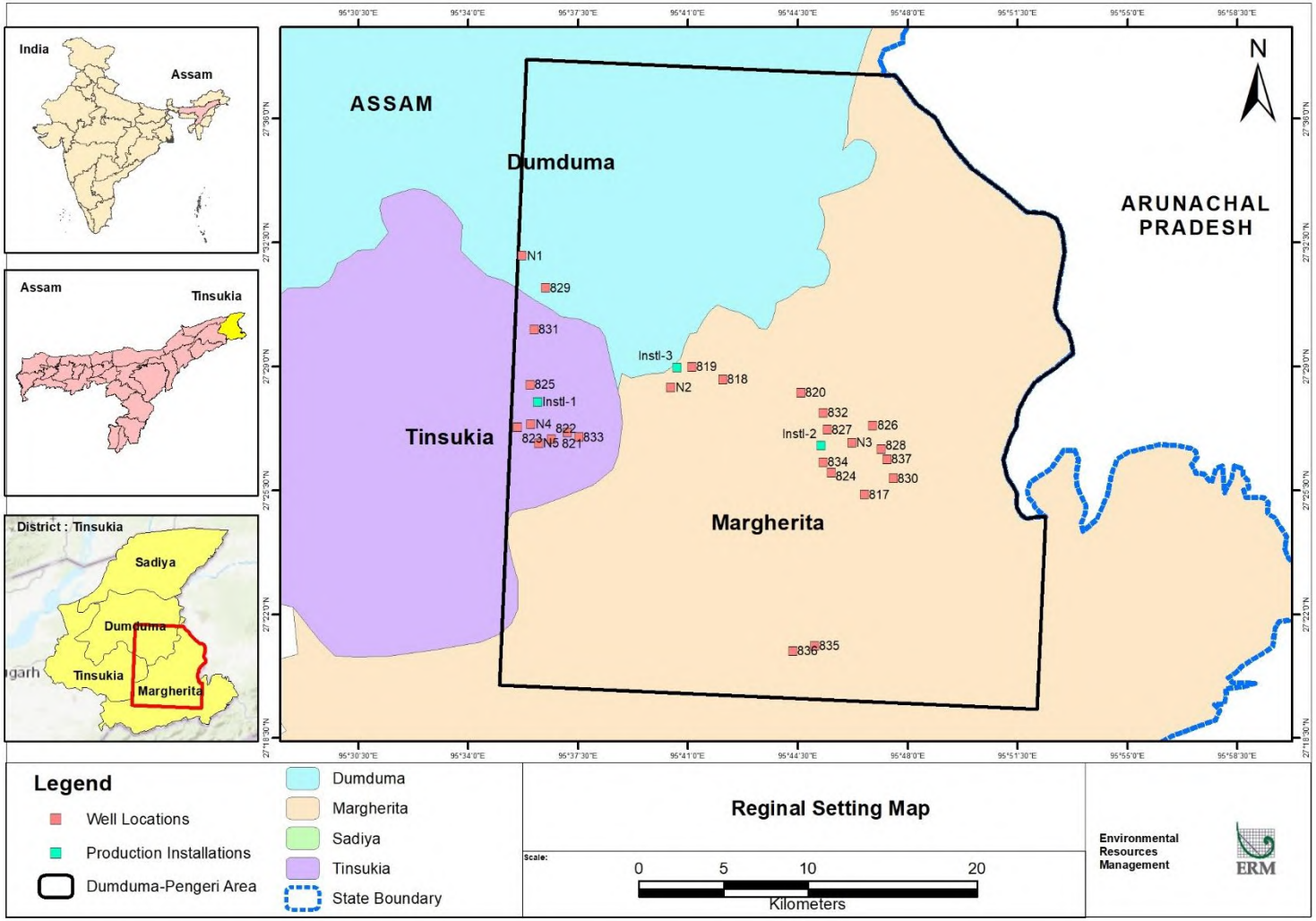


Figure 2.2 Proposed well locations and production facilities on Toposheet

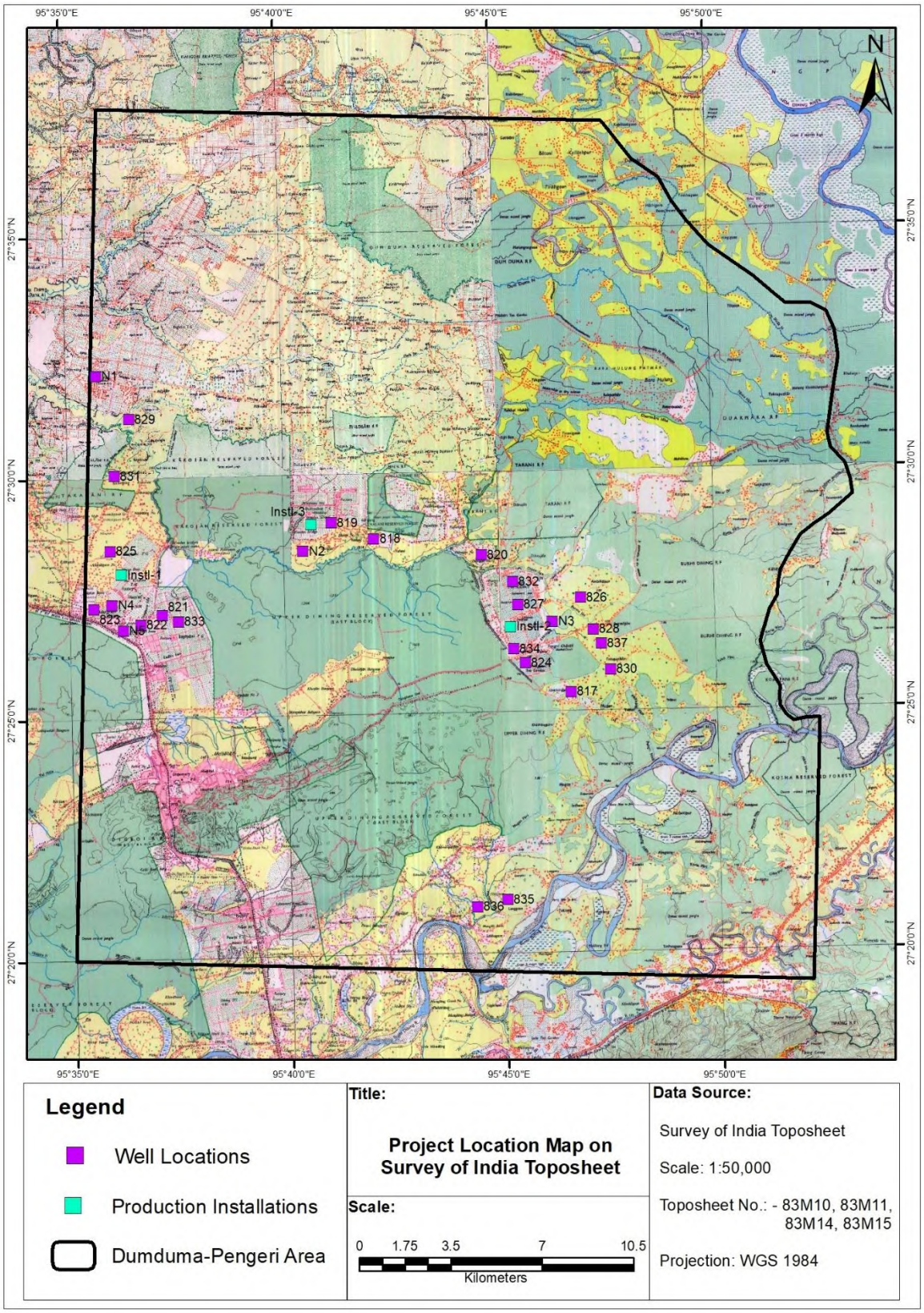
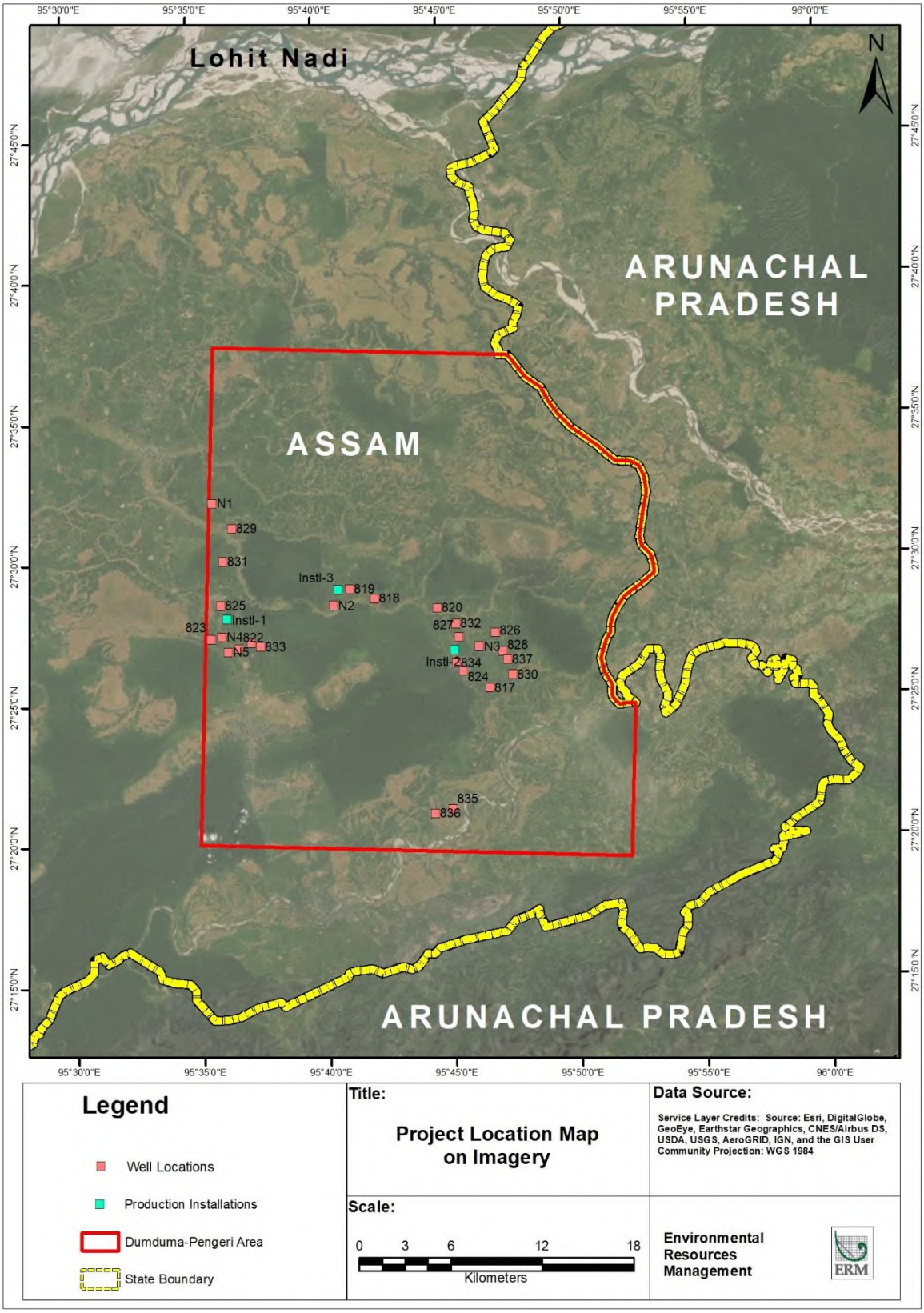


Figure 2.3 Proposed locations and production facilities on Imagery



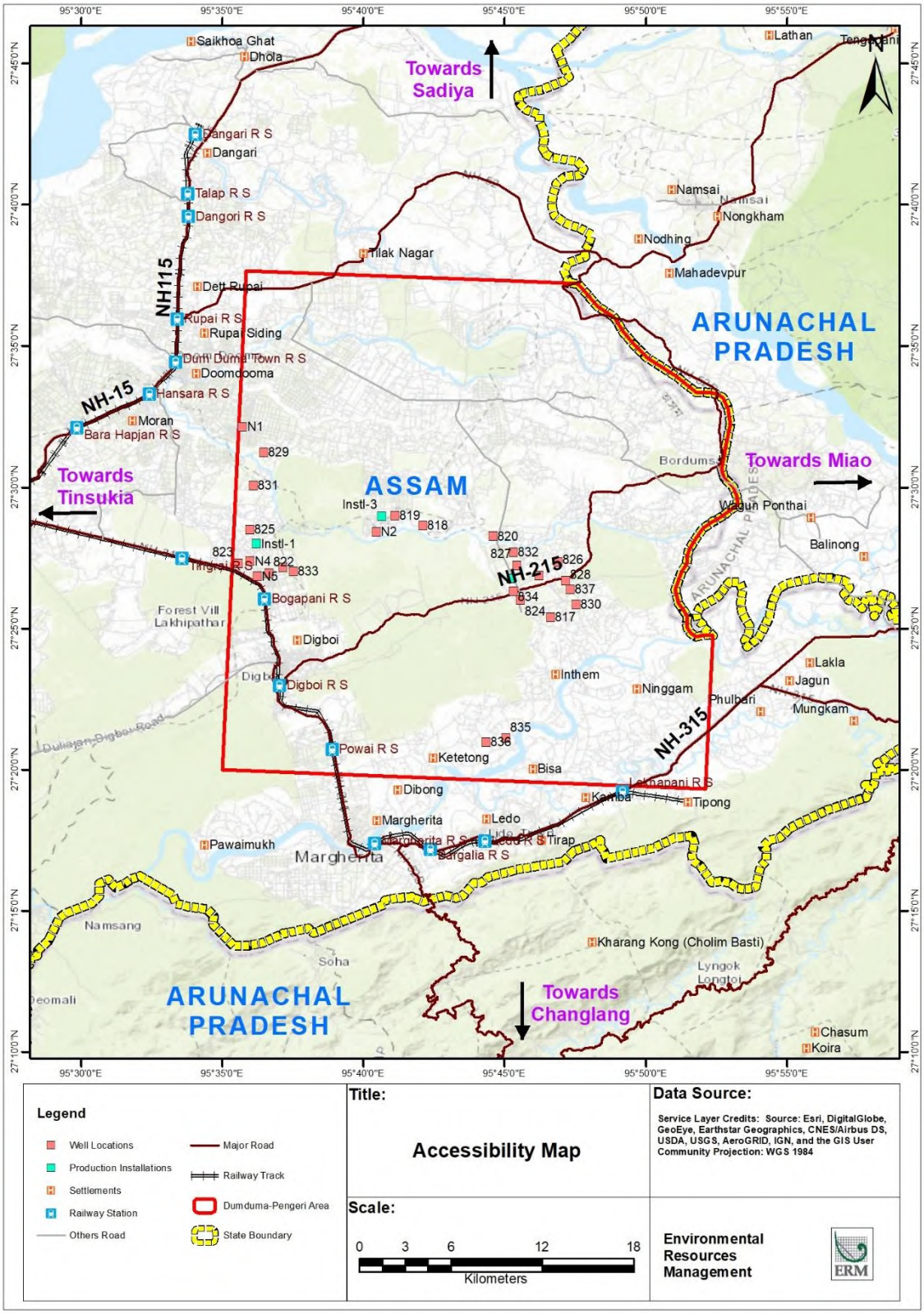
Road: NH 37, NH38 and NH 52 B are the main connecting roads, connecting the Block with rest of Assam and Arunachal Pradesh. Apart from that Digboi-Pengeri road, Phillobari – Pengeri road, Pengeri – Bordumsa road and Pengeri- Margherita road are also present in this block for transportation. Motorable village roads are available which may require further re-enforcement prior to preparation of well area and carrying out of operational activities. Some of the roads are crossing nallahs, rivulets etc. which will need construction activity to access the identified drilling locations and to make it suitable for mobilization of drilling rig & its associated service packages.

Railways: Nearest railway junction station is Digboi Railway station which is located within the Block. Digboi is a major station at the Tinsukia-Ledo railway line. Tinsukia Junction Railway station which is almost 24.9 km from the proposed block.

Airport: Dibrugarh Airport will be around 64.2 km from Digboi town and around 86 km form Pengeri.

The accessibility to the study area of PMLs in Dumduma-Pengeri Area is presented in **Figure 2.4**.

Figure 2.4 Accessibility Map



2.4 Environmental Setting

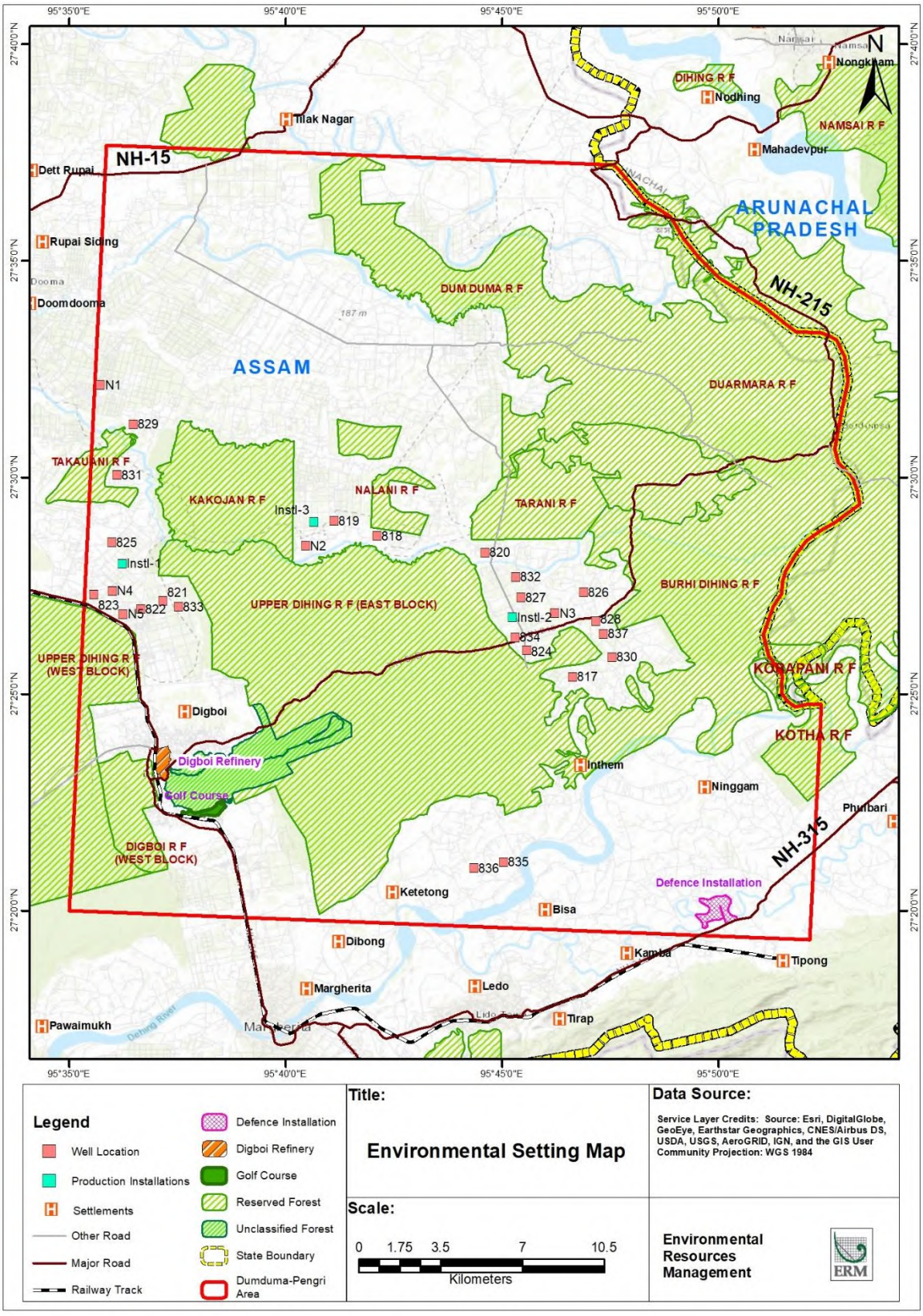
2.4.1 Dumduma-Pengeri Area

The environmental settings of the Dumduma-Pengeri Area are presented below:

- Geomorphologically most of the area is within Brahmaputra river plain between the two large river systems viz., the Burhi Dihing towards south east and the Noa Dihing towards the northeast.
- At least two topographic levels are perceptible in the area as shown by the difference in elevation, degree of oxidation and degree of erosional dissection. The higher levels are formed by slightly oxidized older alluvium at elevation of 1-2 m above the alluvial plain and rarely inundated by floodwater. Traditionally the higher level is extensively used for tea cultivation while the intervening lower levels are used for kharif and rabi cultivation.
- Reserve forest areas within the Block include Katha Reserve Forest (RF), Buridihing RF, Duarmara RF, Tarani RF, Dumduma RF, Nalani RF, Phillobari, RF, Takowani RF, Kakojan RF, Digboi RF, Bogapani RF and Upper Dihing RF.
- The landscape is mostly rural in nature comprising of settlements with homestead plantation, agricultural lands etc.
- NH 38 and NH 52B, Digboi-Pengeri road, Phillobari – Pengeri road, Pengeri – Bordumsa road and Pengeri- Margherita roads are the major road within the Dumduma Pengeri Area.

Environmental setting of Dumduma-Pengeri Area is presented in **Figure 2.5**.

Figure 2.5 Environmental Setting of Dumduma-Pengeri Area



2.4.2 Wells and Production Facilities

26 wells to be drilled at the Dumduma-Pengeri area and 3 production installation will be installed. The wells are spread across Dumduma-Pengeri Area in Tinsukia district. The wells are located in agricultural land (2 nos.), homestead plantation (4 nos.) and tea garden site (20 nos.). The production facilities are located in tea gardens. Environmental setting of the wells and associated production facilities are summarised in **Table 2.2** and detailed environmental settings are presented in **Annexure 2.1**.

Table 2.2 Environmental Setting of the Wells and Production Installations

Type of Land use	Number	Area (ha.)	Well/Production Facility Names
Agricultural	2	6 (approx. 3 ha. per well)	836, 835,
Homestead Plantation	4	12 (approx. 3 ha. per well)	829, N2, 819, 818
Tea Garden	20	60 (approx. 3 ha. per well)	N1, 831, 825, N4, 821, 830, 832, 820, 827, 826, 828, 834, 817, 833, N5, 824, N3, 822, 823, 837,
Production Facilities			
Tea Garden	3	21 (approx. 7 ha. per production facility)	Installation -1, Installation -2 , Installation-3

2.5 Existing Activities in the Area

The proposed project is located within the Dumduma-Pengeri Area, and located in the northern part of OIL'S operational area at Buri-Dihing basin, in Assam. The area covers with unconsolidated alluvium composed of sand, silt and clay in various proportions at different topographic levels. Oil exploration was started in Digboi area in this block long back. Well No. Digboi-1 was drilled in 1889 and oil was discovered commercially in this well first in Asia at about 202 m from the surface. Since then the field was developed and so far 1008 wells have been drilled in this block. In 1969, Well No. Duarmara-1 was drilled down to 4297 m under Dumduma PML. Hydrocarbon gas was established in this well (43,000 SCUMD) with 16 KLPD condensate in Tipam Formation. During mid-eighties another two wells viz. Duramara-2 and Duarmara-3 were drilled. However, due to low gas price market and evacuation facility, the same could not be monetized. This area (8.9 Sq.km, a part of Dumduma PML area was carved out and offered by MoPNG during Discovered Field Round 2016.

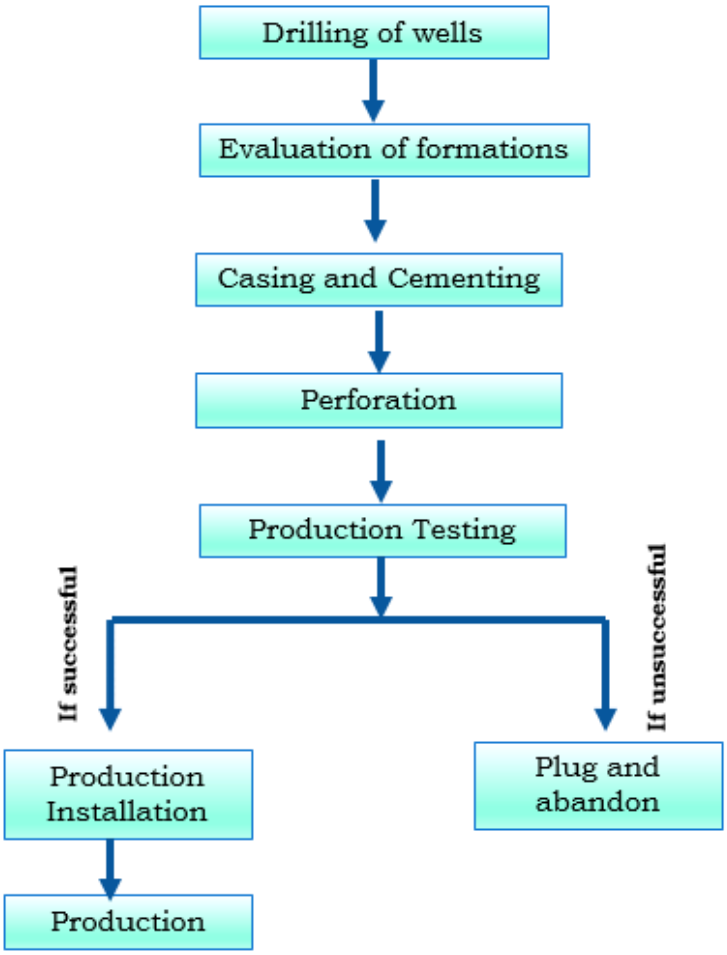
2.6 Well Drilling

The lifecycle of project drilling activities for the proposed project has been divided into distinct steps and each is described in detail in the subsequent sections and will take approximately three to four months to complete drilling and testing activity at each well site. The project lifecycle has been classified into three different phases:

- Pre-drilling activity;
- Drilling activity; and
- Decommissioning.

The process description of drilling presented in the ***Figure 2.6.***

Figure 2.6 Process flow chart-Drilling



2.6.1 Pre-drilling Activity

The pre-drilling phase will comprise of the following sub-phases:

2.6.1.1 Site selection

The sub-surface locations were selected by OIL on the basis of available geological data. The environmental considerations for selection of surface locations of the drill sites are as follows:

- Outside the boundary of National Park or Wildlife Sanctuary;
- Beyond 10 km from any National Park or Wildlife Sanctuary
- Non-forest area and area with low vegetation;
- Away from organized human habitats;
- Easy access to area of interest.

2.6.1.2 Land Lease

As mentioned in ***Table 2.2*** land would be procured from private owners *viz.* agricultural lands, homestead plantation areas and tea garden areas for the development of the proposed wells and production facilities. Approximately 3 ha. land would be required for each well and 7 ha. land would be

required for each production facility. 4 wells are located in agriculture land, 8 wells are located in homestead plantation areas and 14 wells located in tea garden areas. Apart from that 3 production facilities are located in tea garden. There will be requirement of additional land of 99 ha for 26 development wells and 3 production facilities.

However, no physical displacement during land procurement is anticipated, hence, the Project will not involve any rehabilitation and resettlement.

Generally, OIL will procure the required land through private negotiation. In few cases, OIL may request district authority to acquired land under LARR act 2013, if private negotiation is not successful. Land procurement will be done including crop compensation. Land from the tea garden would be taken on long-term lease from the tea garden authority.

2.6.1.3 Access Road and Site Construction.

Construction of Access Road

The distance of the proposed well locations and production facilities would be in proximity to the existing roads; however, approach road varying from 100m to 200 m would be constructed to connect with the existing roads to reach the proposed locations. In some cases the existing roads would also need to be widened or strengthened for the movement of heavy vehicles for drilling and other production facilities.
Construction of site access road will not require any forestland or involve displacement of any household. As far as possible, existing roads will be used. Cutting of trees will be avoided as far as possible. If necessary, existing road will be developed by widening, etc. Culverts and drainage channel will be maintained during site preparation.

Drill Site Construction

The topography is relatively flat. Site construction will begin with clearance of existing vegetation on the site. After clearance of vegetation, top soil of the proposed drill site scraped and stored for future use. Once the top soil is removed, levelling and compaction will be done with the help of graders and mechanical rollers. Drill sites may require filling of earth to elevate the drilling platform based on local topography and High Flood Level (HFL). Quantity of fill material required for each drill sites depend upon the site elevation and HFL. Fill material will be met from excavated material for pit required for drill site and balance amount will be sourced from nearby authorized quarry area.

An area of 3 ha (approximate) will be required for each drill site to facilitate drilling activity. Reinforced Cement Concrete (RCC) will be used for the construction of foundation system. For making foundations of the main rig structure, cast in-situ bored under- reamed piles of specified lengths will also be used. For the construction of a drill site, a total of about 2500 kg of cement, 5000 kg of sand, 500m^3 of earth/fill material, 200 kg steel and 1000m^3 of aggregate will be required. A backhoe will be used for all excavation and cutting activities (for construction of pits) on site. Subsequently, the proposed well sites and production facilities will be duly fenced to a height of about 2 m using jingle wired fencing.

Site preparation will also involve the following:

- Construction of cellar pit, 1.85m X 2.15 m X 1.5 m for installation of well head and BOP;
- Construction of HDPE lined pit of ~800m^3 at well site for temporary storage and disposal of drill cutting;

- Construction of HDPE lined pit of 3030 m^3 for temporary storage and disposal of drilling wash water and waste mud (800 m^3); and
- Septic tanks and soak pits to dispose the domestic wastewater at the drill site.

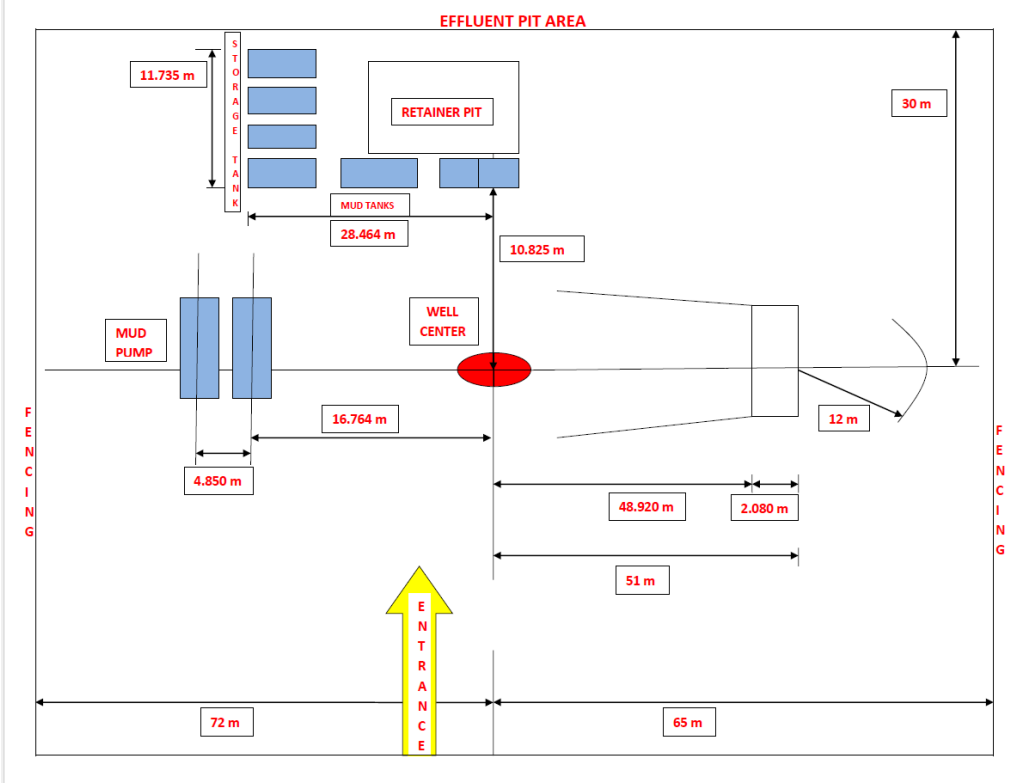
Spares, chemicals and other materials will be required for Drill Site construction will be received from the warehouse located at Duliajan. Materials will be intermittently supplied from warehouse to the drilling site, during operations; a provision will be kept for temporary storage of materials at the drilling site itself.

Vegetation clearance and site development will not be required for the wells that will be drilled from the existing sites.

Additionally, there will be other ancillary facilities like Drilling mud system, Effluent Treatment 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.

Tentative site layout is provided in **Figure 2.7**.

Figure 2.7 Tentative Site Layout



2.6.1.4 Rig Mobilization and Rigging up

A rig building process will follow the site preparation activities. This process involves transport of rig including auxiliary equipment and camp facilities, assembling of various rig parts and equipment to drill a well. The rig including auxiliary equipment and camp facilities will comprise of around 100 truck/trailer loads. Once the drilling rig is assembled, thorough rig inspection will be carried out to check equipment working capability and quality standards. The rig will have various allied equipment like mud tanks, mud pumps, compressors, fuel tank, DG sets etc.

2.6.1.5 Use and Storage of Chemicals and Diesel

Chemicals required for the preparation of drilling fluid will be centrally stored in Duliajan. Additionally, some chemicals will also be stored in the drill site. The storage area will be paved and bunded and will be provided with a shed. Diesel will also be stored in tankers at site within paved and bunded areas.

2.6.2 Drilling Activity

The exploitation of hydrocarbons requires the construction of a conduit between the surface and the reservoir, which is achieved by the drilling process. The exploration and development wells will be drilled 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 3900 m as planned for the project.

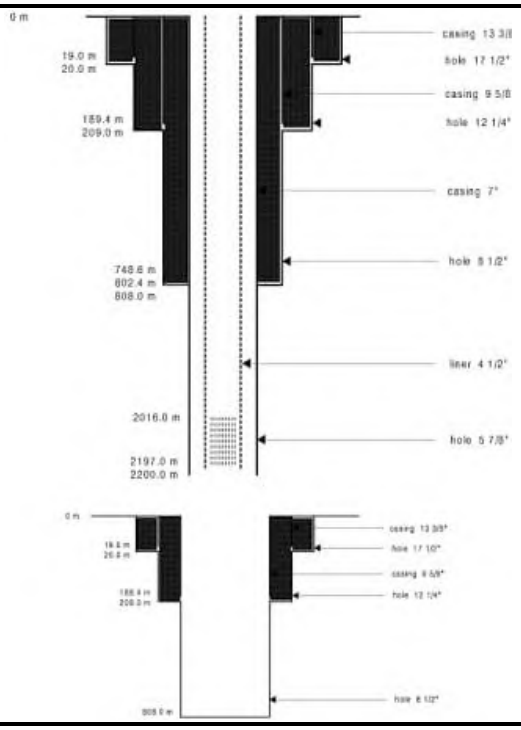
2.6.2.1 Initial Well Construction

Spudding-in well is 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” will be cemented. This process of drilling and casing the hole section continues until the final well depth (target) is achieved.

Lengths and diameters of each section of the well are determined prior to drilling and are dependent on the geological conditions through which the well is to be drilled. Once each section of the well is completed, the drill string is lifted and protective steel pipe or casing lowered into the well and cemented into place.

Cross section of the typical drilling rig is presented in **Figure 2.8**.

Figure 2.8 Cross Section of Typical Drilling Rig



2.6.2.2 Mud Systems and Cuttings

Drilling fluid is essential to the operation and helps in controlling downhole pressure, lift soil/rock cuttings to the mud pit, prevent cuttings from settling in the drill pipe, lubricate, cool and clean the drill bit amongst other functions.

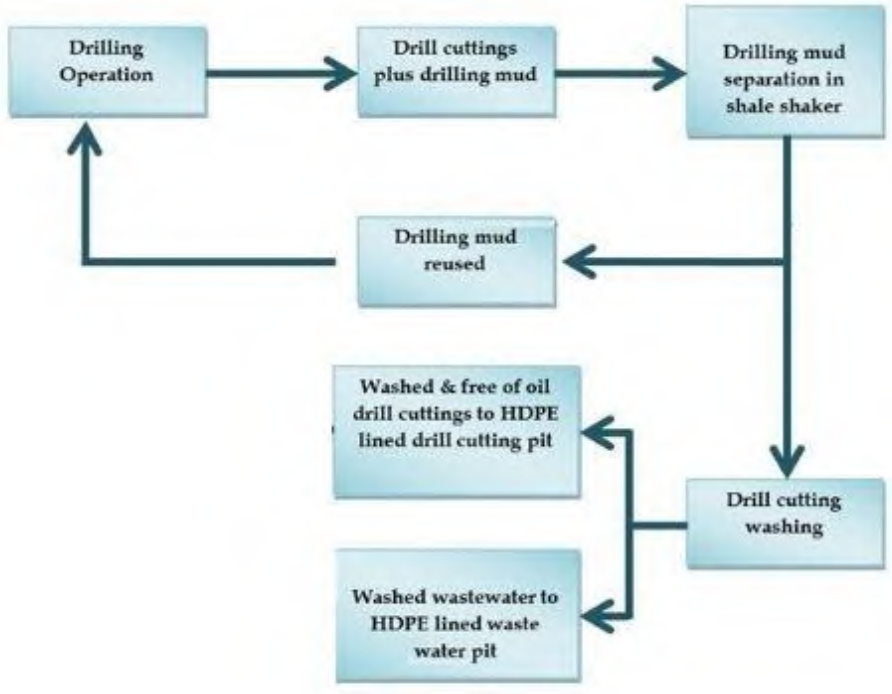
It has been decided that a uniform water-based mud system will be used in all the proposed wells. Unlike an oil-based mud system, usage of water-based mud will not pose higher risk of contamination to subsurface formations, but disposal of the fluid and cuttings will be less problematic. Because of the anticipated borehole instability problems, it may be necessary to introduce a base salt, such as Sodium Formate (HCOONa) into the system. Typical composition of drilling mud is presented in **Annexure 2.2.**

Mud used during the operation will flush out formation cuttings from the well hole. These cuttings will be separated from the drilling mud using a solids-control and waste management package. Cuttings will then be stored in the HDPE lined pits (of approximately 800 m^3 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 OIL. The total amount of cuttings produced during the entire drilling period is projected to be about 350-400 m^3.

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 pits (of approximately 800 m^3 area) for each well. The cleaned wastewater will also be stored in HDPE lined pits and disposed of, after testing and any necessary treatment, to meet the regulatory requirements.

The whole process by which the drilling fluid will be reused during the drilling operation is commonly known as a "closed loop system". This system is ideal for drilling operations in sensitive environments as it cuts down immensely on the total water consumption for the formulation of drilling mud and saves on the consumption of chemicals. **Figure 2.9** shows the schematic layout of the drilling waste management. Various components of the drilling mud will be selected carefully to be able to provide desired properties to the mud. Mud chemicals will be added to the uniform mud system to adjust the mud properties and ensure fluid loss control/circulation, lubricity, shale inhibition, pH control and pressure control in the well during drilling.
Chemicals required for the preparation of drilling fluid will be centrally stored in Duliajan. Additionally, some chemicals will also be stored in the drill site. The storage area will be paved and bunded and provided with a shed.

Figure 2.9 Drilling Waste Management



2.6.2.3 Cementing Programme

Cementing is a necessary aspect of drilling oil and gas wells. Cementing is done for the following:

- Secure/support casing strings
- Isolate zones for production purposes
- Solve various hole problems

Cementing generally utilizes Portland cement (API Class G Oil Well Cement) with various additives in small quantities as accelerators/retarders, density adjusters, dispersants, fluid loss additives, anti-gas migration additives, etc.

2.6.2.4 Well Testing

Between the drilling operations for different zones, logging operations are undertaken to provide information on the potential type and quantities of hydrocarbons present in the target formations. Technicians employed by a specialist Logging Service will be entrusted with the job of undertaking well logging. Logging instruments (sensors) will be attached to the bottom of a wire line and lowered to the bottom of the well. They are then slowly brought back. The device records data in graphical form as it passes through each formation. This data is then interpreted by geologist, geophysicist and drilling engineer. There are no emissions to the environment associated with wire line logging operations, however additional precautions will be undertaken for use of radioactive material, high voltage and explosives. The excess hydrocarbon will be flared.

Salient Features of Wells

The water consumption, generation of drill cuttings and drilling fluid is determined by depth and type of well as presented in **Table 2.3**.

Table 2.3 Salient features of a typical well

Depth of Well	Water Consumption	Drill Cutting	Drilling Fluid
3900 m	3600-4800m^3	350-400m^3	900-1200m^3

2.6.2.5 Blowout Preventer

A blowout preventer (BOP) is a large valve or series of valves that can seal off an oil or natural gas well being drilled or worked on. If underground pressure forces oil or gas into the wellbore, operators can close the valve remotely (usually via hydraulic actuators) to forestall a blowout, and regain control of the wellbore. Once this is accomplished, often the drilling mud density within the hole can be increased until adequate fluid pressure is placed on the influx zone, and the BOP can be opened for operations to resume. BOPs are fitted with hardened steel shearing surfaces that can actually cut through drill pipe and tool strings, if all other barriers fail.

To ensure that it is safe to drill ahead, a leak-off test will be performed immediately after drilling out of the casing shoe. The next section of hole is drilled to the required depth, cleaned out and the intermediate casing is run and cemented. If required, drilling may continue to greater depths by drilling a next hole and running and cementing casing. Details of Blowout Preventer has been provided in **Annexure 2.3**.

2.6.3 Well Decommissioning

2.6.3.1 Well Abandonment

On completion of activities, if the production of the well is commercially viable, the development wells will be either plugged and connected with flow lines or suspended. In the event of a decision to suspend the well, it will be filled with a brine solution containing very small quantities of inhibitors to protect the well. The well will then be sealed with cement plugs and few wellhead equipment (Blind Flange) left on the surface (Cellar). All the wellhead equipment will be removed leaving the surface clear of any debris and site will be restored. It is expected that demobilization phase will last about 10-15 days and will involve the transportation of materials, equipment and other materials from site to bring it back to original condition. It is estimated that about 60 truckloads will be transported out of site during this period. Subsequently, following steps will be typically involved to restore and rehabilitate the area:

- The wellhead and all casing string will be cut off to a minimum depth of 3 m (10 ft.) below ground level;
- Drill cuttings and drill mud will be treated as per G.S.R 546 (E) dated 30th August 2005 to render them harmless;
- Drilling wastewater including drill cuttings wash water shall be collected in HDPE lined disposal pit, evaporated, treated, and shall comply with the S No. 72, Schedule I-Standards for Emission or Discharge of Environmental Pollutants from various industries and will be reused;
- All fencing and access gates will be removed;
- All pits whose contents will show regulatory compliance for on-site disposal, at the time of site closure, will be backfilled and closed out as per Hazardous and other Waste (Management and Transboundary Movement) Rules, 2016; and
- Restoration of unusable portion of the access track, removal of pilings.

2.7 Production Installations

Three production facilities are planned to be established within the Dumduma-Pengeri Area. The production installation may include Oil Collection System (OCS), Gas Compressor Station (GCS), Field Group Gathering Station (FGGS) or Early Production System (EPS). The land required for each facility will range from 4 ha to 7 ha. The brief description of the processes of each facility is provided below.

2.7.1 Field Group Gathering System (FGGS)

In a particular field, a FGGS is set up which accommodates multiple Oil Collection Centre (OCS) and Gas Compressor Station (GCS) in a single facility. A brief description of OCS is provided below.

2.7.2 Oil Collection Station (OCS)

Considering the size of the oil field and the number of oil / gas wells in the area, it is necessary to have certain facilities at various central locations to collect and handle oil / gas coming from the wells before pumping them to the Central Tank Farm (CTF) / Central Processing Facility (CPF) for storage and processing of hydrocarbons. OCS's are built to serve the above purpose. An OCS also facilitates to monitor the flow of oil / gas from wells and the conditions of wells and the flow-lines.

2.7.2.1 Process Description

An OCS has a number of oil / gas wells connected to it depending upon the oil / gas handling capacity of the OCS and techno-economics of laying flow-lines from the well to the OCS. Fluid from the wells enters the LP manifold and passes through the steam jacket to the Three Phase Separator (TPS). Gas, oil and free water (if any) are separated here. Then the wet crude is taken to the Emulsion Treater (ET). In the Emulsion Treater, the wet crude is heated up to 600^{o}C and a chemical called 'Oil Soluble Demulsifier is added to it continuously. In this process oil and water are separated from each other. Oil from the Emulsion Treater is then taken to the Stabilizer and from the stabilizer it goes to the crude oil storage tanks. The stored crude oil is dispatched to CTF from time to time with the help of reciprocating pump. Water is collected in formation water storage tanks, treated in ETP and there after it is disposed in water disposal wells with the help of centrifugal pumps. Natural Gas is sent to the Gas Compressor Station for further processing, compression and disposal. Crude oil is sent to the CTF for pumping out to the pump station of the pipeline. Sedimentation tank with oil water separator will be provided with storm water drains. Gas separated in TPS and ET goes to the 30 psi Low Pressure Master Separator (LPMS) and then to Booster suction at GCS. The excess gas is flared in the flare pit. Gas separated in the Stabilizer goes to the 10 psi Low Pressure Master Separator (LPMS) from where it is flared in the flare pit. Process description of an OCS is presented in the **Figure 2.10** below.

2.7.2.2 Storage Facilities

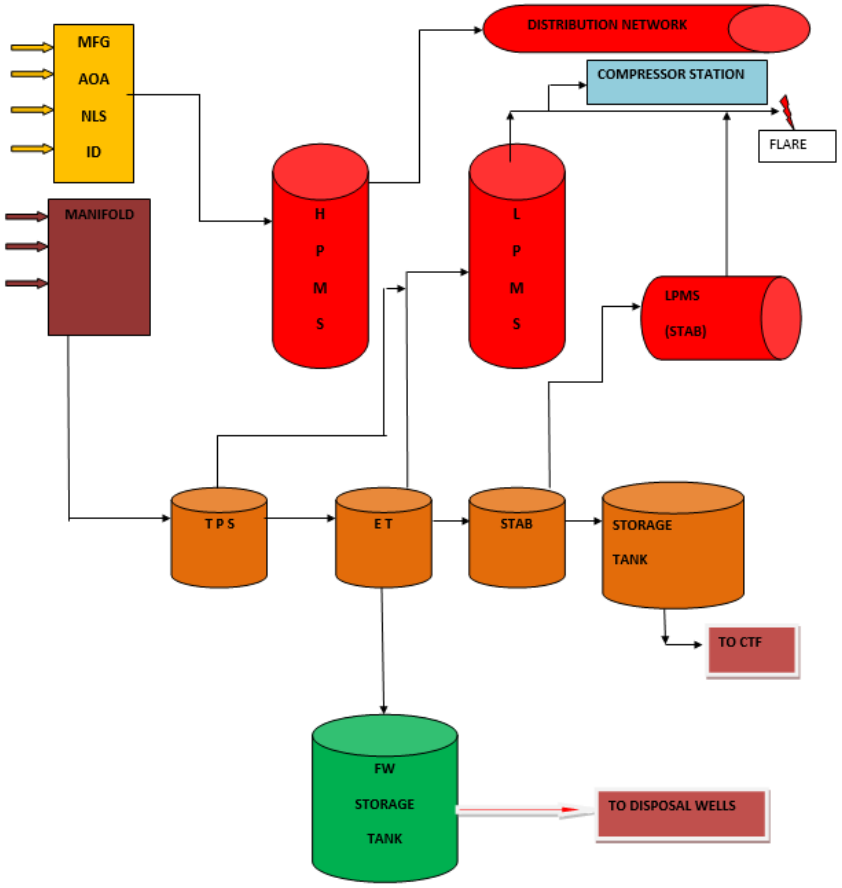
In general following storage facilities are provided at the OCS[1]

- Two production tanks (795 KL capacity) for storage of crude oil. Height of the tanks are approximately 10 m with safe storage height of 5.7 m. Crude is generally stored at 1 atmospheric pressure and at 60°C.
- One test tank (160 KL capacity) for storage of hydrocarbons at the time of testing
- Two formation water tanks (160 KL and 40 KL) for storage of formation water (produced water)
- One skimming tank (40 KL capacity).

Process description of OCS presented in **Figure 2.10**.

[1]The details provided here are obtained from operating Jorajan OCS of OIL. These are standard figures for OCS of OIL. However, the storage facilities may vary on the basis of specific requirement of OCS and its receiving wells.

Figure 2.10 Process Description of OCS



ET- Emulsion Treater; LPMS- Low Pressure Master Separator; HPMS- High Pressure Master Separator; CTF- Central Tank Farm; Fw- Formation Water;

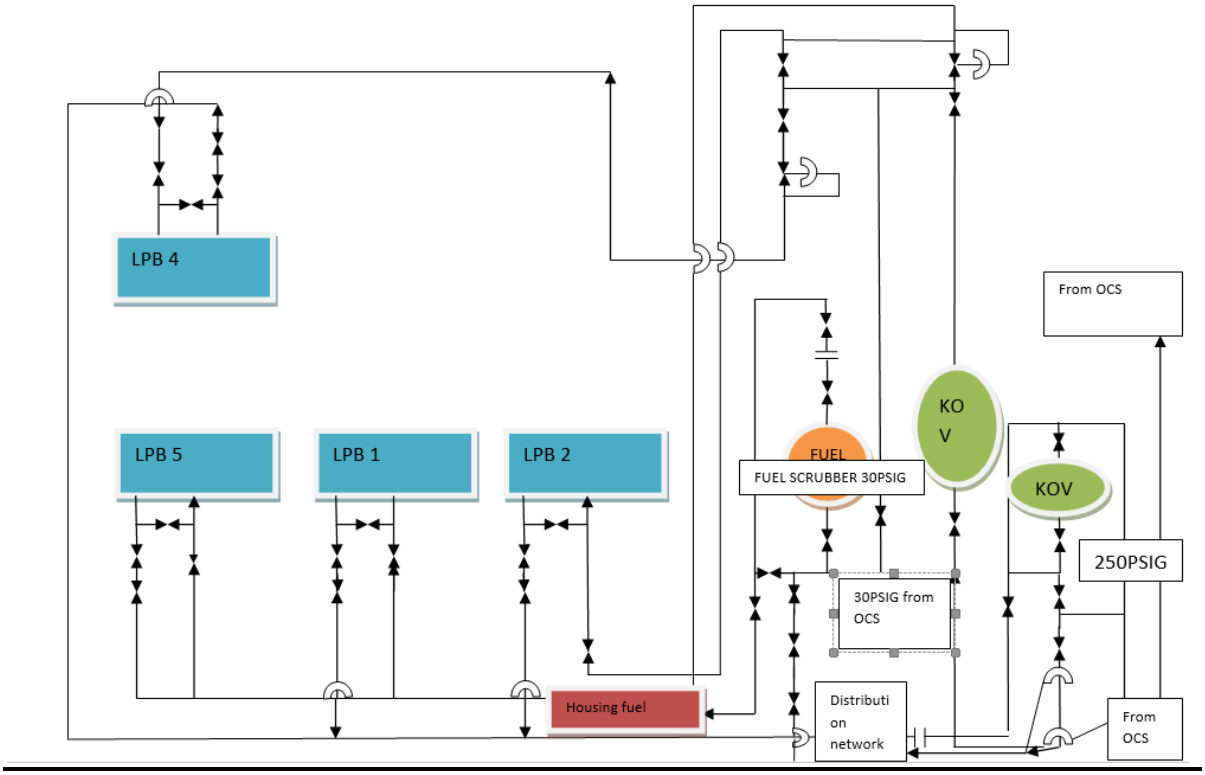
2.7.3 Gas Compressor Station (GCS)

Associated / non-associated gas is collected from the fields through OCSs / Gas Production installations in two pressure streams LP & HP. In order to transport it to consumers, the gas needs to be further compressed to a certain high pressure, depending upon the distance, type of use like LPG extraction etc. Gas Compressor Stations, GCS houses a number of compressors along with allied facilities & pipelines. The compressed gas from GCS is sent to

- LPG Plant for extraction of Propane & Butane, main content of LPG.
- To downstream consumers through Assam Gas Corporation Ltd. (AGCL), Gas Authority of India Ltd. (GAIL).

A fraction of the gas is dehydrated and compressed to higher pressure for use in Gas Lift system. The GCS constructed in the field is also used to pump compressed gas into the sick wells to augment their production. Schematic diagram of a GCS is presented at the **Figure 2.11** below.

Figure 2.11 Line Diagram of GCS



Source: The details provided here are obtained from operating GCS V of OIL. These are standard figures for OCS of OIL. However, the storage facilities may vary on the basis of specific requirement of OCS and its receiving wells

LPB- Low Pressure Booster Pumps

In case of generation of formation water during dehydration, the water is disposed in water disposal wells with the help of centrifugal pumps.

2.8 Interconnecting Pipelines

Subsequent to completion of the well, a well head will be available to which pipelines will be connected to flow the well to nearby production installation. It is proposed to construct pipelines of different diameters. There is no plan for laying of trunk pipeline from production installations to receptor facility. Layout of the pipeline route is not finalized yet. Pipeline will be developed at a later stage and necessary FC will be obtained prior to commencement of site construction activities.

2.9 Utilities and Resource Requirements

The drilling programme will require few common facilities that have been described in the subsequent sections.

2.9.1 Power requirement and generation

2.9.1.1 Drilling

The drilling process requires movement of drill bit through the draw works. The power requirements at the site preparation and construction phase for the drill site will be met by 100 KW DG Sets. Although drilling operations will be continuous, power requirement will vary depending on activities being

carried out. It is anticipated that DG sets with a power rating of 1000 KW (2 working + 1 standby) will be required for drilling of a well. Lighting and other power requirements at drill sites will be met through a 200 KW DG set at the drilling site.

2.9.1.2 Production Installations

Power requirement of production installations will be met through Gas Generator (GG) sets. Natural gas for the GG sets are supplied from the field itself. In general, a 216 KW GG set will be used for power supply at each production facilities.

2.9.2 Fuel Consumption, Supply and Storage

2.9.2.1 Drilling

Fuel consumed during the drilling phase will mainly be diesel used for various equipment and vehicles operating to transport goods and supplies to site. It is estimated that about 1 KLD diesel will be required to power the off-road construction equipment and vehicles during site preparation phase. During the drilling phase, there will be consumption of ~3.5 KLD of High Speed Diesel (HSD). Fuel will be supplied onsite by local supplier through mobile tankers. OILO will store a contingency of 3 days (approximately 10 KL) in a tank at a drill site. Out of this, a major part comprising about 85% will be consumed for drilling operations at the rig and about 15% will be required for the campsite.

2.9.2.2 Production Installations

Gas for the GG sets are supplied through pipelines from the production field of OIL. Natural gas consumption for the GG sets would be 1500 Standard Cubic Meter (SCUM) per day.

2.9.3 Water Requirements

2.9.3.1 Drill sites

Approximately, 5 m^3 per day water will be required for construction and 3 m^3 per day for domestic use during construction phase. Water consumption during drilling and testing of wells will be 50 m^3 per day. Total 39 m^3 per day water fresh water and 11 m^3 per day recycled water will be required for drilling activities.10 m^3 per day freshwater will be used for domestic purposes including drinking, washings and domestic use.

2.9.3.2 Production Installations

Approximately, 5 m^3 per day water will be required for construction and 3 m^3 per day for workers during construction phase. Approximately 20 m^3 per day water is required for the operation of production installations.

2.9.3.3 Water Source and Permission

Water for drilling and production facilities will be sourced from groundwater after obtaining necessary permission. In case of availability of surface water nearby, sourcing of water usage will be done accordingly. The water requirement per well is shown in **Table 2.4**.

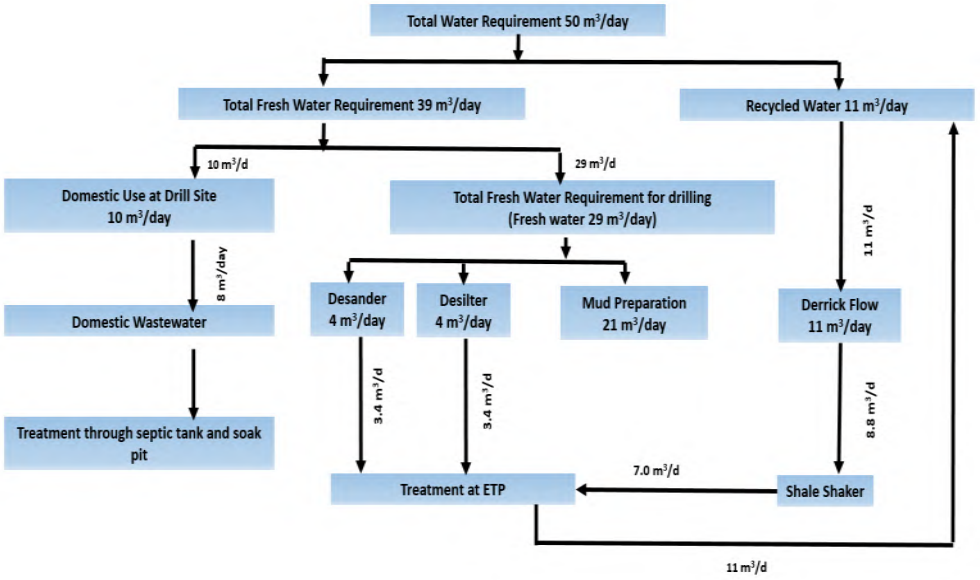
Table 2.4 Water Requirement per Well

Description	Quantity
Total Water Requirement for Drilling Phase (m^3)	4500
No. of Days on well	90
Water required for drilling (m^3 /day)-Freshwater	39
Water required for drilling (m^3 /day)-Recycled Water	11

A provision for storage of about 250 m^3 per day of water (5 days water requirement during peak period) will be made at the drilling site. Potable water requirement at site will be met through packaged drinking water. In addition, a water storage pit of around 1000 m^3 is proposed to store water for fire water supply the likely source being surface water.

The water balance diagram is provided in **Figure 2.12.**

Figure 2.12 Water Balance Diagram for Drilling



2.9.4 Manpower

The estimated employment would be approximately 80 un-skilled temporary workers during the peak construction phase that will be primarily sourced from nearby villages. Additionally, 20 permanent OIL employees will supervise the construction phase. The drilling rig will be operated by approximately 40-50 persons on the rig at any particular time. The manpower will operate in two shifts with continuous operations on the rig. This will include technical experts (including expats), who will be responsible for various drilling related activities and some local workers who will be hired from nearby villages for the entire duration of the Project. Technical staff will be housed in the Drilling Camp Site that will be adequately supported by facilities like kitchen, washrooms, laundry etc. This camp will be preferably located at the outskirts of the closest towns.

2.10 Pollution Sources and Characterization

2.10.1 Noise

2.10.1.1 Construction of Drill sites and Production Facilities

The potential noise emission from the construction activities are as follows:

Table 2.5 Potential Noise Generation and Control Measures during Construction Phase

Activity/ Source	Noise level	Proposed Control Measures
• Construction equipment like loaders, tippers, bull dozers, • DG set. • Construction vehicles	• Site development- 60-65 dB (A) • Erection of rig- 80-85 dB(A)	• Well maintained equipment and vehicles will be used; • DG set would be provided with acoustic enclosures; and • Appropriate PPEs (e.g. ear plugs) will be used by workers while working near high noise generating equipment.

Note: * DG sets will be encased in acoustic enclosure

2.10.1.2 Drilling Operation

During drilling operation source of noise emission, expected noise level and control measures are as follows:

Table 2.6 Potential Noise Generation and Control Measures during Drilling Phase

Activity/ Source	Noise level dB(A)	Proposed Control Measures
• Drilling rig • DG set. • Mud pump • Shale shakers • Desander & Desilter • Miscellaneous sources	• Drilling rig -100 • DG set- 75-85 • Mud pump- 90 • Shale shakers- 75 • Desander & Desilter -80 • Miscellaneous sources- 80 to 85	• Well maintained equipment will be used; • DG set would be provided with acoustic enclosures; and • Appropriate PPEs (e.g. ear plugs) will be used by workers while working near high noise generating equipment.

2.10.1.3 Operation of Production facilities

The source of noise emission and control measures for operation of production facilities is presented in the following table.

Table 2.7 Potential Noise Generation and Control Measures during operation of Production facilities

Activity/ Source	Noise level dB(A)	Proposed Control Measures
• Gas Generator • Different pumps • Miscellaneous sources • Flaring operation	• Gas Generator- 75 to 85 • Different pumps: 80-90 • Miscellaneous sources: 80-85 • Flaring operation: 70-75	• Gas generator set would be provided with acoustic enclosures; • 2.0 m peripheral wall around the production installations; • Development of greenbelt along the periphery of the production installation • Elevated flare stack

2.10.2 Air Emissions

Air emissions expected from different phases of the project and embedded control measures are presented at the table below:

Table 2.8 Source of Air Emissions and Embedded Controls

Source/Activity	Pollutants	Control Measures
Construction activities		
• Earth work for filling levelling, compaction, construction water and waste storage pits. • Foundation work for Production Installations	Particulate matter (PM)	• Water sprinkling in earthen site access road; • Use of excavated earth for site levelling and immediate compaction.
• Transport of construction materials and machineries and equipments (100 truck load for each drill site. • Vehicular emission during transportation • Handling of construction materials (storage and use)	Particulate matter (PM) PM, SO_2, CO, NO_2, HC	• Construction material will be transported through covered truck; • Use of PUC vehicles and its proper maintenance • Covered storage area/ facility of machineries & vehicles
Operation of diesel operated machineries, vehicle and back up DG set (135 KVA)	PM, SO_2, CO, NO_2, HC	Appropriate stack height for back up DG set.
Drilling		
Operation of DG sets	PM, SO_2, CO, NOx, HC	• Stack height of the DG sets will be maintained as per CPCB norms; • DG sets will be periodically maintained/overhauled
Flaring of gases during well testing operations	PM, SO_2, CO, NOx, HC	• Emissions from flaring activity will be limited to well testing operations
Fugitive emission from cement and other drilling chemicals	PM and fumes of chemicals	• Stored in covered storage facility and sealed containers

Source/Activity	Pollutants	Control Measures
Operation of diesel operated machineries, vehicle	PM, SO_2, CO, NO_2, HC	• Use of PUC vehicles and maintenance of machineries & vehicles
Production Installation		
GG set missions	NOx, HC	• Using GG sets conforming to CPCB norms • GG sets to be provided with stacks of appropriate height
Flaring	NOx, HC	Elevated flaring will be erected; flaring stacks of appropriate height will be provided
Re-entrainment of dust from movement of vehicles	PM	Water sprinkling at unpaved roads

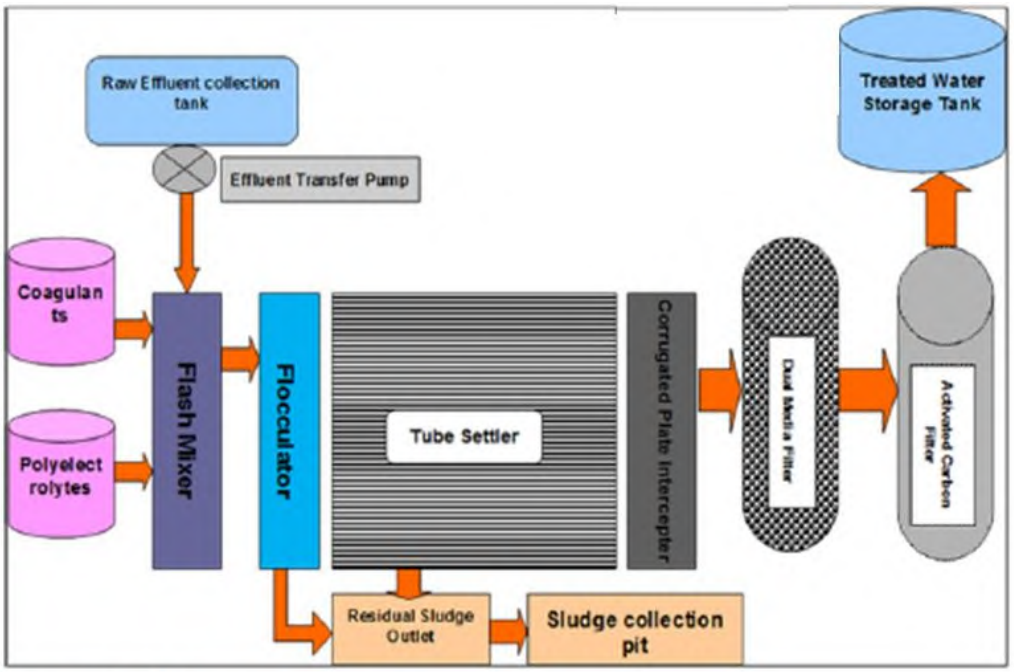
Hydrogen sulfide is generally not encountered during the previous drilling activities in the area. However, if hydrogen sulfide is found then appropriate measures will be taken as outlined in the safety protocol and in accordance to Industrial Best Practice.

2.10.3 Liquid wastes

During drilling, drilling wastewater generation will be approximately 13.8 m^3 per day as a result of rig wash and dewatering of spent mud and washing of drill cuttings will be treated, reused, and recycled. Effluents from, floor washings, pump, seal leakages, spillages will comprise of chemical ingredients of drilling fluid thereby rendering effluent to be polluted. The characteristics of drilling and wash wastewater will be primarily dependent on type and composition of drilling fluid used for drilling. OIL committing to the use of primarily water based mud and eco-friendly polymer based mud (will also be used if required for deeper sections after providing intimation to the Pollution Control Board), the drill cuttings and waste drilling mud generated are likely to be non-hazardous in nature. The drilling wastewater will contain spent drilling fluid generated as a result of washings. The rig wash water and drilling wastewater generation is proposed to be collected in a wastewater pit (constructed at the drilling site). Domestic wastewater generation of about 8.0 m^3 per day for the drilling camp will be treated through a septic pit/soak tank arrangement. The quantities of the liquid wastes, their characteristics and anticipated disposal methods are given in **Table 2.9**.

The drilling wastewater (around 270-360 m^3) will be generated during the entire drilling period from rig wash and dewatering of spent drilling mud. To ensure that effluent from the project comply with the waste water discharge standards as mentioned in 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, a mobile Effluent Treatment Plant will be installed. Proposed installed capacity of ETP would be 50 KLD. Domestic wastewater generated (about 8.0 m^3/ day for the drilling camp) will be treated through a septic tank/soak pit arrangement and then the water will be reused. Formation water generated during drilling activities will be disposed at underground structures at depth below 1000-1500 m. Layout of ETP presented in ***Figure 2.13***.

Figure 2.13 Layout of Effluent Treatment Plant



Source: Oil India Ltd.

2.10.3.1 Production Installation

Produced formation water is stored in formation water tanks will be disposed to the abandoned wells of OIL after necessary treatment. Separated water from phase separation system will be treated in an ETP and will be reused.

Table 2.9 Wastewater generated and it's management

Waste Type	Quantity	Disposal Method
Drill Site		
Drilling and Wash wastewater discharge from wells	13.8 m^3 per day well	The wastewater will be adequately treated in a mobile ETP and will be recycled.
Domestic wastewater discharge from labour camp	8 m^3 per day	Septic tank followed by soak pit
Formation Water	Unquantified	Will be stored temporarily and treated in ETP and then injected into abandoned wells.
Wastewater generated from testing of pipeline	Unquantified	The wastewater will be treated in modular ETP and reused in drilling operation.
Production Installation		
Formation Water	Unquantified	Will be stored temporarily and treated in ETP and then injected into abandoned wells.
Produced water	Unquantified	The water will be adequately treated in an ETP and reused

Source –OIL

2.10.4 Solid and Hazardous Waste Streams

The different solid and hazardous waste streams generated during drilling and their disposal methodology has been presented in ***Table 2.10***.

Table 2.10 Waste streams generated during drilling and their disposal

Waste Type	Quantity	Characteristics	Disposal
Drill Site			
Kitchen Waste	10 – 20 kg per day/well	Organic waste (Non HW)	Will be disposed in compost pits on daily basis that will be buried during site closure.
Drill Cuttings	350-400 m^3/ well	Mainly Inert material Consisting of shales, sands and clay; about 1% of drilling mud. (Non HW)	Drill cuttings will be disposed 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.
Waste Drilling Mud (Fluid)	900-1200 m^3/well	Barite, Bentonite and Traces of Heavy metals (Non-HW)*	The mud will be tested for hazardous contaminants and will be disposed 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
Acid – Lead Batteries	2 – 3 / well	Lead – Acid (HW)	Will be recycled through the vendors supplying acid – lead batteries as required under the Batteries (Management & Handling) Rules, 2001.
Oily waste- used oil & spent Oil	0.5 m^3/well 5-10 Kg/well	Used & Waste oil	Will be collected in metal drums kept in secured dyked area & disposed through approved used oil recycling facility
Recyclables *viz*. packaging wastes, paper, plastic	Depending on usage	-	Proper segregation and storage of recyclable waste in designated bins onsite. Recyclables will be periodically sold to local waste recyclers.
Production Installation			
Kitchen Waste	4.5-5 kg per day	Organic waste (Non HW)	Will be stored in compost pits on daily basis.
Oily waste- used oil & spent oil and loose	Quantity could not be ascertained at present	Used & Waste oil	Will be collected in metal drums kept in secured dyked area & disposed as per Used Oil rules in approved used oil recycling facility
Recyclables *viz*. packaging wastes, paper, plastic, packaging wastes	Depending on usage	-	Proper segregation and storage of recyclable waste in designated bins onsite. Recyclables will be periodically sold to local waste recyclers.

In case OBM is used, DC should meet MOEFCC criteria of oil content less than 10 g/kg and aromatic content less than 1%.

2.10.5 Drilling Hazards

Loss of well control / blow-out, fire, explosion and oil spills are the major potential hazards associated with drilling for oil and gas. Effective response plans to foreseeable emergencies will be developed by OIL and communicated to the project teams. A risk assessment has been carried out as part of this EIA that includes identification of hazards, risks and formulating management plans for emergency response, blowout, oil spills.

2.11 Project Timeline

Drilling of each well location is expected to take three to four months. After development phase, the wells if converted to production wells will continue till the life of the well.

Construction of production facility will require approximately 2 years. The production facility would be permanent.

The overall timeline for developmental drilling, construction of production facility and pipelines would be conducted within 7 years. . Operation of the production facility will be approximately for 20 years.

2.12 Project Cost

Based on OILs previous experience of drilling in the area, cost for drilling of 26 wells (including drilling rates, consumables and well accessories etc.) and three production facilities is approximately INR 1109.40 crores.

3. DESCRIPTION OF THE ENVIRONMENT

The baseline data is collected through primary survey or from secondary sources with reference to the project specific approved ToR provided by Ministry of Environment Forest and Climate Change (MOEF&CC). This data has been collected through the following:

- Reconnaissance Survey and Field Visits;
- Primary monitoring of key environmental components like air, (including noise and meteorology), surface and groundwater and soil;
- Survey of flora and fauna;
- Stakeholder consultations with local people, government departments such as Forest, Panchayats, etc.; and
- Review of secondary literatures available on public domain

3.1 Study Area

Dumduma-Pengeri Area within which the facilities (wells and production facilities) are proposed is spread across 876 sq. km and is a large geographical expanse. Hence, rather than considering 10 km radius around each facility the whole Block was considered to be the Study Area.

3.2 Study Period

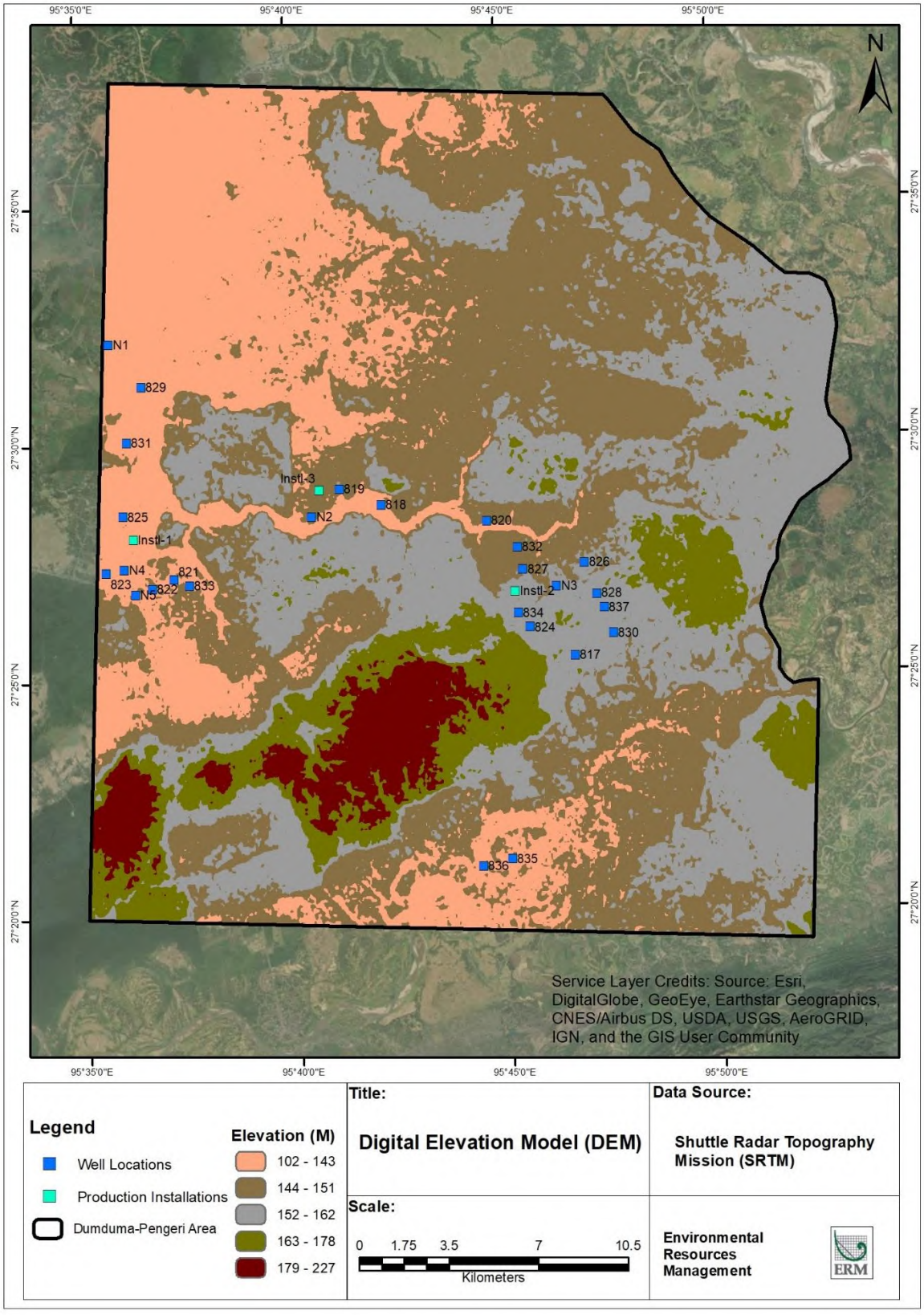
The baseline study was conducted between January-March 2019 for collecting information on physical environment, biological environment and socio-economic environment. Mitra SK Pvt. Ltd., a NABL certified laboratory was engaged for conducting primary monitoring for meteorology, air, noise, soil, surface water, groundwater, traffic for the EIA study. The NABL certificate is attached as **Annexure 3.1**. The primary monitoring data was collected under the supervision of different Functional Area Experts of ERM. The monitoring locations for conducting primary baseline monitoring is presented in **Annexure 3.2**.

3.3 Physical Environment

3.3.1 Topography

Topography of the site is relatively flat. From southwest to northeast elevation profile varies between 205m-155m. From northwest to southeast the elevation profile varies between 143-227m. The topography map is presented in **Figure 3.1.** There is a ridge at the southwestern corner of the block which is included under the Upper Dihing R.F.

Figure 3.1 Topography Map



3.3.2 Land use and Land Cover

The land use of the study area has been interpreted utilising Survey of India (SoI) Toposheet and multispectral satellite imagery (LANDSAT 8) and World Imagery dated 12th December, 2016 along with ground truthing surveys undertaken during site reconnaissance.

The land use-land cover distribution of the Dumduma-Pengeri Area as interpreted from satellite Imagery is presented in **Table 3.1**.

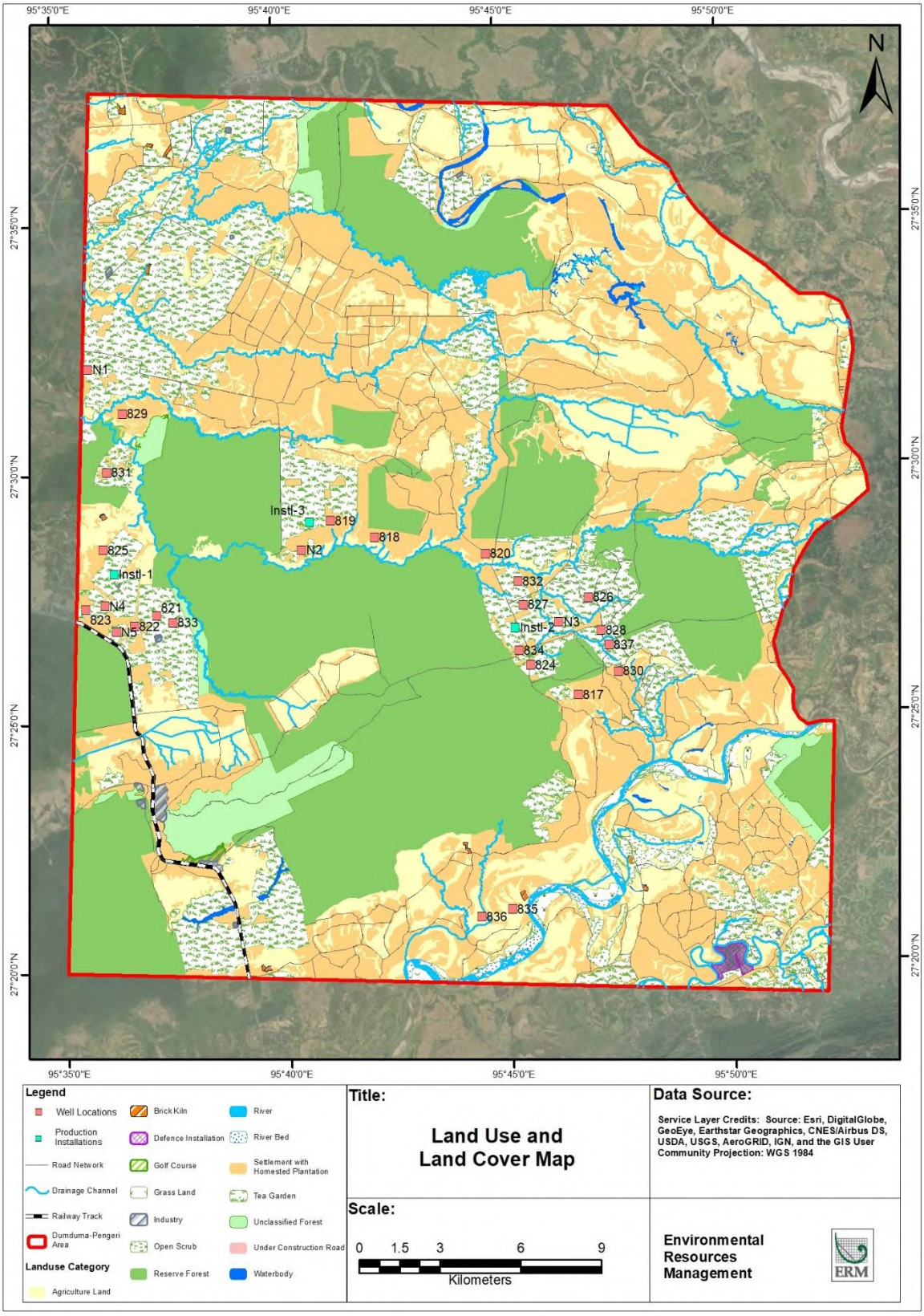
Table 3.1 Distribution of Land use-Land Cover of Dumduma-Pengeri Area

Landuse Category	Area in sq. km	Percentage
Settlement with Homestead Plantation	255.95	29.22
Reserve Forest	253.42	28.93
Agriculture Land	170.92	19.51
Tea Garden	136.39	15.57
Unclassified Forest	23.48	2.68
River and streams	13.43	1.53
Waterbody	4.21	0.48
Open Scrub	5.62	0.64
Grassland	4.77	0.54
Road Network	4.23	0.48
Industry	1.37	0.16
Defence Installation	1.12	0.13
Brick Kiln	0.52	0.06
Parks and gardens	0.44	0.05
Railway Track	0.10	0.01
Under Construction Road	0.05	0.01
Total	**876.02**	**100.00**

Settlement with homestead plantation covers 29.22% of the total area of Dumduma-Pengeri followed by reserve forest (28.93%), agricultural land (19.51%) and tea gardens (15.57%). Unclassified forest areas cover 2.68% of the total area. River, streams and waterbodies approximately 2% of the total area.

Land use land cover map of Dumduma-Pengeri Area as interpreted from Survey of India Toposheet and Satellite Imagery is presented in **Figure 3.2.**

Figure 3.2 Distribution of land use land cover of Dumduma-Pengeri Area



3.3.3 Soil Quality

Soil quality in Tinsukia district can be classified as below:

- Newer alluvial soil: Flood plain areas of River Brahmaputra and the tributaries in the Northern part are characterised by light grey clay with sand and silt;
- Older alluvial soil: Occurs mainly in the central part with limonite yellow to reddish yellow clay; and
  Soil cover in forest and hilly areas: It is deep reddish in colour and occurs over the older geological formations in the southernmost part of the Tinsukia District[1].

Qualitatively, the soil of Tinsukia District is mainly acidic. Micronutrients, especially Zinc (Zn), Boron (Bo), Molybdenum (Mo) and Copper (Cu), etc. were found to be available in almost all parts of the District.

Primary Soil Monitoring

Soil was monitored from five different locations in the study area. An effort was made to represent the major land uses present in the study area such as agricultural field, homestead plantation, tea garden and forest land and soil assess the quality. The details of the soil monitoring locations are provided in **Annexure 3.2** and the soil locations have been shown in **Figure 3.12.** Soil analysis data is presented in **Annexure 3.3**.

Soil Monitoring Results

pH

Soil acidity has a correlation with the availability of nutrients in terms of their deficiency and toxicity. A soil having pH less than 6.5 is considered as acidic. The soil in the study area was found to be extremely acidic to moderately acidic as the pH ranged between 4.45 and 5.97.

Texture and Electrical Conductivity

Texture is an expression to indicate the coarseness or fineness of the soil as determined by the relative proportion of the various sized primary particles in the soil mass. The textures of the collected soil samples were found to be clay loam, sandy clay loam and clayish in nature.

The EC values for the soils monitored at the study area range between 43.4 and 215 µs/cm. For a productive soil, the electrical conductance (EC) should be < 1000µs/cm.

Permeability

Soil permeability is the property of the soil to transmit water and air. The permeability of the soils samples varied from 0.17 cm/hr to 1.9 cm/hr. The permeability value of the soils indicates slow to moderately slow class of soil[2]. The permeability values also indicate clay to loam texture for soil.

1 https://dirhorti.assam.gov.in/sites/default/files/swf_utility_folder/departments/horticulture_medhassu_in_oid_5/menu/document/District%20Irrigation%20Plan%2C%20Tinsukia_0.pdf

2 FAO- Soil permeability classes for agriculture and conservation

Infiltration Capacity

The infiltration capacity indicates movement of water into the soil. The infiltration rate of the soil samples varied from 3.6 to 15 mm/hr. The texture of the soil is also a key factor in determining the infiltration capacity of soil. The infiltration capacity for soil with clay texture varied from 1 to 5 mm/hr, for soil with clay loam texture varied from 5 to 10 mm/hr and for soil with loam texture varies from 10 to 20 mm/hr.[1] The highest infiltration capacity was found in sample SQ3 and the lowest infiltration capacity was found in sample SQ4.

Porosity and Moisture Content

Porosity of the soil samples varied from 48.4% to 50.8%. The moisture content of the soil samples varied from 24% to 37%.

Macronutrients

Nutrient status of the soil samples can be determined from the concentration of N, P, K and organic carbon in soil samples. Standard rating chart for soil nutrients is provided in **Annexure 3.4**.
Nitrogen contents in the soil samples ranged between 381-414 mg/kg (170.26-185 kg/ha), phosphorus content in the soil samples were <3 mg/kg (1.34 kg/ha) and potassium contents ranges between 51-121 mg/kg (22.79-54.07 kg/ha). With comparison to the rating chart nitrogen status is better, phosphorus values are very less and potassium values are very less.

Permeability

Soil permeability is the property of the soil to transmit water and air. The permeability of the soils samples varied from 0.17 cm/hr to 2.9 cm/hr. The permeability value of the soils indicates very slow to slow class of soil[2]. The permeability values also indicate clay, loam and sandy loam texture for soil.

Infiltration Capacity

The infiltration capacity indicates movement of water into the soil. The infiltration rate of the soil samples varied from 3.6 to 18 mm/hr. The texture of the soil is also a key factor in determining the infiltration capacity of soil. The infiltration capacity for soil with clay texture varied from 1 to 5 mm/hr[3], for clay loam 5-10 mm/hr[2] and for loam 1—20 mm/hr[2]. The highest infiltration capacity was found in sample SQ3 and the lowest infiltration capacity was found in sample SQ4.

Porosity and Moisture Content
Porosity of the soil samples varied from 44.4% to 51.4%. The moisture content of the soil samples varied from 24% to 37%.

Metals

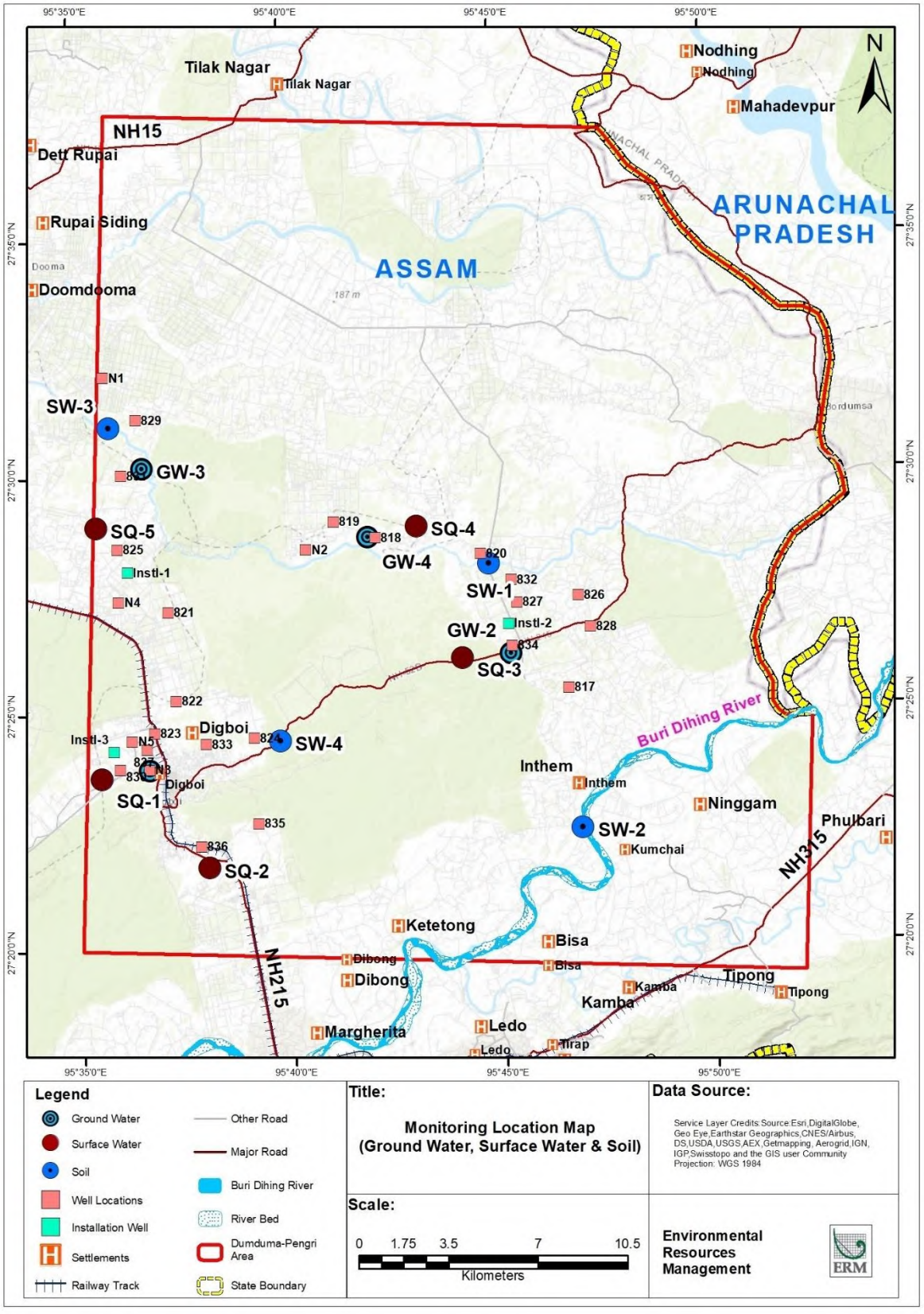
Heavy metals such as Copper (8.0-15.0 mg/kg), Lead (3.0 – 28.0 mg/kg) and Zinc (34-67 mg/kg) were detectable in the soil of the study area. Cadmium (<2mg/kg) and Mercury (<0.1mg/kg) concentrations were found to be below detection limit. The concentration of copper, lead and in the soil sample was much below the soil remediation intervention values specified in Dutch Soil Remediation Circular (Refer **Annexure 3.5**).

[1] FAO- Basic infiltration rates for various soil types
[2] FAO- Soil permeability classes for agriculture and conservation
[3] FAO- Basic infiltration rates for various soil types

Conclusion

Soil samples were found to be clay, clay loam, sandy clay loam in texture with extremely acidic to moderately acidic pH. The infiltration capacity of the soil samples also suggest clay to loam texture. The porosity of the soil samples are high due to presence relatively high clay content. Macronutrient contents viz. phosphorous and Potassium values of the soil samples were found to be very less whereas Nitrogen content of soils were better. The EC values of the samples are found to be below 1000 µs/cm. The SAR value of the soil samples also indicates absence sodicity hazard. Heavy metals such as copper, lead and zinc are present in soil samples but concentration are much below the soil remediation intervention values specified in Dutch Soil Remediation Circular. Overall the soil in the area found to be productive.

Figure 3.3 Soil, Groundwater and Surface water Monitoring Locations



3.3.4 Climate and Meteorology

The study area falls under the humid sub-tropical climate zone with warm seasons.

3.3.4.1 Seasons

There are four well defined seasons as shown below:
Pre-monsoon : March-May
Monsoon : June- September
Post-monsoon: October- November
Winter : December- February

The meteorological data of IMD station at Dibrugarh has been used for interpretation of longer-term temperature profile, rainfall pattern, relative humidity and wind speed and wind direction in the study area.

Temperature

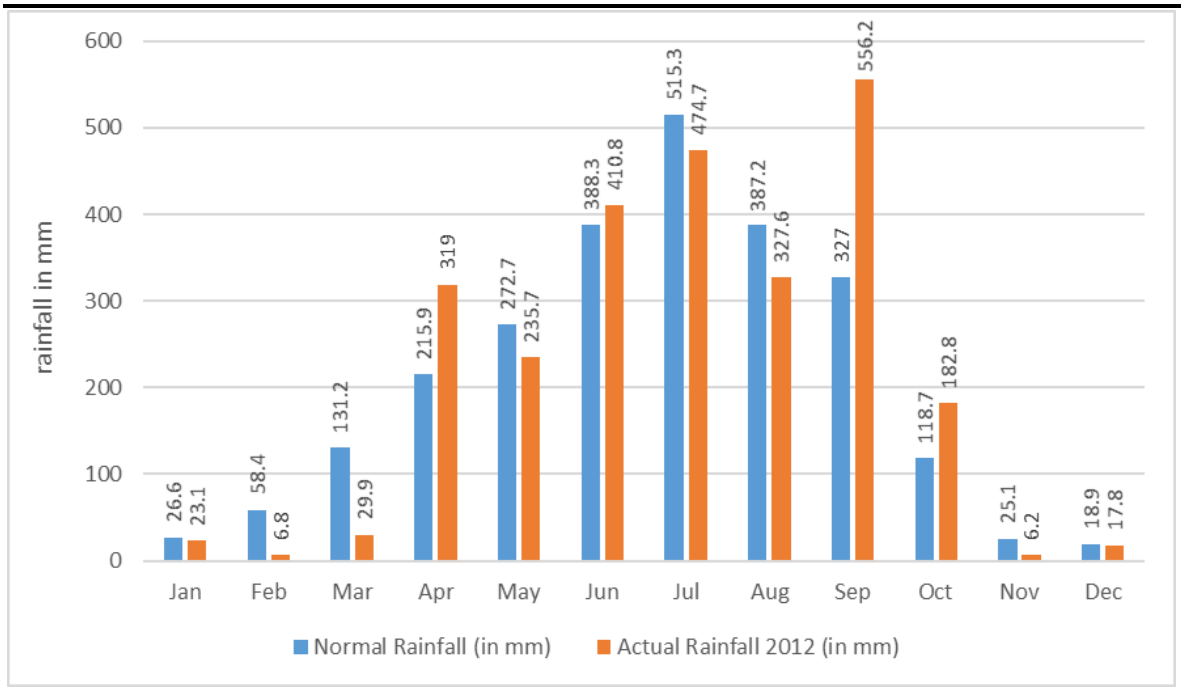
The mean monthly maximum and mean monthly minimum recorded over a period of 1961 to 1990 shows that mean monthly maximum temperature is experienced in April (33.5°C) and the mean monthly minimum temperature is experienced in January (9.9°C). The variation in daily temperature is observed to be maximum in January (a difference of 15°C).

Rainfall

Normal annual rainfall at Tinsukia district is 2323 mm and about 65 percent rain is received during monsoon[1]. Monthly rainfall in Tinsukia district ranges between 6.2 mm in November and 556.2 in September for the year 2012. Higher rainfall was observed during the monsoon months (June-September) while lower rainfall was recorded between November-February. Similar results were reported by the district mean rainfall values where the monsoon month's report of the highest rainfall and November to February are drier months. Monthly rainfall in Tinsukia district for 2012 compared to mean rainfall is presented in **Figure 3.4**.

[1] Ground Water Information Booklet Tinsukia District, Assam. CGWB.

Figure 3.4 Average Rainfall in Tinsukia



Source: http://ecostatassam.nic.in/reports/SHB2013.pdf

Relative Humidity

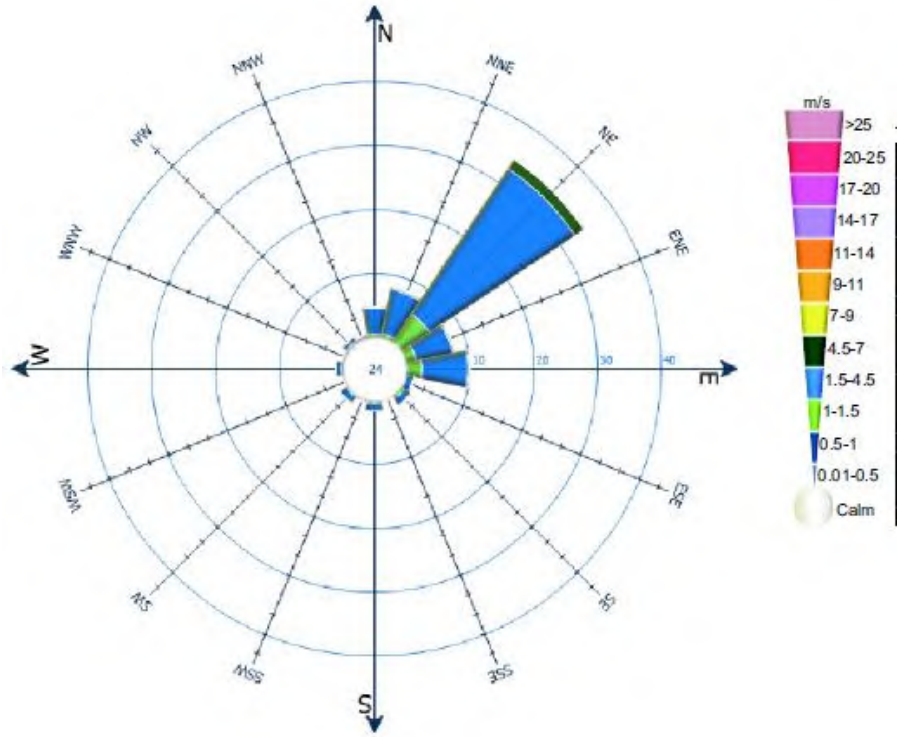
Relative humidity values measured twice daily at 0830 hrs and 1730 hrs at the Dibrugarh IMD station for 2009 revealed high average monthly relative humidity values ranging from 54.68%-87.65%. Maximum monthly average relative humidity values were observed in monsoon months of June to August. The average humidity values recorded for these months during both 0830 hrs and 1730 hours generally varied between 85.97% – 87.65% and 72.67% – 78.71% respectively.

Wind Speed and Wind Direction

The wind speed and wind direction of an area influences the dispersal of pollutants from a point and non-point sources. As the proposed drilling and testing activities involve the operation of both point (DG sets) and non-point pollutant emissions sources, analysis of wind speed and direction data is considered important for predicting the air quality impacts based on pollutant dispersion.

Wind rose data for Dibrugarh prepared from daily surface wind data recorded at 3:00am from 1971-2000 indicates that 65% of the year, the wind blows from northeast.

Figure 3.5 Annual Wind Rose at Dibrugarh, Assam



Source: IMD

Primary Micrometeorology

An automatic micro-meteorological station was installed at Padumoni Gaon. The parameters monitored included wind speed, wind direction, ambient temperature, relative humidity, rainfall. The result of primary meteorological monitoring is presented in the subsequent section.

Temperature: The maximum and minimum temperature reported during the study period was 30.3°C and 10.1°C. The average temperature was in the range of 19.9°C during the study period.

Relative humidity: The average relative humidity was 70.2% during the study period. Relative humidity ranged between 30.9% and 97.8% during the study period.

Rainfall: Rainfall occurred on few days of the study period. Total rainfall recorded during the study period was 38.18 inch. Only 1 rainy day (rainfall>2.5 mm/day) was recorded during the study period.

Summary of meteorological data is presented in **Table 3.2.** The detail monitoring results is presented in **Annexure 3.6**.

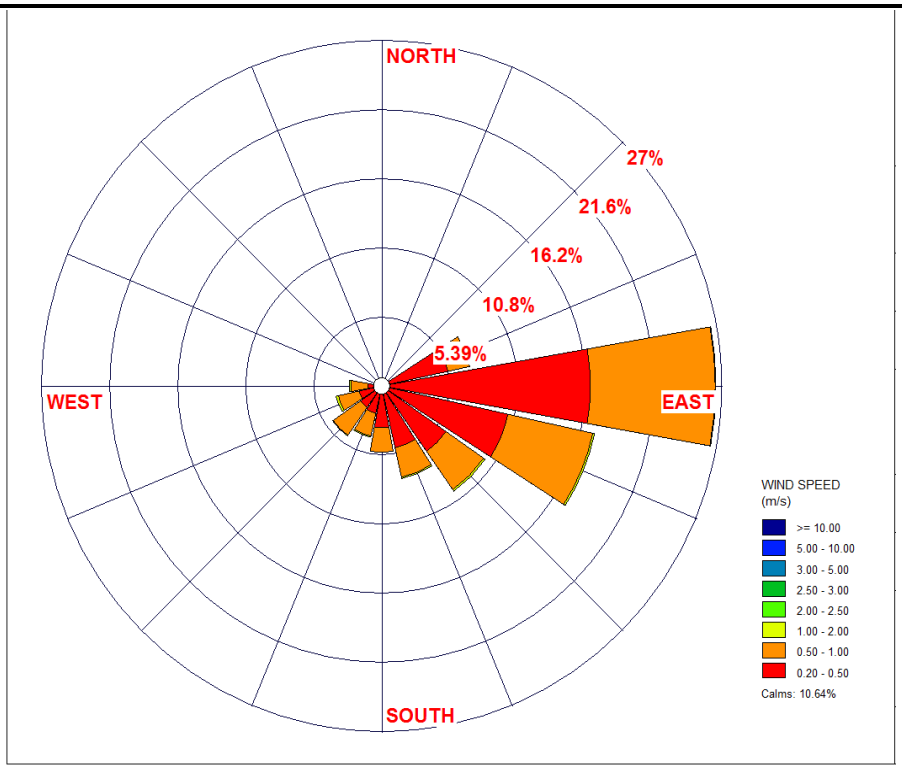
Table 3.2 Summary of Micro-Meteorological Data

Particulars	Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Rainfall (inch)
Maximum	30.3	97.8	5.0	-
Minimum	10.1	30.9	0.0	-
Average	19.9	70.2	1.3	-
Total	-	-	-	38.18

Source: ERM Primary Monitoring

Wind Speed and Direction: The average wind speed in the study period was 1.3 m/s. The maximum wind speed was 5.0 m/s. On average 10.64% of the study period, wind speed was at calm. The predominant wind direction during the study period was from East. The wind rose for the study period is shown in **Figure 3.6.**

Figure 3.6 Wind rose of Study Area during Study Period



Source: ERM Primary Monitoring

3.3.5 Ambient Air Quality

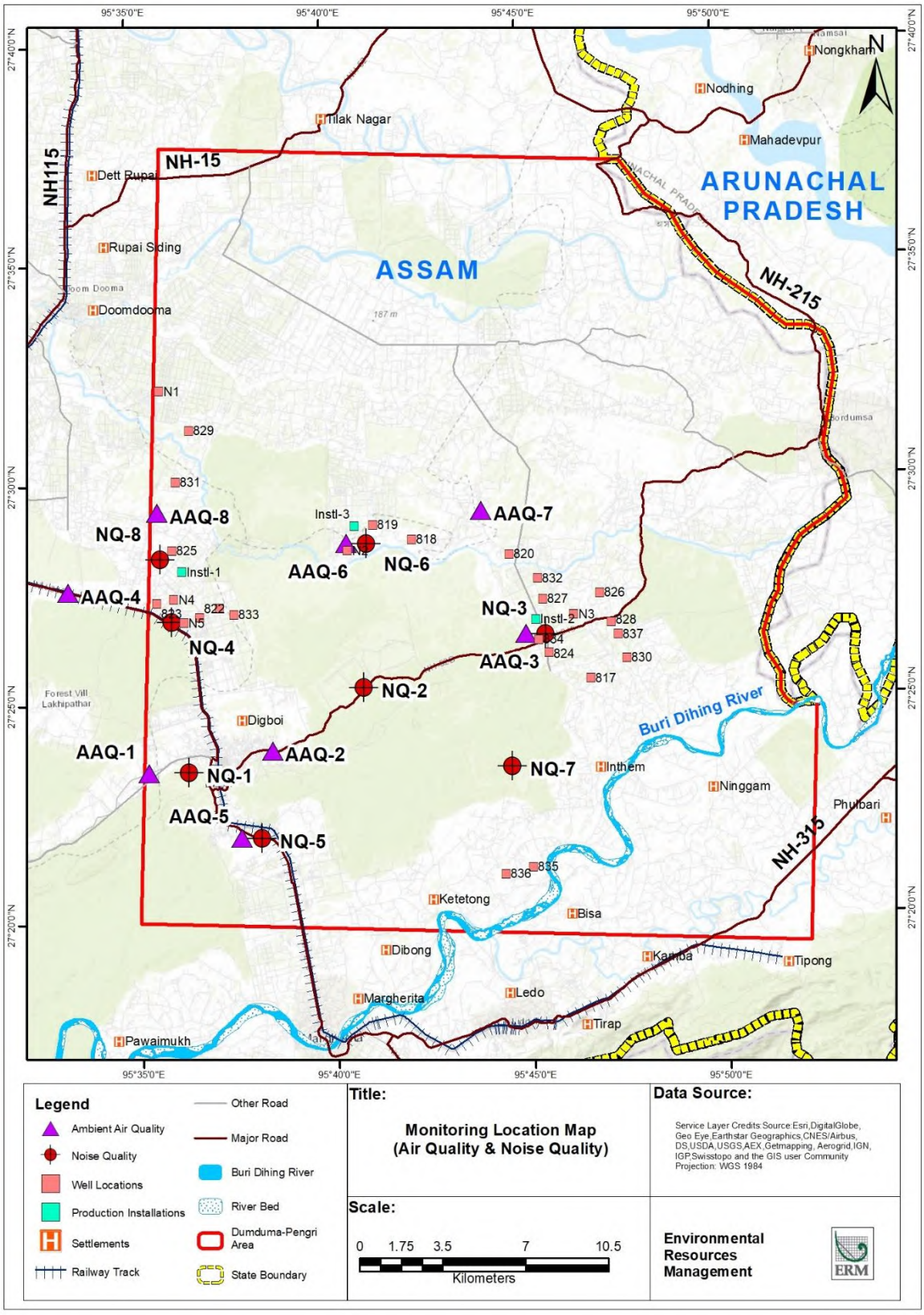
The study area resembles a pre-dominantly rural landscape with villages interspersed between plantations, agricultural lands and natural forests. Major industrial sources of air emission at the Dumduma-Pengeri Area are from hydrocarbon exploration and production of OIL and gas, Digboi refinery, transportation of vehicles, emission from tea garden factories etc.

Major sources of air emissions due to the proposed drilling and producing activities would be exhaust gases generated from operation of DG sets, GG sets project related vehicular movements and flaring from production facilities etc.

Primary Air Quality Monitoring

Ambient air quality was monitored at eight locations across the study area during January-March 2019. The parameters studied were Particulate Matter (PM_{10} and $PM_{2.5}$), Oxides of Nitrogen (NOx), Sulfur dioxide (SO_2), Carbon Monoxide (CO), Hydrocarbon (Methane and Non-methane) and Volatile Organic Carbons (VOCs). Air quality monitoring locations were selected in residential areas. The monitoring locations were selected upwind, downwind and crosswind directions with respect to the surface locations within the study area to understand the baseline air environment in the study area. The monitoring location details are given in **Annexure 3.2**. The air monitoring locations have been provided in **Figure 3.7**.

Figure 3.7 Air, Noise, Met and Traffic Monitoring Locations



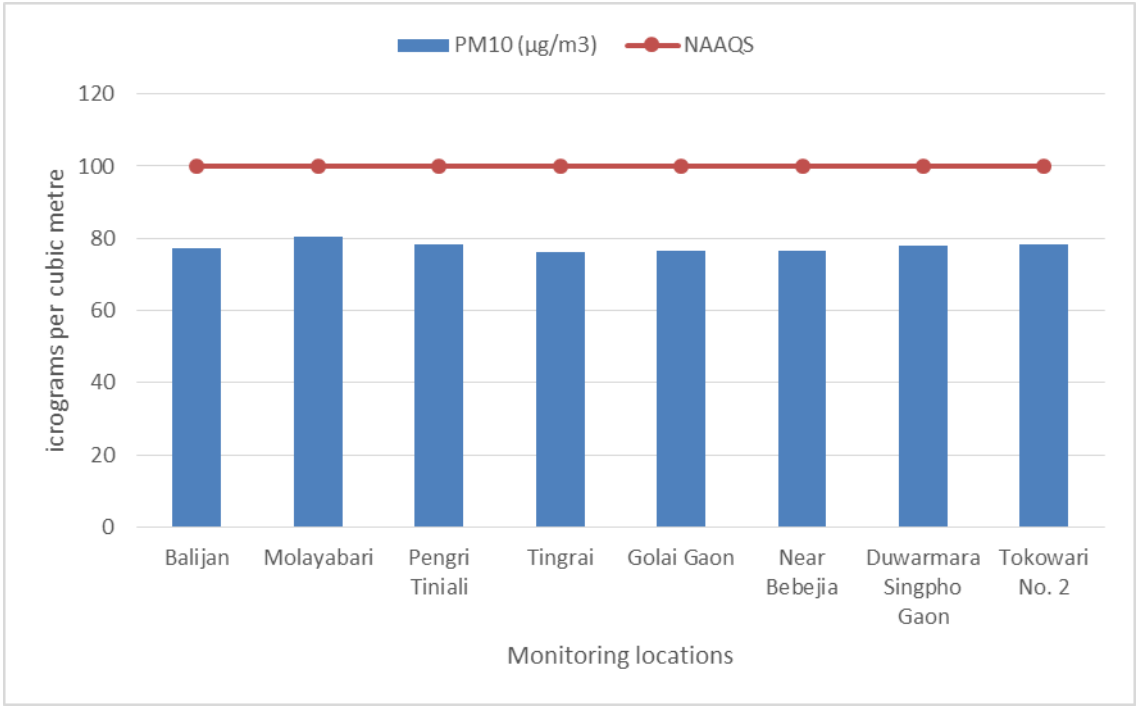
Interpretation of Monitoring Results

The result of the parameters monitored has been discussed in context of compliance to National Ambient Air Quality Standards (NAAQS)[1] of residential, commercial and industrial area. The station wise summary results are **Table 3.3**. The in-detail results are provided in **Annexure 3.7**.

Particulate Matter (PM_{10})

The average concentration of PM_{10} in the Study Area ranged between 76.17 and 80.57 µg/m^3. The average concentration of PM_{10} values at all stations were found to be in compliance to the NAAQS value of 100 µg/m^3. Variation of PM_{10} values in at the monitoring stations are presented in the figure below.

Figure 3.8 Concentration of Particulate Matter (PM_{10}) in the Study Area



Source; Primary Monitoring

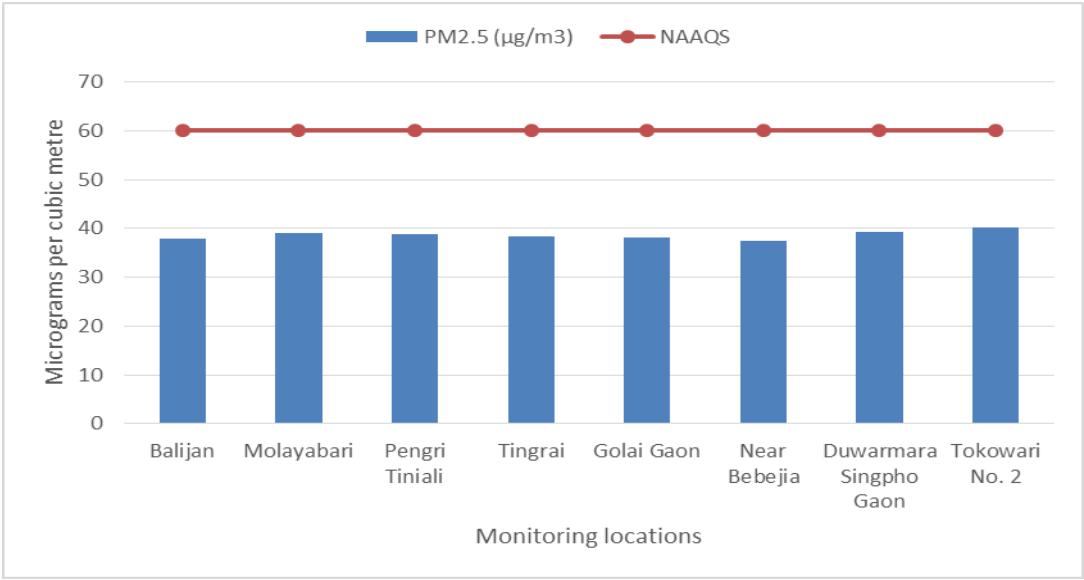
Maximum and minimum PM_{10} values at the monitored stations were found to be 110.7 µg/m^3 and 46.8 µg/m^3 respectively. Maximum PM_{10} values were higher than NAAQS for one time at four stations out of the 24 samples collected at each station. Higher particulate values could be attributed to generation of re-entrained dust from plying of vehicles through dilapidated roads within the block.

Particulate Matter (PM 2.5)

The average concentration of Particulate Matter 2.5 ($PM_{2.5}$) in the study area ranged between 37.46 and 40.11 µg/m^3. The average concentration was within the stipulated standard of 60 µg/m^3. Variation of $PM_{2.5}$ values in at the monitoring stations are presented in the figure below. The lower values recorded at the station were primarily due to rural set up of study area.

[1] http://www.moef.nic.in/sites/default/files/notification/Recved%20national.pdf

Figure 3.9 Concentration of Particulate Matter ($PM_{2.5}$) in the Study Area



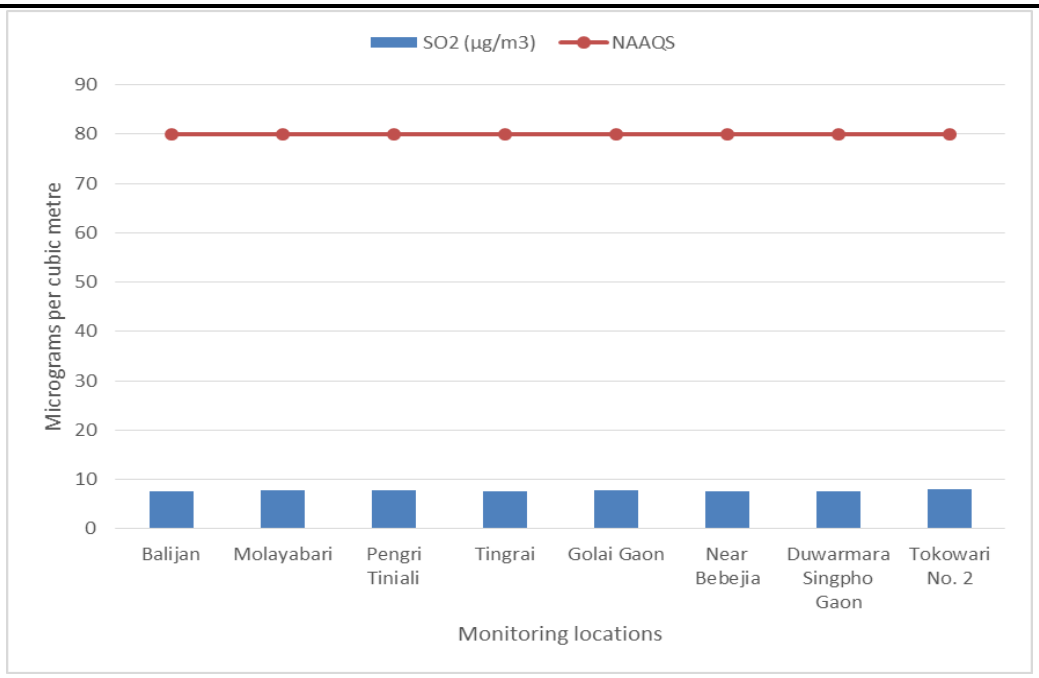
Source: Primary Monitoring

Maximum and minimum $PM_{2.5}$ values at the monitored stations were found to be 55.8 µg/m^{3}and 30 µg/m^3 respectively. The maximum values were also within the NAAQS limits.

Sulfur Dioxide (SO2)

The average concentration of Sulfur Dioxide (SO_2) in the study area ranged between 7.56 and 8.19 µg/m^3. The average concentration reported across all the eight monitoring locations were below the NAAQS value of 80 µg/m^3. Variation of SO_2 values in at the monitoring stations are presented in the figure below. Low values of SO_2 can be attributed to the primarily rural setting of the study area.

Figure 3.10 Concentration of Sulfur Dioxide (SO_2) within Study Area



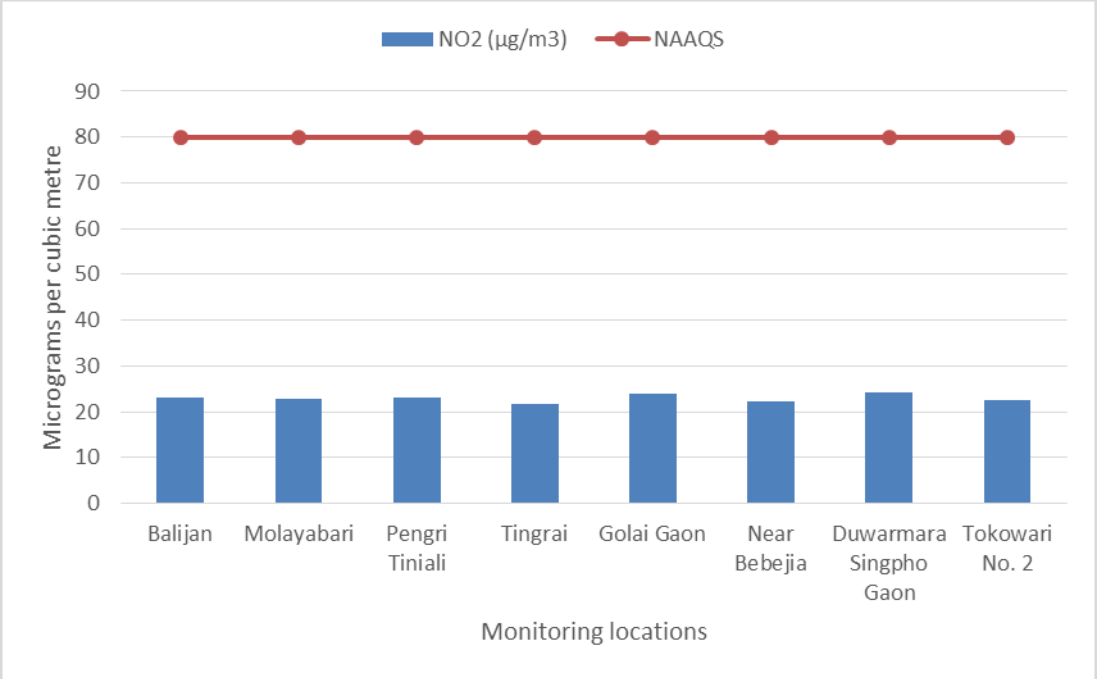
Source; Primary Monitoring

Maximum and minimum SO_2 values at the monitored stations were found to be 10.5 µg/m^3 and less than 6 µg/m^3 respectively. The maximum values were also within the NAAQS limits.

Nitrogen Dioxide (NO_2)

The average concentration of NO_2 in the study area ranged between 21.72 and 24.11 µg/m^3. The average concentration reported across all the eight monitoring locations were below the NAAQS value of 80 µg/m^3. Variation of NO_2 values in at the monitoring stations are presented in the figure below. Low values of NO_2 can be attributed to the primarily rural setting of the study area.

Figure 3.11 Concentration of Nitrogen Dioxide (NO_2) in the Study Area



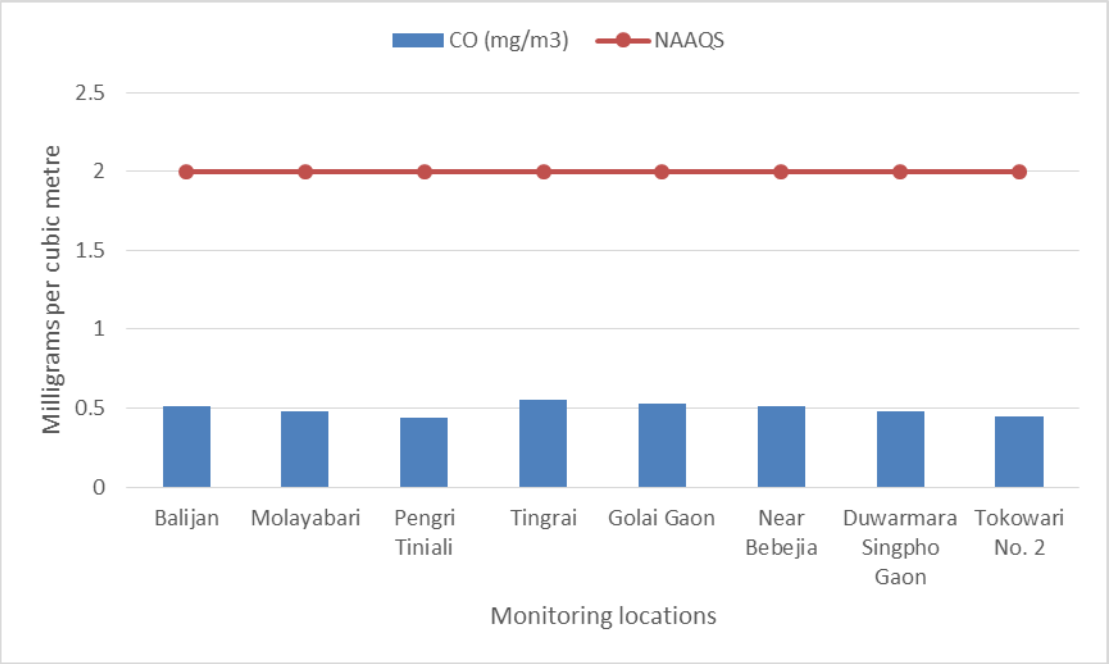
Source: Primary Monitoring

Maximum and minimum NO_2 values at the monitored stations were found to be 36.7 µg/m^{3}and 13.4 µg/m^3 respectively. The maximum values were also within the NAAQS limits.

Carbon Monoxide

The 8-hour average concentration of Carbon Monoxide in the study area ranged between 0.44 and 0.55 mg/m^3. The 8-hour average concentration of CO reported across monitoring locations were in compliance the NAAQS value of 2mg/m^3. Variations of CO values in at the monitoring stations are presented in the figure below.

Figure 3.12 Concentration of Carbon Monoxide (CO) in Study Area



Source: Primary Monitoring

Maximum and minimum CO values at the monitored stations were found to be 0.95 mg/m^{3}and 0.15 mg/m^3 respectively. The maximum values were also within the NAAQS limits.

Hydrocarbons-Methane

The average methane concentration in the study area ranged between 1.57 and 1.93 ppm. There is no standard value for Methane in NAAQS.

Hydrocarbons-Non-Methane

All values for non-methane hydrocarbons were recorded to be below detection limits (<0.1 ppm)..

Volatile Organic Carbons (VOCs)

All the values for VOCs were recorded to be below detection limits (<4.2 µg/m^3) for all the samples.

Conclusion

The study area represents primarily rural environmental setting. The source of emission to air include emission from plying of vehicles at the dilapidated roads within the study area and operation of few drilling sites, operation of Digboi refinery etc. Lower values for the pollutant levels at all the stations could be attributed to the rural setting in the study area.

Table 3.3 Summary of Ambient Air Quality Monitoring Results

	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_2 (µg/m³)	CO (mg/m³)	VOCs (µg/m³)	HC as methane (ppm)	HC as non-methane (ppm)
	Balijan							
Minimum	65.6	30.0	7.71	16.4	0.3	-	1.5	-
Maximum	100.4	46.9	<6.0	30.7	0.95	<4.2	2.96	<0.1
Average	77.28	38.00	9.80	23.22	0.51	-	1.91	-
98 Percentile	96.40	46.12	9.63	30.56	0.89	-	2.82	-
	Molayabari							
Minimum	68.4	30.7	7.96	16.6	0.25	-	1.06	-
Maximum	100.6	52.9	<6.0	31.4	0.84	<4.2	2.01	<0.1
Average	80.57	39.17	9.40	22.72	0.48	-	1.57	-
98 Percentile	98.25	50.97	9.37	30.99	0.80	-	1.06	-
	Pengri Tiniali							
Minimum	60	30.7	7.80	13.4	0.25	-	1.18	-
Maximum	110.7	55.8	<6.0	36.7	0.87	<4.2	2.79	<0.1
Average	78.17	38.95	9.30	23.04	0.44	-	1.86	-
98 Percentile	105.41	53.41	9.23	34.40	0.83	-	1.18	-
	Tingrai							
Minimum	66.5	31	7.64	16.8	0.15	-	1.19	-
Maximum	105.4	46.2	<6.0	29.8	0.95	<4.2	2.4	<0.1
Average	76.17	38.29	10.40	21.72	0.55	-	1.71	-
98 Percentile	98.64	45.92	10.00	28.37	0.90	-	1.19	-
	Golai Gaon							
Minimum	64.2	30.2	7.83	17.5	0.28	-	1.32	-
Maximum	92.7	50.7	<6.0	35.5	0.89	<4.2	2.8	<0.1
Average	76.54	38.04	9.70	23.94	0.53	-	1.93	-
98 Percentile	91.78	47.85	9.70	33.89	0.87	-	1.32	-
	Near Bebejia							
Minimum	65.4	30.5	7.66	16.8	0.27	-	1.16	-
Maximum	92.2	46.6	<6.0	29.6	0.88	<4.2	2.83	<0.1
Average	76.61	37.46	9.50	22.37	0.51	-	1.76	-
98 Percentile	91.23	46.19	9.39	28.27	0.87	-	1.16	-
	Duwarmara Singpho Gaon							
Minimum	46.8	30.7	7.56	15.7	0.25	-	1.03	-
Maximum	95.7	48.2	<6.0	34.7	0.78	<4.2	2.36	<0.1
Average	77.81	39.32	8.80	24.11	0.48	-	1.77	-
98 Percentile	92.80	46.96	8.80	33.04	0.78	-	1.03	-
	Tokowari No. 2							
Minimum	64.8	30.7	8.19	15.8	0.16	-	0.97	-
Maximum	98.3	50.1	<6.0	31.2	0.84	<4.2	2.68	<0.1
Average	78.14	40.11	10.50	22.45	0.45	-	1.72	-
98 Percentile	97.01	47.62	10.44	30.83	0.81	-	0.97	-

Source: Primary Monitoring

3.3.6 Ambient Noise Quality

Ambient noise monitoring was conducted at 8 stations within the study area. All locations are included within the residential area. The location of the ambient noise monitoring stations have been presented in **Annexure 3.2** and shown in **Figure 3.7**.

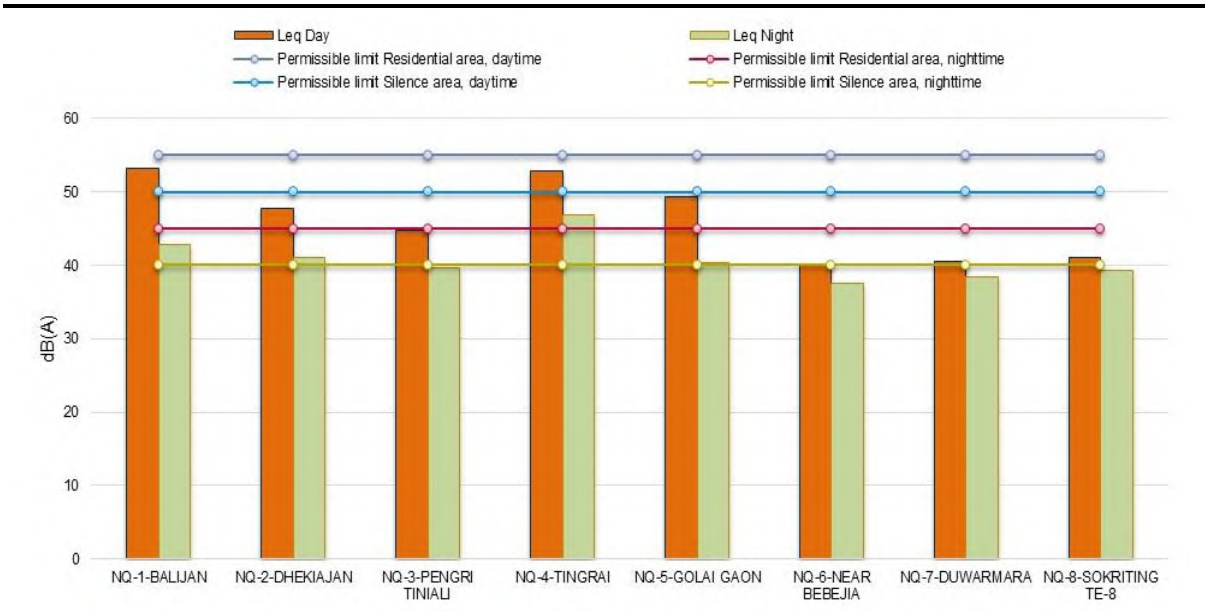
The 24-hour baseline noise monitoring was conducted by using the portable sound meter (Lutron, SL-0423SD, unit: dB(A). Noise level (LAeq) were measured and recorded at a ten-minute interval and averaged at an hourly and daily (i.e. 24-hour) interval using the following formula:
LAeq = 10*Log $_{10}$ (Average (10^ ((X)/10))) where X is measured noise in dB(A). Sound pressure level (SPL) measurements in dB(A) was recorded for 24 hours with the equivalent noise values computed as Leq (Daytime) and Leq (Night time) for each location. Daytime is considered between 06:00 to 22:00 hours and night from 22:00 hours to 06:00 hours. The results so obtained were compared with ambient noise standards specified for respective category under the *Noise Pollution (Regulation & Control) Rules, 2000*.

Interpretation of Primary Monitoring Results

- The equivalent noise level as measured at the residential areas ranges between 40.1-53.2 dB(A) at day time and between 37.5-46.9 dB(A) at night time.
- The equivalent day time noise values at all the 8 stations were in compliance to the day time standard of 55 dB(A) for residential areas.
- The equivalent night time noise values at seven locations viz. were in compliance to the night time standard of 45 dB(A) for residential areas. At one location viz. Tingrai, the equivalent night time noise levels were found to be exceeding the nighttime noise standards. This could be primarily due to the vehicular noise generating from the plying of vehicles at the NH-38 during nighttime.

The result in detail is provided in **Annexure 3.8**.

Figure 3.13 Ambient Noise Monitoring Results



Source: ERM Primary Monitoring

3.3.7 Hydrogeology[1]

As reported in Central Groundwater Board (CGWB) report for Tinsukia District, the district can be divided into two broad hydrogeological units viz. (1) Tertiary Group of Semi-consolidated rocks (2) Quaternary alluvium of Unconsolidated sediments.

Tertiary group of sedimentary rocks are confined to the southernmost part of the district where ground water occurs in the shallow weathered zone and this may be developed through large diameter open wells. Ground water occurs in deeper aquifer consisting of Tipam sandstone and in boulders and gravel beds of Dihing group that are suitable for development through deep tube wells.

In alluvial plain areas, ground water occurs in regionally extensive aquifers down to explored depth of 250 m with reportedly very good yield prospect. The aquifers consist of sands of various grades and are suitable for both shallow and deep tube wells. Ground water rests at shallow depth and in major part of the district, depth to water level varies from 2 to 5 m bgl during pre-monsoon period and from 1.68 to 4.5 m bgl during post monsoon period. Long term water level trend study conducted by CGWB has shown that there has been no significant change of water level in the last 10 years.

The shallow tube wells tapping aquifers within 50 m depth are capable of yielding 20 – 50 m^3/hr at drawdown of less than 3 m. Medium to heavy duty tube wells constructed down to 100 – 150 m depth tapping 25 – 30 m of granular zones are yielding 50 – 100 m^3/hr.

Tinsukia District has been categorized as non-notified and none of the Blocks are Over-Exploited or Critical. Qualitatively, there is high concentration of iron in some localities.

3.3.8 Groundwater Quality

In order to establish the groundwater quality in the study area, monitoring was conducted at 4 stations during the study period. The ground water sampling has been conducted from tube wells adjacent to the project site to capture the existing quality of the ground water that can be used as a reference for future studies during construction and operation phase. The location of the groundwater monitoring stations has been presented in **Figure 3.3**.

Groundwater Quality Results

The result of groundwater quality as sampled in the study area has been provided in **Annexure 3.9**.

Interpretation of Monitoring Results of Groundwater Quality

The results of the groundwater quality have been discussed with reference to Drinking water Standard IS:10500;2012:

- pH of the groundwater samples were recorded in the range of 6.36-8.07. The values were in compliance to the IS: 10500, 2012 drinking water standard of 6.5 to 8.5.
- Turbidity values of the groundwater samples of three sites were <1.0 NTU, only in GW2 the turbidity was 1 NTU. The values of all the samples were in compliance to the permissible limit of IS: 10500, 2012 drinking water standard of 5 NTU.
- Total Dissolved Solids –Concentration of dissolved solids in groundwater ranges between 44-132 mg/l. The values are lower than the acceptable limit of 500mg/l.

[1] Ground Water Information Booklet Tinsukia District, Assam. CGWB.

- Total hardness (as $CaCO_3$) –The values of total hardness ranges between 18 and 100 mg/l. The values in compliance to the desirable limit of 200 mg/l.
- Chlorides – The concentration of chlorides ranged between 7.3 and 20 mg/l. All the stations revealed chloride concentrations in compliance to the acceptable limit of 250 mg/l.
- Alkalinity as $CaCO_3$–The alkalinity of the water samples monitored at study area ranged between 18 and 115 mg/l. Alkalinity were reportedly in compliance with the acceptable limit (200 mg/l) at all the locations.
- Fluoride-Fluoride levels in the groundwater samples were found to be ranged between 0.12-0.15 mg/l. The samples were found to be in compliance to the acceptable limit of 1.0 mg/l.
- Sulphate-Sulphate concentrations in the groundwater samples monitored at study area ranged between <1.0 and 3.8 mg/l. Sulphate concentrations in all the samples were found to be within the acceptable sulphate concentration limit of 200 mg/l.
- Nitrate-Nitrate concentrations in the groundwater samples monitored at study area ranged between <0.5 and 1.8 mg/l. Nitrate concentrations in all the samples were found to be within the acceptable nitrate concentration limit of 45 mg/l.
- Iron- The concentration of iron, monitored at 4 locations ranges between <0.05 and 0.09 mg/l and were in compliance to the permissible limit of 0.3 mg/l. The concentration of Fe beyond 0.3 mg/l affects the taste/appearance, has adverse effect on domestic uses and water supply structures
- Calcium- The concentration of calcium ranged between 6.2 and 19 mg/l in the study area. Calcium levels at all stations were found to be in compliance to the acceptable limit of 75 mg/l.
- Magnesium – The concentration of magnesium was observed to be in the range of 0.6 and 16 mg/l. Magnesium levels at all stations were found to be incompliance to the acceptable limit of 30 mg/l.
- Levels of cyanide (<0.01 mg/l), mineral oil (<0.01 mg/l), phenolic compounds (<0.001 mg/l), anionic detergents (<0.02 mg/l), were found to be below detection limits in all the groundwater samples.
- Pesticides levels in the collected samples were found to be below detection limits
- Concentrations of metals Cd, Cu, Hg, Pb, Mn were found to be below permissible limits in the groundwater samples.
- The presence of Total coliform bacteria is not likely to cause illness, but their presence indicates that the water supply may be vulnerable to contamination by more harmful microorganisms. *Escherichia coli* (*E. coli*) are the only member of the total coliform group of bacteria that is found only in the intestines of mammals, including humans. The presence of *E. coli* in water indicates recent faecal contamination and may indicate the possible presence of disease-causing pathogens, such as bacteria, viruses, and parasites. Total coliform and faecal coliforms were not detected in all four locations in the study area.

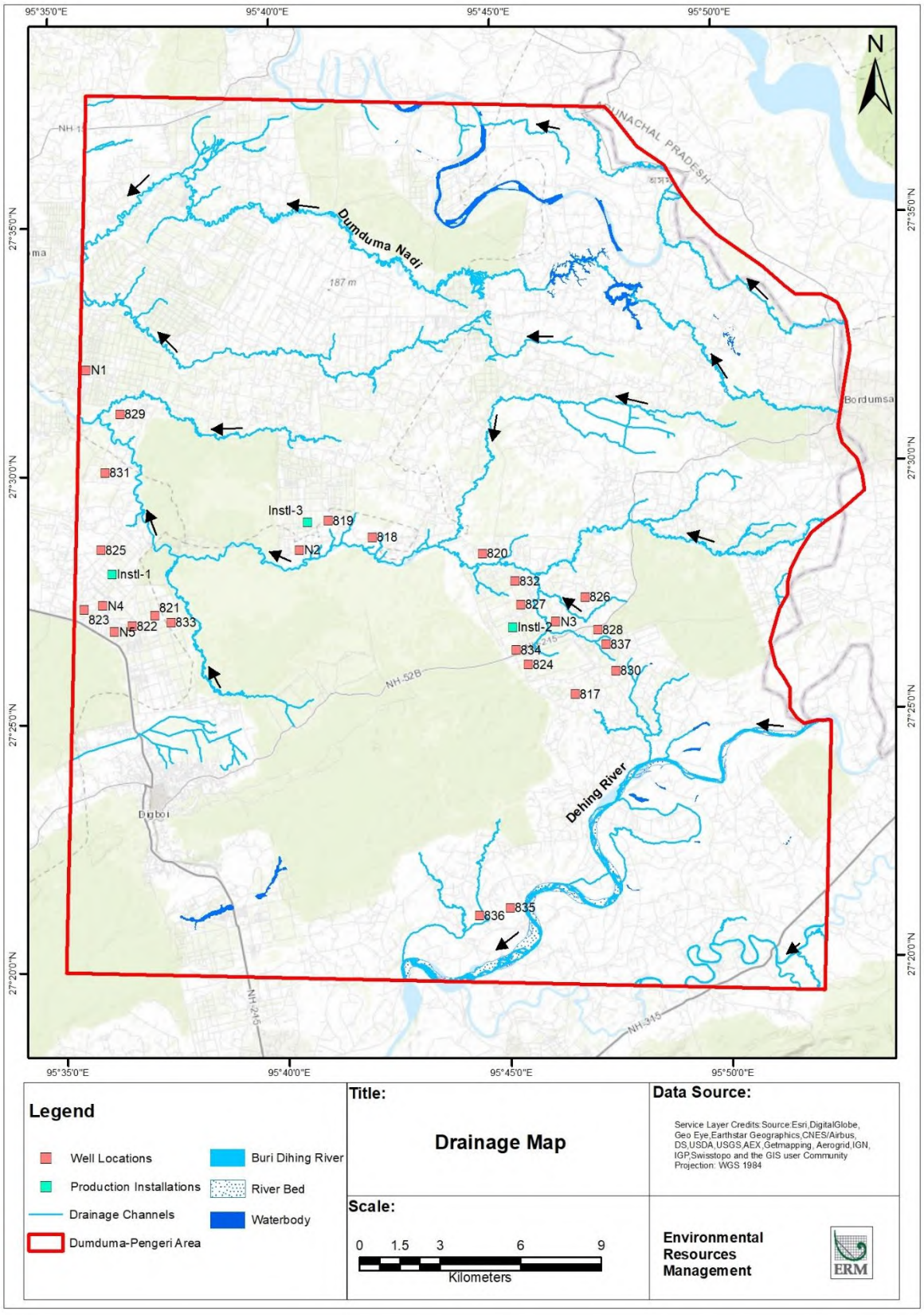
Conclusion

The concentration of all the parameters analysed were within the acceptable limit of IS: 10500, 2012 standard. Absence of coliform indicates that, the water is safe to consume for drinking purpose.

3.3.9 Drainage

The Dumduma-Pengeri Area lies in the catchment of Buri Dihing River and Noa Dehing River. Buri Dihing is the main river in the Dumduma Pengeri Area which flows at the south east corner of the area from south east to south direction. The river meets with Brahmaputra River near Dibrugarh Town. The course of the Noa Dehing River flows outside the Block from west of south east. Other major streams in the Dumduma-Pengeri area include Dumduma River. The major and minor rivers, their tributaries draining through the study area is provided in **Figure 3.14.**

Figure 3.14 Drainage in the study area



3.3.10 Surface Water Quality

Surface water has been monitored at 4 locations within the study area. The sampling locations have been designed to capture the water quality of the water bodies within the study area that could be impacted due to the proposed drilling at the designated surface locations. The surface water monitoring locations in detail has been provided in **Annexure 3.2** and the locations are shown in **Figure 3.3.**

Water sampling and analysis[1] was done during November 2018 following CPCB standard guidelines for physical, chemical and bacteriological parameters. Field parameters viz. temperature, pH, dissolved oxygen were analysed at the site. The results of the samples collected from the ponds in the study area have been discussed below with respect to CPCB's Water Use Criteria as provided in **Annexure 3.10**.

Surface water Monitoring Results

The surface water primary monitoring results have been provided in **Annexure 3.11.**

Interpretation of Surface water Monitoring Results

Results of the water quality sampled in Buri Dihing River, Dibru River etc. are discussed below:

- pH – The pH value of the samples collected from varied between 6.8-7.6;
- Dissolved Oxygen (DO)–DO concentrations of water samples ranged between 6.2 mg/l and 6.8 mg/l;
- Biochemical Oxygen Demand (BOD) – The concentration of BOD for surface water samples were ranged between <2.0 mg/l – 2.8 mg/l;
- Chemical Oxygen Demand (COD) – The concentration of COD for the all the samples ranged between 5.6 to 10.6 mg/l;
- Free Ammonia - The concentration of Free Ammonia were found to be less than 0.1 mg/l for all the samples.
- Boron- Boron concentrations for all samples were found to be less than 0.5 mg/l.
- Sodium Absorption Ratio (SAR) - Sodium absorption ratio for the samples varied between 0.13 (Burhi Dihing River) and 0.40 (Nala of Upper Dihing RF).
- Concentrations of phenol (<0.001 mg/l), were found to be below detection limit for all the samples
- Concentration of metals like lead (<0.005 mg/l), mercury (<0.001 mg/l), cadmium (<0.001 mg/l), total chromium (<0.01mg/l) were found to be below detection limits for all the samples.
- Arsenic – The concentration of Arsenic were found to be less than 0.005 mg/l.
- Oil and grease – The concentration of oil and grease at all the water samples were found to be less than 1.4mg/l.
- Concentrations of phenol (<0.001 mg/l), were found to be below detection limit for all the samples
- Concentration of metals like lead (<0.005 mg/l), mercury (<0.001 mg/l), cadmium (<0.001 mg/l), total chromium (<0.01mg/l) were found to be below detection limits for all the samples.

[1] http://www.cpcb.nic.in/latest/guidelines-water.doc

- Total Coliform – The load of total coliform was reported highest in Dibru River (50MPN/100 ML); followed by Burhi Dihing River (34MPN/100ML). Total coliform levels at Nala with Upper Dihing river and Dibru river near Samdang TE were reported 33MPN/100ML and 30 MPN/100 ML respectively. Faecal coliform was detected at all the surface water samples.

The river water in the area is used for the purpose of bathing and washing clothes (Class B of Designated Best Use Category of CPCB) and also for catching fish. Due to presence of Total Coliform Organisms in numbers less than 50 MPN/100 ml, the Buri Dihing river water sample is found to suitable for “A” Drinking without treatment. However, drinking of river water is not practiced by the locals. The analyzed values also complies with “B” class of water, i.e. outdoor bathing.

Pictures of primary environmental monitoring conducted in Dumduma-Pengeri Area is presented in **Figure 3.15**.

Figure 3.15 Pictures of Primary Environmental Monitoring in Dumduma-Pengeri Area

Air









Surface Water





Groundwater





Soil





3.3.11 Road and Traffic Analysis

As discussed in **Section 2.3.2**., surface locations can be accessed through NH-38, Digboi-Pengeri Road. The traffic monitoring station was selected at Bogapani at the NH-38 and at Pengeri town for Digboi-Pengeri Road. Traffic survey were conducted continuously for 24 hours, one time during the study period. The traffic survey was done for both way movement of vehicles and categorized as heavy motor vehicles (truck, bus, dumper, tanker and trailer), light motor vehicle (car, jeep, van, matador, tractor, tempo and mini bus), two/three wheelers (scooter, motor cycle, auto, moped) and non-motorized vehicles (bicycle, tricycle). Summary of traffic observed in the study area is presented in **Table 3.4,** detail result is provided in **Annexure 3.12**.

Table 3.4 Traffic Values observed in the Project study area

Description	Digboi-Pengeri Road near Pengeri	NH-38 near Bogapani
Heavy Motor Vehicles (in Number), 24 hours	232	474
Light Motor Vehicle (in Number), 24 hours	433	548
Two/Three Wheelers (in Number), 24 hours	505	615
Non-motorized Vehicles	156	118
Total PCU (Nos.)/24 Hours (To & From)	2200	3380
Average PCU Flow/Hr	92	141
Max PCU (Nos)/Hr	227	290
Min PCU (Nos)/Hr	0	2
Minimum PCU Hours	01:00 – 02:00	14:00-15:00
Maximum PCU Hours	11:00-12:00	03:00-04:00

Interpretation of Traffic Survey Results

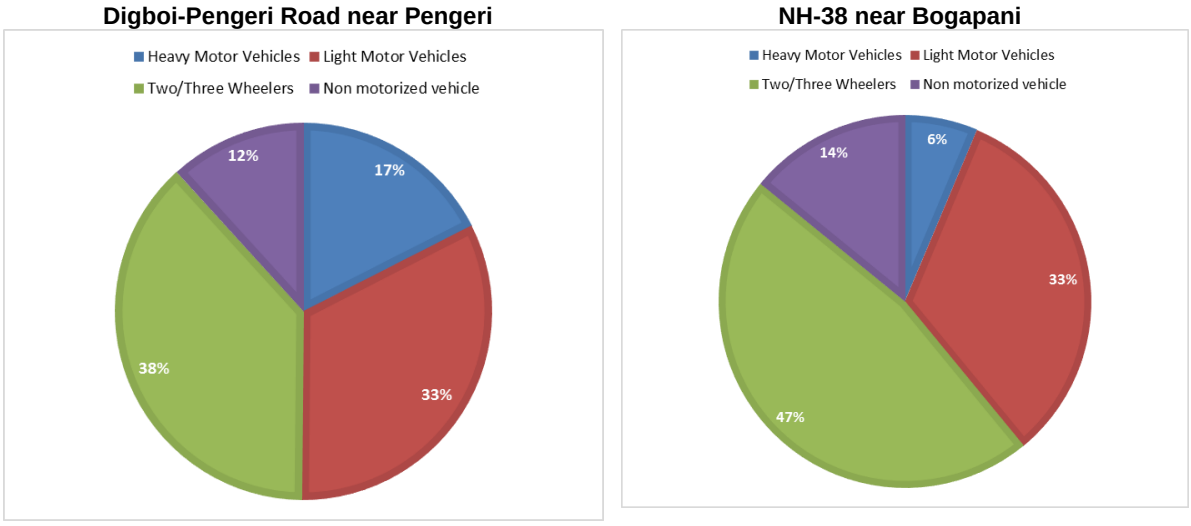
Total 2200 PCU was recorded at the traffic monitoring at Pengeri station and 3380 PCU was recorded at Bogapani station. As per observation made for traffic density, on an average 227 PCU was recorded per hour at Pengeri and 290 PCU per hour was recorded at Bogapani station.

It was also noticed that major contributor (nearly 38%) of the vehicular traffic at Pengeri was two/three wheelers followed by light motor vehicles (33%). Heavy motor vehicles (truck, bus, dumper, tanker and trailer) contribute 17% and non-motorized vehicles contribute 12% of the total vehicles.

At Bogapani station major contributor (nearly 47%) of the vehicular traffic was two/three wheelers followed by light motor vehicles (33%). Heavy motor vehicles contribute 6% and non-motorized vehicles contribute 14% of the total vehicles.

Figure 3.16 illustrates contribution of different type of vehicles towards total vehicular traffic at Talap.

Figure 3.16 Contribution of Different Type of Vehicles



3.3.12 Natural Disaster

Assam is prone to natural hazards such as earthquake, flood and cyclone.

Earthquakes

Assam lies in Zone V, the most severe seismic zone (as per Bureau of Indian Standards (BIS) 2000). The region has experienced a large number of earthquakes of tectonic origin. The risk probabilities of earthquake are less over the entire Brahmaputra valley. Two major earthquakes of magnitude 8.7 (occurred in 1897) and 8.6 (occurred in 1950) causing large scale damage to lives and properties in this region.

Flood

In Tinsukia district, the areas near the Brahmaputra River are Flood Prone. The locations in Dumduma-Pengeri area are reportedly in flood prone areas.

3.4 Biological Environment

3.4.1 Introduction

The State of Assam is located in the Bio-geographic zone of both 9A: Brahmaputra Valley and 9B-North-East Hills and is extremely rich in bio-diversity. Situated in the Indian sub-region of Oriental Zoo-geographic region, local flora and fauna bear a very close affinity and resemblance with floral and faunal components of Indo-Malayan and Indo-Chinese sub-regions.

3.4.2 Objectives

Primary ecological surveys were conducted as a part of this EIA with the following objectives:

Flora

- Identification of floral species (terrestrial and aquatic), sensitive habitats, endangered species and forest land falling within the Dumduma-Pengeri Area;
- Classification of flora for any endangered or protected species or endemic floral species prevailing in the Block based on field surveys;
- Identification of areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value; and
- Identification of aquatic flora in the water bodies falling in the study area.

Fauna

- Identification of fauna (specifically amphibians, birds, mammals and reptiles);
- Identification and classification of any species recognized as threatened (in accordance with International Union for the Conservation of Nature [IUCN] Red List ver. 2020-3), or according to the schedules of the Wildlife (Preservation) Act 1972 and amendments);
- Identification of areas which are important or sensitive for ecological reasons including their breeding, nesting, foraging, resting, over wintering areas including wildlife migratory corridors /avian migratory routes; and
- Identification and assessment of aquatic ecological resources within the study area.

3.4.3 Methodology

Desktop Review & Secondary Data Collection

A desktop review (published document, etc.) was conducted to determine the forest area (Toposheet and Satellite imagery), vegetation type (Champion and Seth, 1968), floral and faunal assemblage in the study area.

Secondary baseline data regarding sensitive ecological habitat (National Park, Sanctuary, Ecological Sensitive Area, Migratory Corridor, etc.), flora & fauna in the study area, forest cover was collected for Forest Working Plans; and other publish and unpublished documents. Stakeholder consultations (Forest Department, Local People etc.) were also carried out to understand the major flora & fauna in the study area, pressure on forest resources, presence of any Schedule I species.

Primary Biological Environment Surveys

Biological environment survey was carried out to determine the existing ecological conditions and was designed to fill any data gaps, and to facilitate an adequate assessment of the Project related adverse impacts upon ecology and the development of appropriate mitigation measures. Baseline survey was conducted during December 2017 for habitat survey, flora & faunal assemblage within Dumduma Pengeri Area.

Biological environment survey also included the targeted study area for habitats (terrestrial and aquatic), identification of floral and faunal species (terrestrial and aquatic) and related sensitivities i.e., within i.e. within 1 km of the proposed well sites and production facilities.

Floral Analysis

Twenty (20) sample plots were studied covering various habitats within Dumduma-Pengeri Area which include 4 plots each in all the five major habitats viz. in tea garden areas, homestead plantation areas, riparian vegetation areas, agricultural lands and forest areas.

Quantitative data was collected using standard quadrate methods of sample plot size 10 m x 10 m for trees, 5 m x 5 m for shrubs and 1 m x 1 m for herbs and grasses. Frequency, Density, Abundance and IVI were calculated. Sample plot is described in **Annexure 3.13**.

Species diversity was calculated based on Shannon Weiner Index(1) for the trees, shrubs and herbs.

Phyto-sociological Analysis

Phytosociology provides frequency, abundance, density and Important Value Index (IVI) of plant species. Formulae used for calculating IVIs are provided in **Annexure 3.14**.

Faunal Analysis

Faunal species from the study area were recorded based on direct sightings, indirect evidences such as dung, droppings, scats, pugmarks, scratch signs, burrows, nests etc. and consultation with Forest Department officials and local community. During consultation with communities, pictorial representations of species were used in form of field guides.

Herpetofauna*:* Sampling for reptiles was conducted during early morning hours and at night, while sampling for amphibians was conducted along edges of water bodies, primarily in the dusk hours. Night drives were undertaken in search of reptiles and amphibians on the road. Standard, updated literature was used to identify the reptiles and amphibians in the field[2].

Avifauna: Birds were surveyed at fixed locations in the forest areas, scrub land and agricultural habitats, and at waterbodies in the study area. Binoculars and standard field guides were used[3].

Mammals: Mammal surveys were conducted along motorable roads and trails, near waterbodies using both direct and indirect (pellets, tracks and scats) sources of evidence. Discussion with local villagers and forest department officials was also conducted to obtain information on mammalian species in the study area. Standard literature was used to identify the mammals[4]. Forest Working Plan was also consulted for determination of prevailing mammalian fauna in the area.

(1) Shannon CE & W Weaver 1949 The Mathematical Theory of Communication. University of Illionis Press. Urbana, IL USA.
[2] Daniels J.C. The Book of Indian Reptiles and Amphibians.
[3] Grimmet, R. Inskipp, C. and Inskipp, T. 2013. Birds of the Indian Subcontinent - Second Edition. Published by Christopher Helm, 49-51 Bedford Square, London.
[4] Menon, V. 2003. A field guide to Indian Mammals. Dorling Kindersley (India) Ltd. New Delhi, 201 p

Fish: Fish species of commercial and livelihood importance were assessed based on discussion with local fishermen and from published literatures[1].

Plankton: Planktonic samples were collected by using plankton net of 60 micron mesh size by filtering 50 L water. Samples were then preserved in formalin (5% concentration) for laboratory analysis of species diversity and load (Number/litre). Plankton were identified following Edmondson (1992)[2], Eaton *et al.* (2005)[3], Michael and Sharma (1990)[4] and Battish (1992)[5].

3.4.4 Terrestrial Ecosystem

3.4.4.1 Forest Resources

The Dumduma-Pengeri Area is located in Tinsukia district. Tinsukia district has 1536 sq. km under the forest cover, i.e. 40.53 percent of its total geographical area (State of Forest Report 2011, FSI). The notified reserve forest area falling within the Block are area are the Upper Dehing Reserve Forest, Digboi Reserve Forest, Doomdooma RF, Tarani R.F, Nalani R. F, Takauni R. F., Burhi Dihing R.F., Kotma R.F., Duarmara R. F., Korapani R. F. etc.

OIL will drill 26 onshore wells, 3 Nos. of production installations and assorted Oil & Gas flowlines /delivery lines (from 50mm to 300mm NB) of total length 100km. in Dumduma-Pengeri Area.

3.4.4.2 Flora

Forest Vegetation

Owing to the climate of the region, vegetation type present in the study area is described below.

1/3/3C/C3b East Himalayan moist mixed deciduous forests: This forest is mainly characterized by a tall more or less closed forest in which the individual trees often of quiet large size. Community is mostly well mixed but there is a dominance of deciduous species that grows on well drained soil. There is an abundant undergrowth of mostly shrubs but no grass unless burnt. With burning grass many become abundant with coarse tufted species absent. This type of forest can be found in Reserve Forests in Doomdooma tehsil. Some of the species that can be found in this forest are *Lagerstroemia* sp.*, Terminalia bellerica, Amoora* sp. etc.

Floral Diversity

Due to diverse physiography, edaphic and climatic condition, Assam boasts of profuse diversity of floristic elements.

[1] Deori D.J., Abujam S. and Biswas S.P. 2015. Fish diversity and habitat ecology of Dihing River - A tributary of Brahmaputra River. International Journal of Fisheries and Aquatic Studies 2015; 2(4): 190-197
[2] Edmondson, W.T. (1992). Fresh water Biology (Ward and Whipple). International Books and Periodicals Supply Service, New Delhi.
[3] Eaton, A.D., Clesceri, L. S. & Greenberg, A. E. (1995). Standard Methods of the Examination of Water and Wastewater. American Public Health Association. Washington D.C.
[4] Michael, R. J. & Sharma, B.K. (1988). Fauna of India and adjacent countries, Indian Cladocera (Crustacea: Brachiopoda: Cladocera). The Technical & General Press, India, Calcutta.
[5] Battish, S.K. (1992). Freshwater Zooplankton of India, Oxford and IBH publishing Co, Pvt. Ltd., New Delhi.

Man Made Forest and Non-Forest Vegetation:

Vegetation was also recorded in the non-forest area of the Dumduma-Pengeri Area. Tree species in these sites are mostly planted and few are natural. The village woodlot, road side plantation and riparian vegetation are recorded in the study area, these are as follows:

Road side Plantation: Trees planted along the major roads in the study area. Some important tree species are *Alstonia scholaris, Aegle mermelos, Melia azedarach, Bombax ceiba, Ficus religiosa, Lagerstroemia speciosa*.

Village Woodlot: Naturally or planted trees on community or private land. Bamboo and timber woods are planted in this area. Some important tree species are *Mangifera indica, Bambusa sp., Delonix regia, Ficus benghalensis, Ailanthus grandis, Ficus religiosa, Syzygium cumini, Gmelina arborea,* etc.

Tea Garden &Shade Tree*:* Most of the tea gardens have shade trees and plantation along the garden roads. These are mostly nitrogen fixing plant species, viz. *Albizia* sp. *Cassia siamea*, *Shonka arvenis* etc.

Riparian Vegetation: Vegetation along river bank, major plant species are *Syzygium cumini Anthocephalus sinensis, Alstonia scholaris, Bombax ceiba, Ficus hispida*, etc.

Figure 3.17 Photographs of Different Type of Habitats in the Study Area



Homestead Plantation



Tea Estate



Riparian Vegetation



Agricultural Land



Forest Areas

Floral Diversity

Floral diversity in the study area is moderately rich although natural vegetation is prominently disturbed by human interferences. 253 numbers of plant species was reported from the area, which includes 129 species of trees, 68 species of shrubs and herbs, 8 species of climbers, 16 species of grasses and 32 species of epiphytes. The detailed listing of floral species recorded in the study area is given in **Annexure 3.15**.

Endemic, Threatened & Endangered Floral Species

The Wildlife (Protection) Act 1972 prohibits picking, uprooting, damaging, destroying, acquiring or collecting six species of plants from forest land and any area specified, by notification, by the Central Government [Clause 17A of Chapter IIIA (Protection of Specified Plants), page 346 of Handbook Vol. 1]. The six species are: Beddome's cycad (*Cycas beddomei*), Blue Vanda (*Vanda coerulea*), Kuth (*Sassurea lappa*), Ladies slipper orchids (*Paphiopedilum* spp.), Pitcher plant (*Nepenthes khasiana*), Red Vanda (*Rananthera imshootiana*). None of these species is recorded in the forests of the study area during the EIA.

Phytosociological Analysis

Trees:

Out of the total 5 enumerated tree species from Tea plantation maximum relative density and IVI values were observed for *Albizia lebbeck (*RD-30.0/IVI-78.6*)*, followed by *Albizia chinensis* (RD-16.4/IVI-38.4) .

Out of the total 15 enumerated tree species from homestead plantation maximum relative density and was observed for *Areca catechu* (RD-16.13), followed by *Musa sp*. (RD-12.90), and *Melia azedarach* (RD-12.90). Highest IVI value was recorded for *Ficus religiosa* (IVI-40.7), followed by *Melia azedarach* (IVI-27.9) and *Musa* sp. (IVI-22.8)

Out of the total 5 enumerated tree species from Riparian vegetation maximum relative density and IVI values were observed for *Syzygium cumini* (RD-30.0/IVI-64.6).

Out of the total 7 enumerated tree species from agricultural land maximum relative density and IVI values were observed for *Bombax ceiba* (RD-23.08/IVI-49.9) followed by *Ailanthus grandis* (RD-23.08/IVI-45.0) and *Dillenia indica* (RD-14.0/IVI-30.4).

Out of the total 10 enumerated tree species from Forest area maximum relative density and IVI values were observed for *Bombax ceiba* (RD-17.86/IVI-44.2) followed by *Dipterocarpus macrocarpus* (RD-14.29/IVI-33.0) and *Mesua ferrea* (RD-14.29/IVI-23.4).

The list of tree species and their ecological parameters are given in **Annexure 3.16.**

Shrubs:

Shrubs in the study area were represented by 17 species. *Camelia sinensis* was found to be the most dominant species having highest relative density as recorded at Tea Plantation. *Lantana camara* had the highest relative density and RVI values in riparian and agricultural habitats. *Clerodendron odoratum* had the highest RVI value for homestead plantation. *Clerodendron viscosum* and *Nerium indicum* had the highest density and RVI values for forest areas.

The list of shrub species and their ecological parameters are given **Annexure 3.16.**

Herbs and Grass:

Herbs and grass species in the study area are represented by 18 species. *Dryopteris filix-mas* was found to be the most dominant herb species in agricultural land and forest areas. *Colocasia esculenta* was found to be the most dominant species in tea gardens, *Solanum indicum* in homestead plantation and *Eupatorium odoratum* in riparian vegetation areas.

The list of herbs and grass species and their ecological parameters are given in **Annexure 3.16**.

Species Richness

The species richness of the different habitats were calculated based on total number of species. Species richness was highest for forest (36 plant species) followed by homestead plantation (34 plant species). Species richness was lowest for tea plantation with 11 plant species.

Species Diversity

The species diversity (1) is calculated based on Shannon Weiner Index (H'). The H' values calculated for different habitat types are presented in **Table 3.5.** Highest diversity value was observed for Homestead plantation (H'=3.34) followed by Forest (H'=3.24), Riparian vegetation (H'=2.52), Agricultural land (H'=2.49), and while Tea plantation (H'=1.10) showed the minimum value.

Table 3.5 Species Richness and diversity within Study Area

S No.	Habitat Type	Total no. of plots studied	Species Richness	Shannon Weiner Index (H')
1	Tea Plantation	4	11	1.10
2	Homestead Plantation	4	34	3.34
3	Riparian Vegetation	4	14	2.52
4	Forest	4	36	3.24
4	Agricultural land	4	15	2.49

The Importance Value Index gives an overall estimate of the influence of importance of a plant species in the community. All the habitat types showed high H' values except the tea plantation area which indicate diverse plant communities.

(1) On the diversity scale, biologically r3ealistic H' values range from 0 (only one species present with no uncertainty as to what species each individual will be) to about 4.5 (high uncertainty as species are relatively evenly distributed). In theory, the H' value can be much higher than 4.5, although most real world estimates of H' range from 1.5 to 3.5

Fauna

Wildlife Habitat

A significant part of the study area falls within the newly designated Dehing Patkai National Park. which includes Dehing Patkai Wildlife Sanctuary and Upper Dehing Reserve Forest. Dehing Patkai National Park is located at the south western corner of the Block, However, the nearest well is located 11.0 km from Dehing Patkai National Park (refer **Box. 3.3**). Two Elephant Corridors between Upper Dihing R. F. East and West Blocks at Bogapani and Golai-Powai and also the Kotha-Buridihing Elephant Corridor are located within the Dumduma Pengeri Area (details provided in **Box. 3.2**). Apart from the protected areas tea garden plantation covers huge tracts of land within the study Area as well as in the surrounding region. As tea gardens have very low human population density and settlement within them are isolated and patchy, tea gardens acts as wildlife movement corridor between isolated protected areas, as well as habitat for huge diversity of avian fauna and even large cats like leopards. Four Important Bird Areas (IBA) are also located within the Dumduma Pengri Area.

The eco-sensitive map of study area along is shown at **Figure 3.18**.

Box 3.1 Dehing Patkai National Park

The Sanctuary with an area of 234.26 sq. km. is located in Dibrugarh and Tinsukia districts and is famous for Assam Valley Tropical Wet Evergreen Forests bordering Arunachal Pradesh. It includes part of Jeypore RF, Upper Dihing RF and is part of the Dihing-Patkai Elephant Reserve. The Dehing Patkai forms the largest stretch of tropical low-land rainforests in India.

The different trees of this four layered rainforest are laden with many exotic species of orchids. There is an abundance of ferns, epiphytes, Wild Banana, orchids, Arums, climbers and lianas in this humid forest habitat. Some of the importance tree species found in this forest area are – Hollang, Mekai, Dhuna, Udiyam, Nahar, Samkothal, Bheer, Hollock, Nahor, Au – tenga (elephant apple), different species of Dimoru etc. The towering Hollong tree which is also the state tree of Assam dominates the emergent layer of this rainforest. The forests are wet tropical evergreen Assam valley forests. The important species of overwood are *Dipterocarpus mncrocarpus, Mesua ferrea, Castanopsis indica, Shorea assamica, Vatica lanceaefolia, Amoora wallichii, Dysoxylum hinectiferum etc.* The other species found in under storey are *Garcinia lanceaefolia, Michelia muni, Baccaureu supida, Bischqfia javanica, Myristica limifolia* etc. The shrub and herb layer has *Glochidion* spp., *Alpinia* spp., *Mallotus philippinensis*, Wild Banana, Tree fern, Pepper etc. The ground cover mainly has *Melanstoma*, *Leea* and other species. So far, 101 species of orchids within 45 genera have been recorded there. Of these, 79 are epiphytic, 21 are terrestrial and 1 species is a saprophyte. Eight of the species found here are critically endangered, 15 species are endangered, 5 species are near threatened and 28 species are in the vulnerable category.

Huge diversity of Mammals of Oriental as well as Malayan origin can be found in this WLS, like Chinese pangolin, Flying fox, Slow loris, Stump-tailed macaque, Assamese macaque, Rhesus macaque, Capped langur, Hoolock gibbon, Malayan Sun bear, Hog –badger Wild pig, Sambar, Barking deer, Gaur, Serow, Malayan giant squirrels, Porcupine, Pig-tailed macaque [1]etc. More over recent camera trapping in Dehing Patkai WLS have confirmed the co existence of seven wild cats in the forest of this region, namely clouded leopard (*Neofelis nebulosa*), marbled cat (*Pardofelis marmorata*), and golden cat (*Catopuma temminckii*), tiger (*Panthera tigris*), leopard (*Panthera pardus*), leopard cat (*Prionailurus bengalensis*), and jungle cat (*Felis chaus*).

Birds like Lesser Adjutant Stork, White Winged Wood duck, White-backed Vulture, Slender-billed Vulture, White cheeked Hill Partridge, Khaleej Pheasant, Grey Peacock-Pheasant, Rufus necked Hornbill, Wreathed Hornbill, Great Pied Hornbill, Beautiful Nuthatch, Black-browed Leaf Warbler, Green Imperial Pigeon, Purple wood or Pale capped Pigeon etc. can be found in this forest.

Source: A study on the road-kill herpetofauna of Jeypore Reserve Forest, Assam NeBIO I An international journal of environment and biodiversity Vol. 5, No. 1, February 2014, 78-83 ISSN 2278-2281(Online Version) .Mazedul Islam and Prasanta Kumar Saikia

[1] Dehing Patkai Wildlife Sanctuary, Department of Environment & Forests, Govt. of Assam

Elephant Corridor

Dehing Patkai Elephant Reserve – Dehing Patkai Elephant reserve[1] falls within the Eastern South Bank Landscape of Elephant range in India. The Eastern South Bank occupy about 4500 sq. km of forest on the Southern bank of Brahmaputra River. 937 sq. km of forest land within Tinsukia and Dibrugarh district adjoining Arunachal Pradesh and Nagaland was declared Dehing Patkai Elephant Reserve on 17th April 2003. The Elephant reserve gets its name from the two most dominant geographical features in the landscape, the Buri Dehing River and the Patkai Hills. Dehing Patkai Wild life Sanctuary, Upper Dehing West and East Block Reserve Forest and Digboi Reserve Forest are part of the Dehing Patkai Elephant Reserve. According to the 2005 elephant population census, 295 elephants were found in the Dehing Patkai Elephant Reserve. Elephants from Digboi Forest Divisions move to forest areas of Changlang district of Arunachal Pradesh near Buri Dihing River. Movement between Upper Dihing East and West block takes place mainly through tea gardens and agricultural land. There are two elephant corridors between Upper Dehing East Block and Upper Dehing West Block viz. Bogapani and Golai Powai located at the western side of the Dumduma-Pengeri Area. Apart from that another elephant corridor viz. Kotha-Buridihing is located at the eastern part of Dumduma-Pengeri Area. Description of the corridors from Right of Passage (2017)[2] is presented in ***Box. 3.2***.

Box 3.2 Elephant Corridors within Dumduma-Pengri Area

Elephant Corridor- Upper Dihing East-Upper Dihing West Block at Bogapani: This corridor is in Digboi Forest Division. Elephants move through Bogapani Tea Gardens, agricultural fields and human habitations once they have crossed NH 38 and the railway track near Ramnagar village. This railway track along with the national highway, is a major impediment to elephant movement in the corridor. The length and width of the corridor is 2.5-3.0 km and 0.5-1 km respectively. The frequency of usage of the corridor by elephant is Regular (Seasonal; September to February).

Elephant Corridor- Upper Dihing East-Upper Dihing West Block between Golai-Powai: This corridor facilitates elephant movement between the Upper Dihing East and West blocks. The length and width of the corridor is 3 km and 0.5 km respectively. The frequency of usage is regular but minimised (Bulls and herds). A boundary wall had been constructed for the Indian Oil Corporation (IOC) terminal adjacent to the corridor. The wall inside the corridor area was later demolished to facilitate elephant movement after the state and central governments, locals and NGOs raised objections.

Elephant Corridor- Kotha-Buridihing: This corridor connects the Kotha Reserve Forest (Digboi Forest Division) and adjacent elephant populations of Changlang district of Arunachal Pradesh with the Burihiding Reserve Forest (Doomdooma Forest Division), thereby maintaining a linkage with the Terai Reserve Forest, Kakojan Reserve Forest and Nalani Reserve Forest. Elephants cross the Burihiding River near the Kotha Kakharani settlement and pass through small tea gardens and agricultural land to enter Burihiding Reserve Forest. The length and width of the corridor is 3 km and 1-1.5 km respectively. The frequency of usage of the corridor by elephant is occasional.

The mammalian species recorded during primary survey or reported by the local villagers and forest department personnel from within 1 km of the proposed drill sites and production installations are presented at **Annexure 3.17** along with detailed list of mammalian species of the study area.

[1] The report of the Elephant Task Force, Ministry of Environment and Forests, August 31, 2010.

[2] Right of Passage (2017).Elephant Corridors of India [2nd Edition]. Menon, V, Tiwari, S K, Ramkumar, K, Kyarong, S, Ganguly, U and Sukumar, R (Eds.). Conservation Reference Series No. 3.WIldlife Trust of India, New Delhi.

Important Bird Areas

Upper Dihing (East) Complex Important Bird Area

This IBA is located at the central portion of the Dumduma-Pengeri Area. Upper Dihing (East) Complex includes four reserve forests, namely Upper Dihing (East Block) RF including the area leased to oil fields (13,168 ha), Kakojan RF (2,345 ha), Duarmara RF (653 ha), and Torani RF (2,040 ha). The Upper Dihing (East Block), Kakojan, and Digboi Oil Field areas are contiguous, while Torani and Duarmara are isolated areas some distance away. These are among the last remaining patches of Tropical Evergreen Forest of some significance in Assam. The IBA area consists of slightly undulating plains. Dibru, the main river, flows through the Upper Dihing and Kakojan Reserve Forests. Many small perennial streams criss-cross the area, notably Kharjan River. Small pools and natural or artificial swampy areas are also present in the forest. These forests are globally important, as a sizeable number of the White-winged Duck (*Asarcornis scutulata)* is found here (Choudhury 1996, 1998). The vegetation of the site is mainly Tropical Wet Evergreen Rain Forest type. About 300 species of birds are reported from the site. Mammalian fauna includes Asian Elephant (*Elephas maximus),* Leopard (*Panthera pardus)*, Western Hoolock Gibbon (*Hoolock hoolock)*, Capped Langur (*Trachypithecus pileatus)*, Rhesus Macaque (*Macaca mulatta)*, Pig-tailed Macaque (*M. nemestrina)*, Slow Loris (*Nycticebus bengalensis)*, Malayan Giant Squirrel (*Ratufa bicolor)*, Common Giant Flying Squirrel (*Petaurista petaurista)*, Barking Deer or Indian Muntjac (*Muntiacus muntjak*).

Upper Dihing (West) Complex Important Bird Area

Section of this IBA is located within the western part of Dumduma-Pengeri Area. This complex includes six Reserve Forests and three proposed Reserve Forests, all contiguous. The areas constituting this IBA are Upper Dihing (c. 22,000 ha), Joypur (c. 8,870 ha), Dilli (3,030 ha), Makumpani including additions (538 ha), Desali (200 ha), and Digboi (West Block) (929 ha). Together with the adjacent Dihing-Patkai Wildlife Sanctuary, they form the largest contiguous tropical rainforest area extant in the whole of Brahmaputra Valley. Burhi-Dihing is the main river flowing through the site. Other notable rivers are Disang or Dilli, Namsang, and Digboi. Many small perennial streams criss-cross the area; noteworthy among them are the Janglu and Pawoi nullahs. The forests, especially Upper Dihing (West Block), have the largest known population of the globally Endangered Whitewinged Duck. This area is also rich in primates. The vegetation of the site is mainly Tropical Wet Evergreen Rain Forest type. About 300 species of birds are reported from the site.

Tirap-Burhidihing Important Bird Area

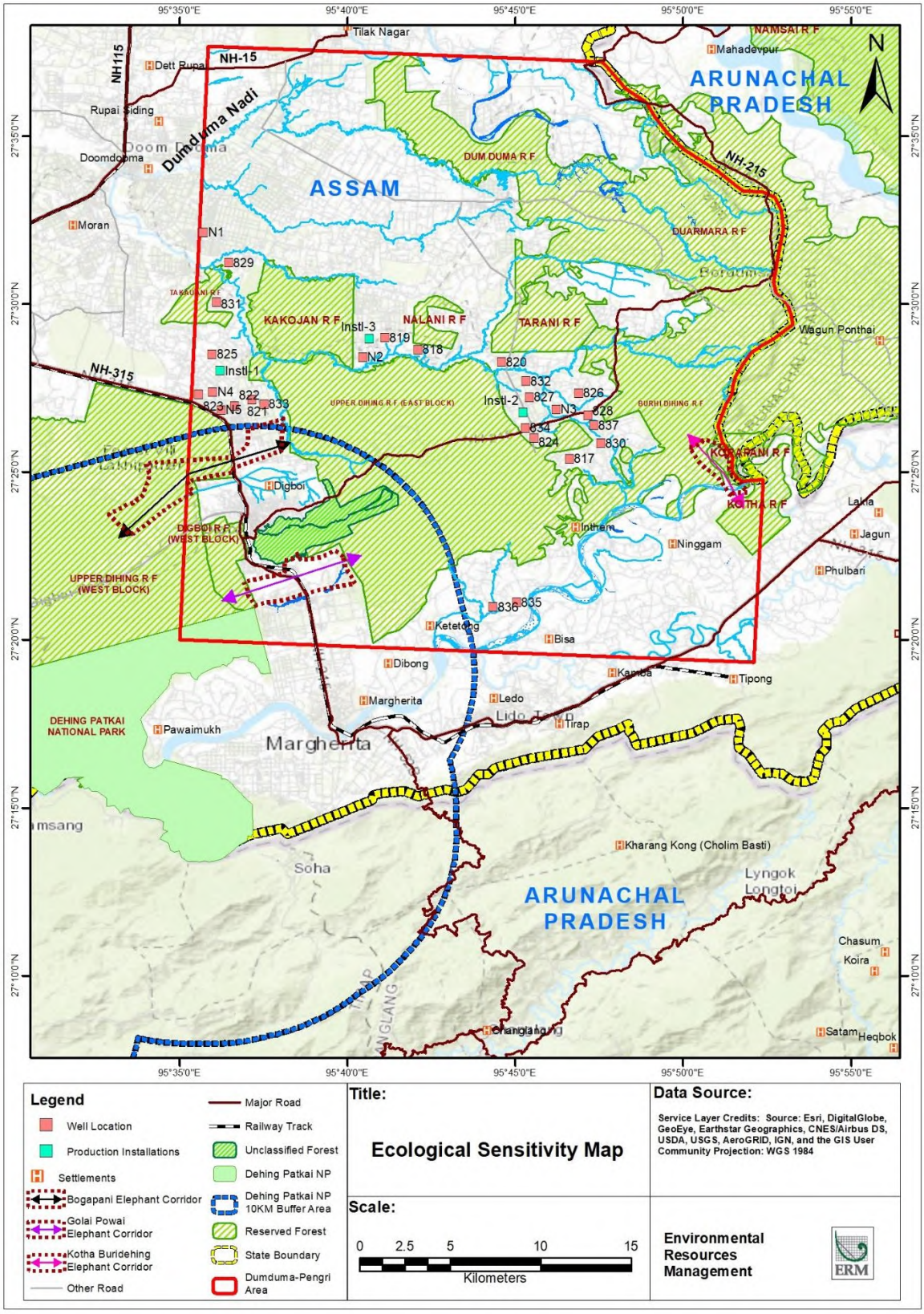
Section of this IBA is located within the eastern part of Dumduma-Pengeri Area. The reserve forests are Burhidihing North and South Block (2,295 ha), Kotha (1,130 ha), Namphai (2,100 ha), Tinkopani (3,030 ha), Tirap (1,454 ha), Tipong (445 ha), and additions to Tirap and Tipong (4, 995 ha). All these areas bear tropical rainforest and are known strongholds of the Endangered White-winged Duck. The Masked Finfoot (*Heliopais personatus*) has been reported. These forests are also rich in primates and other wildlife.

Dum Duma, Dangori & Kumsong Reserved Forest Important Bird Area (IBA)

Three reserve forests in Tinsukia district, in eastern Assam, Dum Duma (2,880 ha), Dangori (920 ha), and Kumsong (2,250 ha), constitute this IBA. Partially this IBA is located at the northern portion of the Dumduma Pengri Area. Rainforest dominated by Hollong (*Dipterocarpus macrocarpus)* on flat plains. All these areas are surrounded by tea gardens and human settlements. These forests are known for their population of Endangered (IUCN v2020-3) White-winged Duck (*Asarcornis scutulata)*, but are also important for other wildlife, especially primates. This site has been selected as an IBA as it is one of the most important areas for the long-term protection of the White winged Duck. The site is important for rainforest birds. More than 100 species have been recorded, but more are likely to occur

(A.U. Choudhury, *pers. comm*. 2002). Mammalian fauna includes Leopard (*Panthera pardus)*,Western Hoolock Gibbon (*Hoolock hoolock)*, Capped Langur (*Trachypithecus pileatus)*, Rhesus Macaque (*Macaca mulatta)*, Pig-tailed Macaque (*M. nemestrina)*, Slow Loris (*Nycticebus bengalensis)*, Malayan Giant Squirrel (*Ratufa bicolor)*, Common Giant Flying Squirrel (*Petaurista petaurista)*, Barking Deer or Indian Muntjac (*Muntiacus muntjak).*

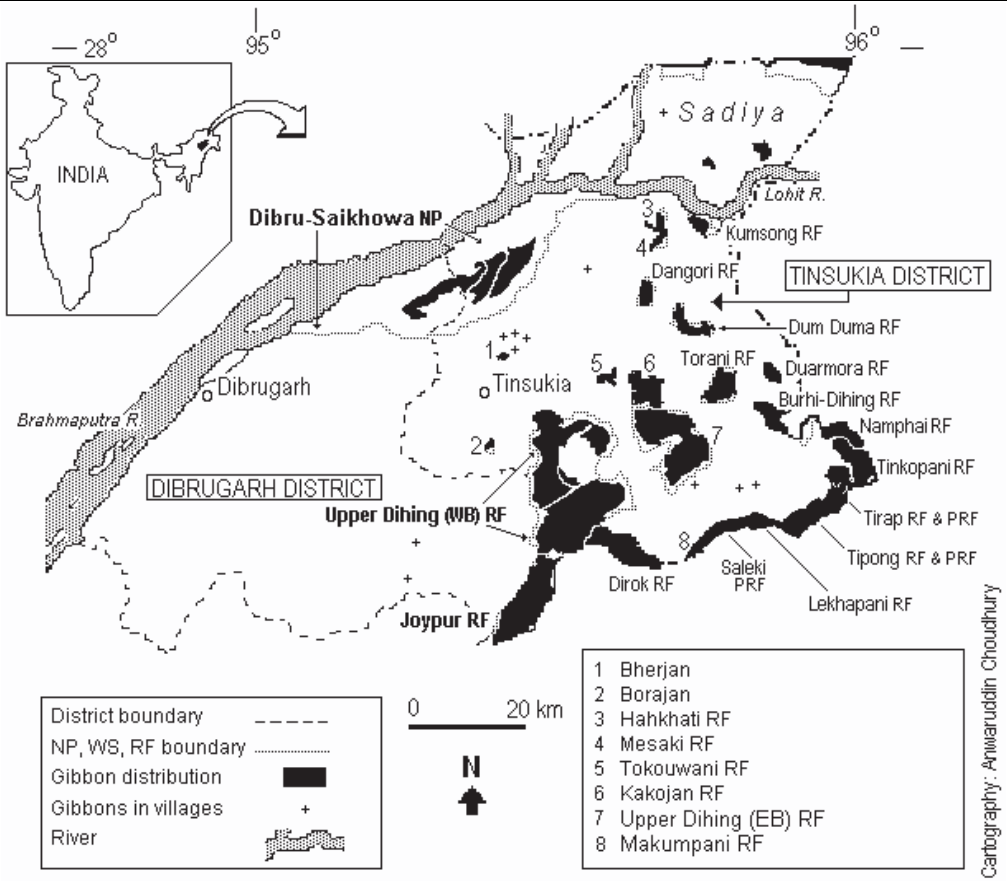
Figure 3.18 Sensitive Ecological Habitat Map



Mammals

Primate Habitat: The tropical wet evergreen forests provide an ideal habitat for primate species. Within the study area Hoolock gibbon (*Hoolock hoolock*) population is present within the Dehing Patkai WLS, Upper Dehing reserve Forest areas. In the Reserve Forest and Wildlife Sanctuary other primates like Assamese macaque (*Macaca assamensis),* Pig tailed macaque (*Macaca nemestrina),* Rhesus macaque (*Macaca mulatta),* Capped Langur (*Presbytis pileatus),* are also reported. Species which are not strictly confined to top canopy like Rhesus macaque and Assamese Macaque can be found throughout the study area, including in proximity to the settlements.

Figure 3.19 Hoolock gibbon habitat in Tinsukia and Dibrugarh districts



Carnivores: The lesser carnivores like, Leopard Cat (*Prionailurus bengalensis*), Jungle Cat (*Felis chaus*), Large Indian Civet (*Viverra zibetha*), Small Indian Civet (*Viverricula indica*), Indian Fox (*Vulpes bengalensis*), Common Mongoose (*Herpestes edwardsi*), small Indian Mongoose (*Herpestes auropunctatus*) etc. has been reported in the Forest Working Plan and reported by the locals. Larger carnivore like Leopard (*Panthera pardus*) has been also reported by the locals during consultation and recorded at the Forest Working Plan. A large portion of the study area is under tea garden plantation. These large tea garden plantations also act as leopard habitat. Leopards prefer residing in surrounding tea gardens where prey in the form of dogs and livestock is available.

Herbivores: Elephants are herbivores that favour bamboo, berries, mangoes, bananas, shrubs, fruits etc. They prefer thick forests with abundant food and shade. They also like muddy areas and swamps. The DPNP including the Dehing Patkai Wildlife Sanctuary and it surrounding reserve forest areas have a substantial population of the Asiatic Elephant (*Elephas maximus).* The Dihing Patkai Elephant Reserve with total area of 937 sq. km. and a total of 295 wild elephants. There was evidence of regular movement of elephant herds in the Upper Dihing Reserved forest of the Field.

Checklist of mammalian species reported by forest department and recorded/reported during primary survey is presented in **Annexure 3.17**.

Birds

Assam harbours a highly diverse bird life. Choudhury (2000)[1] has listed 820 bird species from the State, which include some 280 migrants from the northern latitudes. This richness and diversity in bird species is due to the fact that the northeast India and Assam in particular, is a meeting place of two zoogeographic sub regions, the Indian and the Indo-Chinese, within the framework of the Oriental (or Indo-Malayan) Zoogeographic Region (Choudhury 2000).

Primary survey within 1 km of the proposed well sites recorded 58 avian species. The list include five Schedule I species viz. Shikra (*Accipiter badius*), Black Kite (*Milvus migrans*), Black-winged Kite Common Kestrel (*Falco tinnunculus*) and Hill Myna (*Gracula religiosa*).

The checklist of avifauna recorded during primary survey from the study area is given in **Annexure 3.18**.

Checklist of avifauna reported from the Dumduma Forest division is presented in **Annexure 3.18**.

Herpetofauna

Secondary sources[2] [3] [4] indicate presence of 11 species of amphibians and 33 species of reptiles from the study area. The latter group includes species of conservation concern such as the Burmese Python, Assam Roofed Turtle. Most of the freshwater turtle species were reported from Brahmaputra River. The checklist of herpetofauna from the study area is given in **Annexure 3.19**.

3.4.5 Aquatic Ecosystem

Aquatic Habitat

The Dumduma-Pengeri Area lies in the catchment of Buri Dihing and Noa Dihing River. Other drainage channels within the area include Dumduma River.

Following aquatic ecological groups has been studied.

Macrophytes

Seasonal wetlands and marshy lands are suitable habitat for aquatic macrophytes. The most dominant macrophytes encountered during the survey are *Eichhornia Crassipes, Polygonum hydropiper, Ranunculus sceleratus, Azolla pinnata, Cleome hassleriana, Pistia stratiotes, Ipomoea fistulosa, Trrapa natans, Salvinia perpusilla, Phragmites karka,*. A total of 13 species of aquatic macrophytes were recorded from these aquatic ecosystems.

Plankton

For the study of plankton, 50 L water was filtered through plankton net. The water sample then preserved by adding formaldehyde solution and transferred to 100ml vial for microscopic analyses. Plankton genera/species recorded from the study area during primary survey is presented at the table below.

[1] Anwaruddin Choudhury.2000. The Birds of Assam. Gibbon Books. WWF North East Regional Office.
[2] Ahmed MF, Das A, Dutta SK. Amphibians and Reptiles of North East India.
[3] The Working Plan of Doom Dooma Division.
[4] Ahmed MF, Das A, Tortoises and Turtles of North East India: Saving them from Extinction. 2010.

Table 3.6 Plankton Recorded from the Study Area

S No	Monitoring Location Code	Monitoring Location Name	Phytoplankton recorded	Zooplankton recorded
1	SW1	Dibru river	*Nitzschia* sp.,	*Brachionus angularis, Keratella cochlearis, Moina micrura,*
2	SW2	Burhi Dihing river	*Navicula* sp., *Coscinodiscus* sp.	*Keratella cochlearis, Filinia longiseta, Mesocyclops leuckarti*
3	SW3	Dibru river near sanding TE.	*Phacus* sp., *Chlorella* sp.,	*Keratella cochlearis, Moina micrura, Mesocyclops leuckarti*
4	SW4	Nala within upper Dihing RF	*Navicula* sp., *Chlorella* sp., *Phacus* sp., *Spirodella* sp.	*Keratella cochlearis, Mesocyclops leuckarti,*

Source: ERM Primary Survey

Fish & Fisheries: Due to its unique topography and ecological conditions, Assam harbours a diverse ichthyofaunal resource. About 20 fish species have been reported from this area. The fish species recorded from the study area are shown in the checklist in **Annexure 3.20**. Deori *et al*. (2015)[1] reported 50 fish species from Buri Dehing River. The list of fish species reported are presented in **Annexure 3.2o.**

Aquatic Birds

12 species of aquatic birds were recorded from the study area. The lists includes Pond Heron (*Ardeola grayi*), Cattle Egret (*Bubulcus ibis*), White breasted Kingfisher (*Halcyon smynensis*), White Wagtail (*Motacilla alba*), Red wattled Lapwing (*Vanellus indicus*), Black-winged Stilt (*Himantopus himantopus*), Little Cormorant (*Phalacrocorax niger*), Common Sandpiper (*Actitis hypoleucos*), River Tern (*Sterna aurentia*), White breasted Waterhen (*Amaurornis phoenicurus*), Bronze Winged Jacana (*Metopidius indicus*), Little Egret (*Egretta garzetta*).

Aquatic Mammals

One aquatic mammal, Eurasian otter (*Lutra lutra*) was reported from the study area.

3.4.6 Schedule-I Species

The non- forest area and forest areas form the habitat of some threatened species which are listed in the Schedule I of the Indian Wildlife (Protection) Act, 1972 and amendment in 1991. Secondary information and primary surveys revealed presence of thirty six of Schedule I animals which includes 6 species of reptiles, 19 species of birds and 11 species of mammals. List of the Schedule I species is presented at the table below.

Table 3.7 Scheduled Animal Species in the Study Area

Sl. No.	Scientific Name	Common Name	IUCN Category (ver, 2020-3)
A.1: Reptiles			
1.	*Python molurus*	Asiatic Rock Python	Near Threatened
2.	*Python bivittatus*	Burmese Python	Vulnerable
3.	*Varanus bengalensis*	Indian Monitor Lizard	Least Concern
4.	*Varanus flavescens*	Yellow monitor lizard	Least Concern

[1] Dibya Jyoti Deori, Santoshkumar Abujam and Shyama Prasad Biswas (2015). Fish diversity and habitat ecology of Dihing river - A tributary of Brahmaputra river. International Journal of Fisheries and Aquatic Studies 2015; 2(4): 190-197

5.	*Lissemys punctata*	Indian Flapshell Turtle	Least Concern
6.	*Nilssonia gangeticus*	Indian Softshell Turtle	Vulnerable
A.2 : Birds			
7.	*Anthracoceros albirostris*	Oriental pied hornbill	Least Concern
8.	*Bucerus bicornis*	Great pied hornbill	Near Threatened
9.	*Gyps bengalensis*	White-rumped Vulture	Critically Endangered
10.	*Asarcornis scutalata*	White-winged Wood duck	Endangered
11.	*Gracula religiosa*	Common Hill Myna	Least Concern
12.	*Gyps tenvirostris*	Slender-billed Vulture	Critically Endangered
13.	*Accipiter badius*	Shikra	Least Concern
14.	*Elanus caeruleus*	Black-winged Kite	Least Concern
15.	*Falco tinnunculus*	Common Kestrel	Least Concern
16.	*Milvus migrans*	Black Kite	Least Concern
17.	*Gyps indicus*	Indian vulture	Critically Endangered
18.	*Lophura leucomelanos*	Kaleej Pheasant	Least Concern
19.	*Polyplectron bicalcaratum*	Grey Peacock Pheasant	Least Concern
20.	*Spilornis cheela*	Crested Serpent Eagle	Least Concern
21.	*Accipiter nisus*	Eurasian Sparrowhawk	Least Concern
22.	*Accipiter trivirgatus*	Crested Goshawk	Least Concern
23.	*Circus melanoleucos*	Pied Harrier	Least Concern
24.	*Anorrhinus tickelli*	Brown Hornbill	Near Threatened
25.	*Aceros undulates*	Wreathed Hornbill	Not Evaluated
A.3 : Mammals			
26.	*Elephas maximus*	Asian Elephant	Endangered
27.	*Prionailurus bengalensis*	Leopard Cat	Least Concern
28.	*Hoolock hoolock*	Western Hoolock Gibbon	Endangered
29.	*Panthera pardus*	Common Leopard	Near Threatened
30.	*Babalus arnee*	Wild Asian Buffalo	Endangered
31.	*Trachypithecus pileatus*	Capper langur	Endangered
32.	*Panthera tigris*	Tiger	Endangered
33.	*Manis pentadactyla*	Chinese Pangolin	Critically Endangered
34.	*Melursus ursinus*	Sloth Bear	Vulnerable
35.	*Pardofelis marmorata*	Marbled Cat	Near Threatened
36.	*Catopuma temmincki*	Asiatic Golden Cat	Near Threatened

EN- Endangered; VU- Vulnerable; NT-Near Threatened, LC-Least Concern, (IUCN Version 2020-3); NE- Not Evaluated

3.5 Socioeconomic Environment

This section deals with the baseline socio-economic environment of the following

- 26 well drilling activity in Tinsukia district
- 3 Production Installations.

The following section discusses the methodology used for the socio-economic assessment. The subsequent sections discuss the baseline profile of the districts and the villages within the study area. The information provided has been primarily derived from the secondary sources (Census of India). In addition primary information was also collected during the discussions at the villages with the local community members. The village wise secondary data (obtained from Census, 2011) has been taken into consideration for analysing the socio-economic profile in a comparative manner for the three oil well.

3.5.1 Area of Influence

The study area for detail socio economic assessment and community consultations was limited in the villages located within 1 km radius around the proposed wells and production facility as these are the villages which are directly or indirectly most impacted by the project. These villages are primarily selected based on reconnaissance surveys, census data information, toposheet maps, understanding of the project and professional judgment. Total 14 villages located in Dumduma Circle of Tinsukia District.

3.5.2 Methodology

The social assessment was primarily based on the analysis of the secondary data obtained from the census survey 2011 and Community consultations. Following tools were used for gathering information and validating secondary data after considering nature of project operation and understanding the demographic characteristic of the area.

Secondary Data Analysis

To evaluate socio-economic environment in the study area, secondary information from the 2011 Census handbook has been referred to and details pertaining to habitations in the study area have been extracted and assessed.

Stakeholder Identification

At the beginning of the EIA process, the ERM team conducted a preliminary identification of probable stakeholders. An inventory of actual / potential stakeholders, including local groups and individuals, villages which may be directly or indirectly affected by the project or with interest in the development activities of the region was made.

Stakeholder Consultations

Consultations with community are a continuous process that was carried in the EIA process and would be continued during the construction and operation phases of the project. Issues like land and resource damage, social disturbance, severance and increased congestion, noise and air pollution, employment opportunities, need for development of basic infrastructure, safe drinking water, sanitation facilities in the villages located in 1 km periphery were discussed during the consultations so that they can be adequately addressed through the environment management plans. The consultations also helped in developing preliminary understanding of the requirement of social development initiatives, which are required in the project villages in proximity to the well sites.

3.5.3 General Socioeconomic Profile

The demographic profile in terms of total population, household size and sex ratio of the above-mentioned selected villages in the block has been summarized in the sections below, while the detailed demographic profile of the study area villages has been provided in **Annexure 3.21.**

Population and Household Size

Digboi (TC) (21736) has the highest population among the study area villages followed by Pengerigarh Grant No.93 (4378). The lowest populations was recorded in Pengeri Garh N.C. with a total population of 100. The household size of the study area villages generally ranged within 5.85 to 3.67 with an average household size of 4.84.Population and household of those villages summarized in the **Annexure 3.21.**

Sex Ratio

The average sex ratio of the area of influence is 962 and it is higher than the state averages of Assam (958) as well as the country average (943). The highest sex ratio is recorded in Pengeri Garh N.C (1128) followed by Balijan (1079) and the lowest sex ratio was been recorded at Sakreting Wl No-8 (669). Detail is summarized in **Annexure 3.21.**

Scheduled Caste (SC) & Scheduled Tribes (ST)

The overall demographic data of study area villages shows 4.62% of the population to be under ST category whereas 1.40% population belongs to scheduled caste category. Highest schedule tribe (44.52%) and schedule cast (6.96%) population was observed in Dhekiajan Forest Village No.1 and Borbil Gaon No.1 respectively. There was no schedule tribe population recorded in 6 of the study area villages. Details of SC and ST population are given in **Annexure 3.21.**

Education & Literacy

The study of the literacy profile in the region is relevant in order to have an understanding whether the proposed project can utilize skilled human resources available within the area.

According to 2011 census data, the literacy rate in Tinsukia district is 69.66%, which is lower than the state literacy rate of Assam (73.18%). But the average literacy rate of area of influence observed as 62.56% which is below the state and district literacy rate. The highest literacy rate was observed in Sakreting Wl No-8 (85.10%) and the lowest in Bebejia N.C. (36.78%). Average male and female literacy rate in the study area was recorded at 71.47% and 53.27%, which is comparatively lower than the district average of 77.19% and 61.73% respectively. Details are given in **Annexure 3.22.**

Economic Activity & Livelihood Pattern

The relevance of economic activity and livelihood pattern is important in the context of the study since depending on the existing situation one can predict the impact of the project activity on the economy of the region.

The total working population in the study area villages varies from 67.00% to 30.01%. Of the total workforce, Pengeri Garh N.C. revealed the highest percentage of workforce with 67.00% workers while Panbari Forest Village revealed the lowest workforce percentage (30.01%). Village wise details are incorporated in **Annexure 3.23**.

Major population in the study area villages involved in cultivation or work in tea garden. The study area mainly comprises of mono-cropped land with paddy being the major agricultural produce. Apart from paddy cultivation, inhabitants of study area villages are also involved in tea cultivation in their homestead land. Some fraction of the study area population is also reported working in Govt. and Private sector at Tinsukia, Dum duma etc.

3.5.4 Basic Amenities and Infrastructure

Drinking Water facilities

The Census data reveals that drinking water facility exits in most of the villages. There are different types of drinking water facility available in study area. The Tube wells are present in all study area villages whereas tap water supply present in 13 of the study area villages.

Other than drinking water people also depends on the above mention facility for their daily activity. Villagers resides near river also use river water for their domestic purpose. Other than river or stream, surface water body in the villages is very less in number.

Medical Facilities

In Tinsukia district, there are three sub divisional hospitals, 4 Primary Health Centers and 10 Community Health Centers. In the villages considered for the study, none have medical facilities within the villages barring one Community Health centre in Borbil Gaon No.3 and one Primary Sub-Health Centre in Obhatajan T.E.293 Nlr and 2 Hospitals in Digboi (TC).

Educational Facilities

As per census 2011, all selected villages have the provision of educational facilities. Primary schools are present in most of the identified villages (18); on the other hand, middle schools are present in thirteen villages. However, secondary school is present in five of the study area villages and 1 senior secondary school in Digboi (TC). College are present in Digboi and Doom Dooma area, which is more than 10 km away from the selected villages.

Transport & Communication

Assam Trunk Road (AT Road) i.e. NH-37 is the major road connecting the study area with Tinsukia town and is being used by the local people as a route of transportation. Pucca paved road is present in almost every village. The public transport system is yet to reach its highest efficacy since there is no public transport system in most of the sampled villages. Villagers depend on the private auto or jeep.

Power Supply

Electricity is available in all study area villages adequate for domestic, agricultural and other purposes.

Post and Telecommunication

Access to mobile phone is within every bodies reach. All villages from sample study area have the access to post- office and other private courier services.

Community Consultation

Public consultation was carried out with the objective of finding out about people's views and opinion on issues relating to the project, its operations and also to the peripheral development. In this backdrop, extensive public consultations were conducted during the socio-economic assessment as part of EIA study. Suggestions were also received from participants on managing of project functions so that it does not have any adverse impacts on the community living in the area adjoining the project, better targeting community development programs, ensuring community involvement and cooperation in the operation of the project. The feedback from the continued consultation will facilitate the project in developing strategies to address these issues in consensus with the communities residing around the project.
Community consultations in this project are mainly carried out the village located in 1 km periphery of proposed development well location in Dumduma-Pengeri Area.

The summary findings of the consultations carried out have been discussed below:

- Majority of the people in the area are cultivators and paddy is the major agricultural produce. Apart from paddy cultivation, people also work in the tea garden areas. Household tea cultivation is also common in the area. Few people are engaged in public and private organizations in the urban areas of Tinsukia, Dum Duma etc.
- Water requirement is catered through tap water and household borewell/tube well facility in the village areas.
- It was reported during consultations that all parents send their children to the primary school. Almost every village has a primary school; however, percentage of students pursuing higher education is comparatively less.
- During the public consultations, the household members expressed their concern about the health facilities. As Primary health centers is not present, patients were taken to hospitals at Tinsukia.
- The local communities at the tea garden mentioned about the facilities they receive from the tea estates like hospitals and ambulance services, incentives during marriages for the family members and other infrastructure like utensils etc., subsidized LPG for cooking.

4. IMPACT ASSESSMENT AND MITIGATION MEASURES

This section identifies and assesses the potential impacts in the environment that could be expected from the proposed oil & gas development drilling and construction and operation of production facilities in Dumduma-Pengeri Area. The Project activities will affect the physical, social and ecological environment in three distinct phases:

a. Pre-drilling
b. Drilling
c. Decommissioning of drilling activities
d. Construction of associated production facilities
e. Operation of associated production facilities
f. Laying of interconnecting pipeline

Impacts are identified and predicted based on the analysis of the information collected from the following:

- Project information (as outlined in Chapter **2**);
- Baseline information (as outlined in Chapter **3**).

The identification of likely impacts during all phases of the Project including drilling of development wells, construction of production facilities and operation of production facilities has been carried out based on likely activities having their impact on physical, biological and socio-economic components of the environment. The impact assessment of the Project entire life cycle is worked out in the following sections.

4.1 Impact Assessment Methodology and Approach

4.1.1 Identification of Potential Impact

The potential impacts have been identified through a systematic process whereby the activities (both planned and unplanned) associated with the Project have been considered with respect to their potential to interact with physical, biological and social resources and or receptors. The impact identification matrix is presented in ***Table 4.1***.

4.1.2 Impact Assessment Methodology

Impact identification and assessment starts with scoping and continues through the remainder of the impact assessment process (IAP). The principal impact assessment (IA) steps are summarized in **Figure 4.1.** Detailed Impact Assessment Methodology is presented in **Annexure 4.1.**

Figure 4.1 Impact Assessment Process

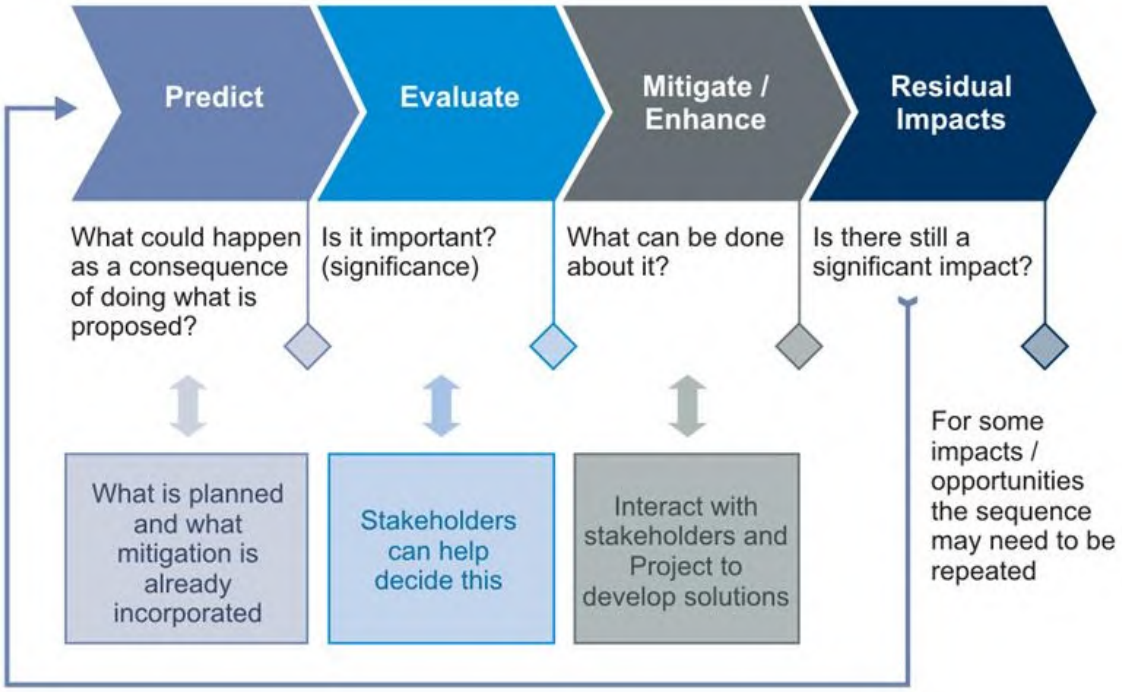


Table 4.1 Impact Identification Matrix

			Physical Environment										Biological Environment				Socio-economic Environment						
	Project Activity	Aspect	Aesthetics & Visual impacts	Air Quality	Noise Quality	Land use	Soil Quality	Local Drainage & Physiography	Surface water quality	Ground water Resources	Ground water quality	Road & Traffic	Terrestrial Habitat & Flora	Wildlife habitat & Fauna	Aquatic Habitat & flora.	Aquatic wildlife habitat & fauna	Influx of Population	Common Property Resources	Job & Economic Opportunity	Economy & Livelihood	Conflict with local people	Occupational Health & Safety	Community Health & Safety
A.	**Pre-Drilling and Construction of Production Facilities**																						
A.1	Land procurement for drill and production facilities																						
A.1.1		*Procurement of land*				X							X							X			
A.2	Clearance of vegetation																						
A.2.1		Removal of vegetation	X										X										
A.2.2		Generation of dust	X	X									X									X	X
A.3	Site filling, grading & levelling																						
A.3.1		*Loss of top soil*					X																
A.3.2		*Raising of site with earth material*						X															
A.3.3		*Compaction of soil*					X																
A.3.4		*Generation of dust*	X	X									X									X	X
A.3.5		*Surface runoff from construction site*							X						X	X							
A.4	Earth Work for construction of waste pits cellar pit																						
A.4.1		*Storage of earth and fugitive emission during dry season*	X	X									X									X	X
A.4.2		*Surface runoff from excavated material storage area into land/stream*					X		X							X							
A.6	Transport of fill materials, construction material, equipment & manpower																						
A.6.1		*Exhaust emission and fugitive from fill materials, construction materials*		X									X									X	X
A.6.2		*Generation of noise*			X									X									X
A.6.3		*Generation of reintrained dust*	X	X									X									X	X
A.6.4		*Plying of vehicle through narrow access road*																					X
A.6.7		Road accident																					X
A.8	Storage and handling of construction material																						
A.8.1		*Generation of fugitive dust*	X	X									X									X	X
A.8.2		*Surface runoff from construction material storage area into nearby land/stream*					X		X						X	X							
A.9	Storage & handling of fuel, lubricants, paints & other chemicals, etc.																						

			Physical Environment										Biological Environment				Socio-economic Environment						
	Project Activity	**Aspect**	Aesthetics & Visual impacts	Air Quality	Noise Quality	Land use	Soil Quality	Local Drainage & Physiography	Surface water quality	Ground water Resources	Ground water quality	Road & Traffic	Terrestrial Habitat & Flora	Wildlife habitat & Fauna	Aquatic Habitat & flora	Aquatic wildlife habitat & fauna	Influx of Population	Common Property Resources	Job & Economic Opportunity	Economy & Livelihood	Conflict with local people	Occupational Health & Safety	Community Health & Safety
A.9.1		*Spillage of oil, lubricant, etc. from storage & handling*					X				X												X
A.9.2		*Surface runoff from spillage area into nearby land/stream*					X		X		X												X
A.10	Operation of heavy machineries & equipment																						
A.10.1		*Exhaust emission*		X									X										X
A.10.2		*Generation of noise*			X									X									X
A.10.3		*Spillage of oil*																					
A.10.4		*Discharge of machineries wash water into open soil & river*					X		X						X	X							
A.11	Souring of construction water																						
A.11.1		*Sourcing of ground water for construction activity*								X								X					
A.12	Generation & disposal of construction waste																						
A.12.1		*Storage construction waste on open soil*					X				X												X
A.12.2		*Disposal of construction waste in non-designated area*	X				X				X												X
A.12.3		*Spillage of used oil from storage area*					X				X												X
A.12.4		*Surface runoff from construction waste storage area*					X		X						X	X							
A.13	Sourcing of construction workers																						
A.13.1		*Engagement of local person for construction work*															X		+	+	X		
A.13.2		*Hiring of construction workers from outside*																			X		
A.14	Operation of labour camp																						
A.14.1		*Sourcing of ground water for potable use*								X								X					
A.14.2		*Generation of MSW, storage & disposal of open soil*	X				X				X												X
A.14.3		*Generation of domestic waste water & discharge without treatment*									X												X
A.14.4		*Interaction with local community*																					X
B	**Drilling of wells**																						
B.1	Physical presence of drilling facility																						
B.1.1		*Illumination from facility*	X																				

			Physical Environment										Biological Environment				Socio-economic Environment						
	Project Activity	**Aspect**	Aesthetics & Visual impacts	Air Quality	Noise Quality	Land use	Soil Quality	Local Drainage & Physiography	Surface water quality	Ground water Resources	Ground water quality	Road & Traffic	Terrestrial Habitat & Flora	Wildlife habitat & Fauna	Aquatic Habitat & flora	Aquatic wildlife habitat & fauna	Influx of Population	Common Property Resources	Job & Economic Opportunity	Economy & Livelihood	Conflict with local people	Occupational Health & Safety	Community Health & Safety
B.1.2		*Drill Rig, DG Set, Pota cabins, machineries*	X																				
B.2	Operation of Drilling rig & associate machineries																						
B.2.1		*Noise generation from rig, mud pump, etc.*			X																	X	X
B.2.2		*Cutting of ground water table*								X													
B.2.3		*Accidental leakage of drill mud in ground water*								X													X
B.3	Storage and disposal of drill cuttings & spent mud																						
B.3.1		*Improper disposal of drill cuttings & spent mud from waste pits*				X					X												X
B.3.2		*Accidental leakage of spent mud and leachate from waste pit*				X					X												X
B.3.3		*Surface runoff from waste pit*				X			X						X	X							
B.4	Storage, treatment and discharge of process waste water																						
B.4.1		*Accidental discharge of untreated waste water into nearby land, stream*					X		X		X				X	X							
B.4.2		*Overflow of untreated waste water from waste pit*					X		X		X				X	X							
B.5	Storage and handling of oil, lubricant, chemical, etc.																						
B.5.1		*Spillage on open soil*					X				X												
B.5.2		*Surface runoff from spillage site*					X		X		X				X	X							
B.6	Storage, handling and disposal of waste oil and other hazardous waste																						
B.6.1		*Spillage on open soil*					X				X												
B.6.2		*Surface runoff from spillage site*					X		X		X				X	X							
B.6.3		*Disposal on non-designated site*					X				X												
B.7	Operation DG sets																						
B.7.1		*Exhaust emission*		X																			X
B.7.2		*Generation of noise*			X																	X	X
B.8	Transport of chemical, oil & lubricant, equipment & manpower																						
B.8.1		*Exhaust emission from transport vehicles*		X																			X
B.8.2		*Generation of noise*			X																	X	X
B.8.3		*Generation of reinterned dust*	X	X																			X

			Physical Environment										Biological Environment				Socio-economic Environment						
	Project Activity	**Aspect**	Aesthetics & Visual impacts	Air Quality	Noise Quality	Land use	Soil Quality	Local Drainage & Physiography	Surface water quality	Ground water Resources	Ground water quality	Road & Traffic	Terrestrial Habitat & Flora	Wildlife habitat & Fauna	Aquatic Habitat & flora	Aquatic wildlife habitat & fauna	Influx of Population	Common Property Resources	Job & Economic Opportunity	Economy & Livelihood	Conflict with local people	Occupational Health & Safety	Community Health & Safety
B.8.4		*Plying of vehicle through narrow access road*										X											X
B.8.5		*Road accident*																					X
B.9	Storage and Disposal of MSW																						
B.9.1		*Spillage of MSW from storage bin*				X					X												
B.9.2		*Disposal in non-designated site*	X			X					X												
B.10	Sourcing of process water																						
B.10.1		*Souring from ground water*								X								X						
B.11	Sourcing of construction workers																						
B.11.1		*Engagement of local person for drilling work*																	+	+			
B.11.2		*Hiring of construction workers from outside*																			X		
B.13	Flaring during testing																						
B.13.1		*Emission from flare stack*		X																			X
C.	**Decommissioning of Wells**																						
C.1	Dismantling of rig and production facilities																						
C.1.1		*Noise generation during dismantling of rigs and associate facilities*			X									X									X
C.1.2		*Improper capping of waste pits and generation of leachate*									X			X									
C.2	Transport of drilling rigs, machineries & equipment and fill materials																						
C.2.1		*Exhaust emission from transport vehicles*		X																			X
C.2.2		*Generation of noise*			X									X								X	X
C.2.3		*Generation of reinterned dust*																					
C.2.4		*Plying of vehicle through narrow access road*										X											X
C.2.5		*Road accident*																					X
D	**Operation of Production Facility**																						
D.1	Flaring of excess gas																						
D.1.1		*Emission of pollutants*		X																			
D.2	Separation of oil and gas from formation water																						
D.2.1		*Discharge of formation water*							X						X								
D.3	Spillage of oil						X																
E	**Laying of pipeline**																						

			Physical Environment										Biological Environment				Socio-economic Environment						
	Project Activity	**Aspect**	Aesthetics & Visual impacts	Air Quality	Noise Quality	Land use	Soil Quality	Local Drainage & Physiography	Surface water quality	Ground water Resources	Ground water quality	Road & Traffic	Terrestrial Habitat & Flora	Wildlife habitat & Fauna	Aquatic Habitat & flora	Aquatic wildlife habitat & fauna	Influx of Population	Common Property Resources	Job & Economic Opportunity	Economy & Livelihood	Conflict with local people	Occupational Health & Safety	Community Health & Safety
E.1	Site clearance and soil removal		X	X									X										
E.1.1		*Removal of vegetation and top soil*																					
E.2	Trenching																						
E.2.1		*Generation of dust*																					
E.3	Transportation and Transfer of pipes to construction site			X																			
E.3.1		*Exhaust emission*																					
E.4	Workforce engagement						X																
E.4.1		*Generation of domestic solid waste & disposal*																					
E.5	Testing of pipeline								X														
E.5.1		*Wastewater discharge*																					

4.2 Assessment of Impact

Based on the Impact Identification Matrix (**Annexure 4.2**) for project activities and likely impacted resources/ receptors from construction and operational phases of the proposed Project, the potential impacts are discussed in the following sections:

4.2.1 Potential Impact Aesthetic and Visual

Source of Impact: Aesthetics and visual impacts from different phases of the project activities can result from:

- Pre-drilling Phase and Construction of Associated Facilities and laying of pipeline:
  - Removal of vegetation from the land required for the drilling of wells and production facilities;
  - Emission of fugitive dust and deposition on vegetation and property;
  - Storage of construction materials;
  - Storage and disposal of construction waste, municipal waste etc.
- Drilling Phase:
  - Physical presence of rig and associated equipment;
  - Emission of fugitive dust and deposition on vegetation and property;
  - Disposal of MSW.
- Decommissioning:
  - Unplanned disposal of decommissioning waste materials in the vicinity of the well sites;
  - Emission of fugitive dust and deposition on vegetation and property.
- Presence of production facilities:
  - Operation of flare stacks

Embedded Control Measures:

- Storage facility for construction materials will be provided within the proposed well sites and production facility;
- Labour camp with sanitation facility, solid waste collection facilities will be set up in nearby another site proposed for drilling of a well or setting up of production facility not in active use.

Assessment of Impact: The potential impact due to above-mentioned activities has been discussed in following section.

Removal of vegetation: The proposed development well sites will be temporarily developed to house the drill pad, storage facilities, drilling facility, site office etc. Few of the development wells have been proposed at places (homestead settlements) where vegetation exists. The clearance of vegetation is likely to cause visual and aesthetic impacts at surrounding localities. It has been estimated that approximately 3 ha of land will be required for the well sites, 7 ha for the proposed production facilities and 10m RoU for pipelines. As the drilling site/production facilities will be low in size, non-contiguous (except for pipelines), the affected area will be scattered, less in size and hence the aesthetic and visual impact will be low due to removal of vegetation.

Storage of construction & fill materials: The construction materials will be stored in the covered shed as well in open stack within the proposed well sites/production facilities. The fill materials for additional

land development will be stored temporarily on the existing well sites. Improper storage of these materials is likely to cause visual and aesthetic impacts on surrounding localities.

Fugitive dust emission: Fugitive dust emission will happen during well site preparation, drilling phase of the proposed project. There are households within 0.1 km of the proposed well sites and production facilities. The dust will be deposited in the nearby vegetation and property and likely to cause medium visual and aesthetic impacts on surrounding localities.

Disposal of MSW: The villages near the project site have no municipal solid waste disposal site; as practice most of the organic waste is disposed within the homestead land for manure and other wastes are either recycled or disposed in their own premises. MSW will be generated from the drill sites and production facilities during all phases. The disposal of MSW in open area around the village is likely to cause visual and aesthetic impacts at surrounding localities.

Disposal of decommissioning waste: The waste material will be generated during site decommissioning phase. If these materials stored within the site or disposed in non-designated area, this is likely to cause visual and aesthetic impacts at surrounding localities.

Physical presence of rig and associated equipment: The setting up of rig, DG set and other machineries will create an impression of an industrial setup at the drill sites. The drill sites are all located in rural settings. The industrial setup is likely to cause visual and aesthetic impacts at surrounding localities. The drill site would have bright illumination arrangements. The physical presence and illumination at the project facilities is likely to cause visual and aesthetic impacts at surrounding localities of the area.

Flare stack at Production Installations*:* The illumination from flare stack through all night may be source of visual discomfort for the local people or fauna. The flare stack in the proposed production installation will be an additional source of visual disturbance to the villagers of located within 1 km of the production installations. However, the settlements are surrounded with plantations and hence away from the line of sight.

Laying of interconnected pipelines*:* The route of the pipeline will be close to RoU of existing road for minimum disturbance. To avoid, densely populated area, the pipeline will be routed through agricultural land. The trenching activity, the storage of soil on the RoU (10m) of the pipeline and the temporary storage of pipelines will create visual disturbance and will be aesthetically displeasing.

Removal of vegetation, generation and deposition of fugitive dust, storage of materials and wastes, presence of rig and equipment at drill site, illumination from production installation and noise generated from the drill sites may cause visual and aesthetic impact however, the same can be easily revert to earlier stage with mitigation; so the scale of impact is medium. The visual impact can be noticed by the nearby people; i.e. within 0.5 km from the project site- so the extent of impact is local. The above-mentioned activities can occur only in phase of drilling life cycle of 3 to 4 months per site; however, vegetation removal and setting up of six additional and three existing production facilities will have long-term impact. Hence, the impact magnitude is **medium**.

The environmental setting of the area reveals that the study area has a typical rural setting - flat terrain with agricultural land, villages with homestead plantation and tea garden. The people in the area have experienced drilling activity. The receptor sensitivity can be categorized as ***medium***.

The aesthetics and visual impact is assessed to be ***moderate*** (Refer to **Table 4.6:** Impact Significance Matrix without mitigation).

Mitigation Measures: The mitigation measures to minimize the above-mentioned impacts are as follows:

- All the construction activities will be restricted within the designated site;
- Fugitive dust will be suppressed with periodic water sprinkling;
- Appropriate shading of lights to prevent scattering;
- On completion of work all temporary structures, surplus materials and wastes will be completely removed from site and disposed at a designated area;
- Construction wastes, decommissioning waste and municipal solid waste temporarily stored at the sites will be transported to the designated disposal site/facility at regular intervals;
- Flare stack of production installations will be provided with Chinese hat;
- The pipelines once laid will be covered with burrowed soil and levelled as per the surrounding land;
- The boundary wall of the production facilities will be covered with creepers to blend with the surrounding.
- Greenbelt would be developed and maintained at the production well sites and production facilities

Residual Impact: Considering the implementation of above-mentioned mitigation measures the residual impact is assessed to be **minor** (Refer to **Table 4.7:** Impact Significance Matrix with mitigation)

4.2.2 Potential Impact on Land Use

Source of impact: The sources land use impacts can result from:

- Procurement of land for wells (~3 ha), production facilities (~7 ha).

Assessment of Impact: Land will be required for proposed wells and the production installations. The drilling wells and production facilities are located in private land (agricultural land, homestead plantation, tea gardens etc.). The current oil and gas drilling and production activities will lead to conversion of land use from private land to industrial land. Land use change may lead to impact on income and livelihood; this has been discussed in socio-economic impact section.

As discussed (*Ref. Section 2.6.1 land procurement process*), OIL usually procures land through negotiated purchase from private owners. OIL does not plan to reinstate the land after drilling activity; hence, the land use change is ***permanent*** impact. As per preliminary assessment, approximately 63 ha. of tea garden land, 12 ha. of agricultural land, 24 ha. of homestead plantation will be required for this project.

The project will involve conversion is 0.07% for total agricultural land within Dumduma Pengeri Area, 0.09% for total homestead plantation area within Dumduma Pengeri Area and 0.46% for total tea garden areas within Dumduma Pengeri Area. Hence, the scale of impact is ***low***. The impact will be limited to the local since the land belongs to people living in and around the proposed sites, however the duration will be long term. The magnitude will be ***small***. The resource sensitivity is ***medium*** since the maximum land impacted will be of homestead plantation, tea garden and agricultural land. The

impact on land use is assessed to be ***minor*** (*Refer* ***Table 4.7:*** *Impact Significance Matrix without mitigation*).

Some mitigation will include provision of green belt around the land parcels to be acquired. Areas within Dumduma Pengeri Area will be identified for carrying out plantations drive to make area greener. For the land parcels to be acquired for the Project will result in long term change of land, for which adequate compensations will be dispensed to the landowners from whom land is taken on lease or acquired for drill/production sites or taken for right of use for pipelines laying.

4.2.3 Potential Impact on Soil Quality

Source of Impact: Soil quality impacts can result from:

- Pre-drilling Phase and construction of production facilities and laying of pipelines:
  - Removal of top soil from the land procured;
  - Compaction of soil;
  - Disposal of construction waste/ MSW in non-designated area;
  - Spillage of chemical/oil on open soil;
  - Surface runoff from material & waste storage areas and oil spillage area.
- Drilling Phase:
  - Spillage of chemical, spent mud, hazardous waste etc.;
  - Surface runoff from waste storage area and spillage area.
- Decommissioning Phase:
  - Disposal of decommissioning waste materials in open soil.

Embedded Control Measures: The project embedded control measures are as follows:

- Construction waste generated from the drill site will be utilized for backfilling within the site itself;
- MSW generated from the labour camp and construction site will be transferred to the waste disposal site at Dumduma or Digboi in consultation with the authorities;
- Dedicated paved storage area will be identified for the drilling chemicals, fuel, lubricants and oils within the drill sites;
- HDPE lined pits will be considered for the disposal of unusable drilling mud cuttings and drilling wastewater etc.

Assessment of Impact: The potential impact due to above mentioned activities has been discussed in following section.

Removal of top soil: The wells will be drilled at agricultural lands, homestead plantation, tea garden areas. Before site development activity, the top soil of the site if not properly stripped and stored for future use, the entire volume of top soil will be permanently lost or fertility/soil characteristics will be changed.

Handling of oil, chemical and waste*:* The drilling chemicals, cement for mud preparation, fuel & lubricants will be stored on dedicated paved storage areas within drill sites. The hazardous waste (spent oil & used oil), batteries, e-waste and municipal waste will be stored within the drill sites before final disposal. Thus, the contamination of soil can happen only due to accidental spillage of fuel, lubricants and paints from storage areas and during the transfer of fuels and chemicals. The

contamination of soil with fuel, lubricants and paints may affect the soil microbes and bacterial growth and can affect the soil quality, which in turn may contaminate subsurface groundwater.

Storage and disposal of drill cuttings and spent mud: It is estimated that nearly about 350-400m^3 drill cuttings and 900-1200 m^3 spent drilling mud is likely to be generated from each drilling operation.

The project design takes into account construction of a HDPE lined impervious pits for storage of drill cuttings, drilling mud and drilling fluid respectively and their disposal in accordance with "CPCB Oil & Extraction Industry Standard – Guidelines for Disposal of Solid Wastes" in their planning stage. The flooding history of the area and rainfall intensity will be taken into account while designing the depth of the pits. It can be stated here as high flood levels taken into considerations for the previous drilling programmes at the drill sites, the same considerations would also be undertaken here. Further with OIL committing to the use of primarily water based mud and eco-friendly polymer mud system will also be used if required for deeper sections (after providing intimation to the Pollution Control Board), the drill cuttings and waste drilling mud generated are likely to be non-hazardous in nature. Spillage of drill cuttings and spent mud on nearby open soil may lead to change of soil characteristics due to chemical contamination.

Surface runoff during monsoon season from disturbed construction site, construction material & waste storage area and spillage area have the potential to degrade soil quality due to deposition of foreign materials, hydrocarbon and other hazardous waste.

Primary monitoring results of soil quality results shows that there is no contamination of heavy metals in the nearby agricultural land, homestead plantation or tea garden areas (Refer Section 4.5.5) hence the resource sensitivity is termed as **medium**.

Contamination of soil from wastes, contaminated surface runoffs from the drill sites may cause perceptible changes of the soil quality hence, the scale of impact is considered to be **medium**. The above mentioned soil quality impacts will be localized within the project site or immediate vicinity hence the extent of impact would be **local**. The duration of impact will spread across phases of the project life cycle hence duration is considered as **medium** term. The magnitude of the impact is assessed to be **medium**.

The significance of impact on soil quality is assessed to be **moderate** (Ref. **Table 4.6:** Impact Significance Matrix without mitigation).

Mitigation Measures: The mitigation measures to minimize the above-mentioned impacts are as follows:

- Properly stripping of top soil and conserve it for future use;
- The top soil will be stored in mound form;
- The height of the mound should not be more than 2m;
- The slope angle should not be more than 30˚;
- A jute mat will be overlaid on the mound to contain the erosion of top soil;
- Restricted project and related activities during monsoon season;
- Restrict movement of vehicles within the site only to designated areas to prevent any compaction of soil;
- Drainage system at site is to be provided with sedimentation tank and oily-water separator to prevent contaminants, especially oil and grease, from being carried off by surface runoff;
- Manage spills of any contaminants on soil using spill kits;

- Storage of construction waste/ MSW in designated areas within drill sites;
- Adopt best practices e.g. use pumps and dispensing nozzle for transfer of fuel, use drip trays etc.
- Testing of drill cutting to determine if they are hazardous in nature and accordingly planning for their disposal.

Residual Impact: Considering the implementation of above mentioned mitigation measures, impact on soil quality is assessed to be ***minor*** (Refer to **Table 4.7** Impact Significance Matrix with mitigation).

4.2.4 Potential Impact on Topography & Drainage

Potential impact on drainage and topography viz. alteration of drainage pattern and water logging are anticipated during well site preparation and raising of the well site and access road. The sites will be raised to a height of one and half a meter above the high flood level of past 10-20 years. This may lead to alteration of onsite micro-drainage pattern leading to potential problems of water logging in the agricultural land and settlements abutting the drill site. This problem is likely to be further aggravated due to heavy rainfall experienced by the area throughout the year. Approach roads have to be constructed for few proposed sites. The length of the site approach road will vary between 100 to 250m only. Approach road may interfere with the drainage of surface run-off during rainfall.

Similar to the proposed well sites, the site of the proposed production facilities will be raised to a height of one and a half meters above the high flood level of past 10-20 years. The raising of the height of the construction site above the surrounding land may lead to waterlogging of the adjacent land or disrupt the existing drainage pattern.

The extent of the impact will be local, i.e. within the site and immediate vicinity; duration will be long term, as OIL will purchase the land and retain the sites and scale will be medium as the damage would be irreversible but drainage can be corrected to existing flow patterns with mitigations in place. The magnitude will be medium. The sensitivity will be medium, as human receptors in the vicinity may experience the impact, the impact significance is assessed to be moderate (Refer Table 4.7: Impact Significance Matrix without mitigation)

Mitigation Measures: The mitigation measures to minimize the above-mentioned impacts are as follows:

- Levelling and grading operations will be undertaken with minimal disturbance to the existing contour, thereby maintaining the general slope of site;
- Development of garland drains along the periphery of the drilling and production facilities connected to existing flow patterns; and
- Construction of cross drainage structures underneath approach road for runoff drainage.

Residual Impact: The implementation of the above mitigation measures will help mitigate the impacts on topography and drainage however, the residual impact significance will reduce to **minor** (*Refer to* ***Table 4.8:*** *Impact Significance Matrix with mitigation*).

4.2.5 Potential Impact on Air Quality

Source of Impact: Potential impact on ambient air quality during different phase of the project could arise due to:

- Predrilling phase, construction of production facilities:
  - Site development;
  - Operation of vehicles and construction machinery;
  - Transportation, storage, handling of construction material, disposal of construction waste;
  - Operation of diesel generator (DG) sets.
- Drilling phase:
  - Operation of DG set;
  - Emissions from temporary flare stack for 24-48 hours during well testing;
  - Transport of drilling chemical and manpower etc.
- Decommissioning phase:
  - Decommissioning and soil work;
  - Transport of de-mobilized rigs and machineries.
- Operation of production facility
  - Emission from flare stacks

Embedded Control Measures: Project embedded control measures are as follows:

- Vehicle, equipment and machinery used for drilling would conform to applicable emission norms;
- Drilling chemical and materials would be stored in covered areas to prevent fugitive emissions;
- DG set stacks would have adequate height, as per statutory requirements, to be able to adequately disperse exhaust gases; and flare stacks of adequate height to be provided.

Assessment of Impact: The potential impact due to above mentioned activities has been discussed in following section.

Fugitive emission: Fugitive dust emissions due to the proposed project will be principally associated with emissions of dust during the site preparation. The dust generated would be primarily from the handling and transportation of fill material and re-entrainment of dust during movement of the vehicles on unpaved roads. However, generation of such fugitive dust is likely to be governed by micro-meteorological conditions (wind speed and direction). Effects of dust emissions are heightened by dry weather and high wind speeds and effectively reduced to zero when soils and/or ambient conditions are wet. However, dust generated from the site development and construction activity will generally settle down on the adjacent areas (i.e. < 500 m from the source) within a short period due to its larger particle size.

Emissions from Vehicles/Equipment: The pre-drilling, drilling and decommissioning operations would involve movement of diesel operated vehicles and operation of machineries and equipment. Heavy vehicles will be particularly intense during site preparation and decommissioning phases. Gaseous pollutants such as NO_x, SO_2, CO and hydrocarbons are likely to be emitted from operation of vehicles and machineries.

Impacts from Operation of DG/GG sets and Flaring: The proposed project will involve the operation of two diesel driven 1000 KW generators for drilling of each development wells; additionally one 200 KW generator will be required to meet power demand of the residential camp and other emergency requirements. Moreover, power at the production installation would be sourced through 216 KW GG sets.

Combustion of fuel in a DG sets typically happens at high temperatures resulting in generation of considerable amounts of NOx. The SO_2 concentration in emissions is dependent on the sulphur content in fuel burnt and particulate matter consisting of unburnt carbon particles. The emissions from the DG set will be discharged into the atmosphere through a stack of height about 7 m from ground level and will be dispersed into the surrounding atmosphere.

Flaring of gases primarily during the drilling testing phase will contribute to additional air pollution. Flaring will involve high temperature oxidation process to burn combustible gases that may be generated from the proposed well sites. Emissions from flaring will include CO_2, carbon particles (soot), unburnt hydrocarbons, CO and other partially burned or altered hydrocarbons, NOx. Since sour gas[1] and mercaptans are not expected, so SO_2 would not be considered as a priority pollutant. The flaring will only be intermittent and will last for 24 to 48 hours.

Combustion of natural gas in GG sets at production installations will primarily generate CO_2, unburnt hydrocarbons, NOx etc. Elevated flaring (30m) will be done during operation of production Installation to burn the excess gas vented from the process vessels. NOx emission is associated with the flaring activity.

In order to predict the Ground Level Concentrations (GLCs) at various distances from the source, of the above mentioned pollutants, an air modelling exercise AERMOD-ISC ST3 has been undertaken and is discussed in the impact prediction section below. The following input parameters (Refer to **Table 4.2**) have been considered in the impact prediction modelling undertaken using AERMOD ISC-ST-3.

Table 4.2 Input Parameters Considered for Modelling

Emission sources	Stack height (m)	Stack dia. (m)	Stack gas temp. (K)	Stack gas velocity m/s)	Fuel Consumption (kg/hr)	Emission Rate (g/s)			
						PM	NO_2	HC	SO_2
1250 KVA DG	7	0.3	749.4	17	206.48	0.007	1.836	0.004	0.001147
250 KVA DG	3	0.3	708.7	17	46.25	0.003	0.188	0.008	0.00026
Flare Stack (Well testing)	9	0.5	1273	20	Data not available	-	0.149	-	-
Flaring Stack (production installation)	30	0.5	1273	20	273.15	-	0.07	-	-
216 KW GG sets	3	0.457	700	20	Data not available	-	0.2117	0.0029	-

Though, AERMOD-ISCST3 is a refined model, the model run was carried out based on micro-meteorology to predict air quality impacts for an average 24 hr period that may be caused by peak power utilization at the drill site. The model was run for operation of 2 no. of 1000 KW DG (approximately 1250 KVA each) set and one 200 KW (approximately 250 KVA) DG sets at drill sites and also 216 KW GG sets at production installations. AERMOD-ISCST3 model considers wind towards the direction of flow.

To predict the incremental concentrations of the pollutants due to the proposed project activities, the concentration values for these pollutants estimated during the baseline monitoring at different monitoring locations was also taken into account (refer ***Table 4.4***). **Figure 4.2, Figure 4.3, Figure 4.4**

[1]sulphur-containing materials such as hydrogen sulphide (sour gas) or mercaptans

and **Figure 4.5** represent the isopleths of distribution of maximum 24-hours average NO_x, PM, HC and SO_2 concentrations respectively due to operation of DG sets at drill sites. **Figure 4.6** and **Figure 4.7** shows the isopleth of distribution of NOx and HC due to flaring at production facilities and operation of GG sets.

Table 4.3 Predicted GLC for Air Pollutants

Pollutants	Predicted maximum GLC (µg/m^3)		
	Incremental Maximum Concentration	Distance from well /production facility(m)	Direction
DG Set +Flaring (Well testing)			
NOx	15.38	685	W
PM	0.07	611	W
HC	0.1	626	W
SO_2	0.010	610	W
Flare Stack and GG Set (Production facility)			
NOx	3.78	620	W
HC	0.16	610	W

Figure 4.2 Predicted Incremental Concentration of NO_x - operation of DG sets and Test Flaring of Well

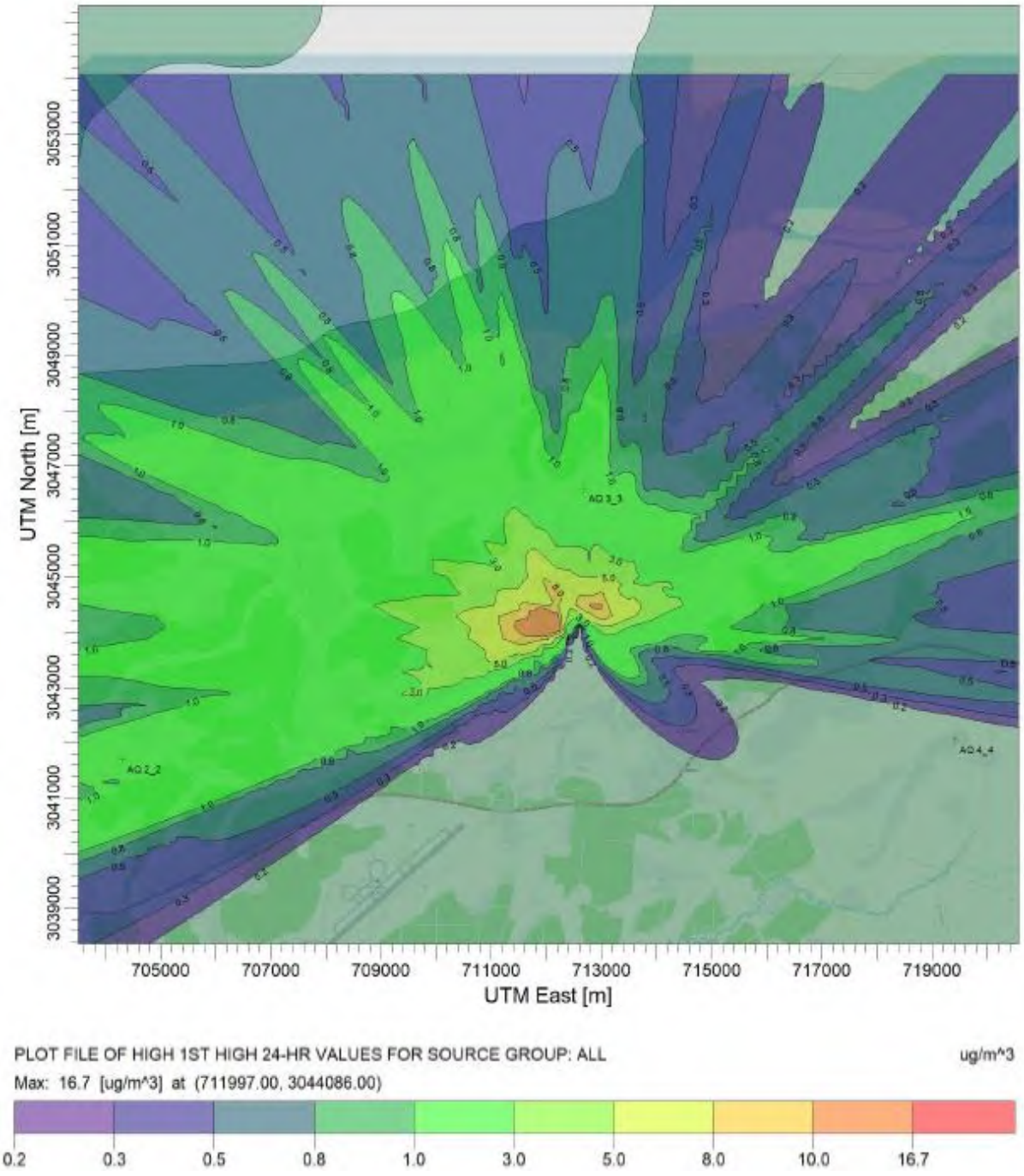


Figure 4.3 Predicted Incremental Concentration of PM -operation of DG sets and Test Flaring of Well

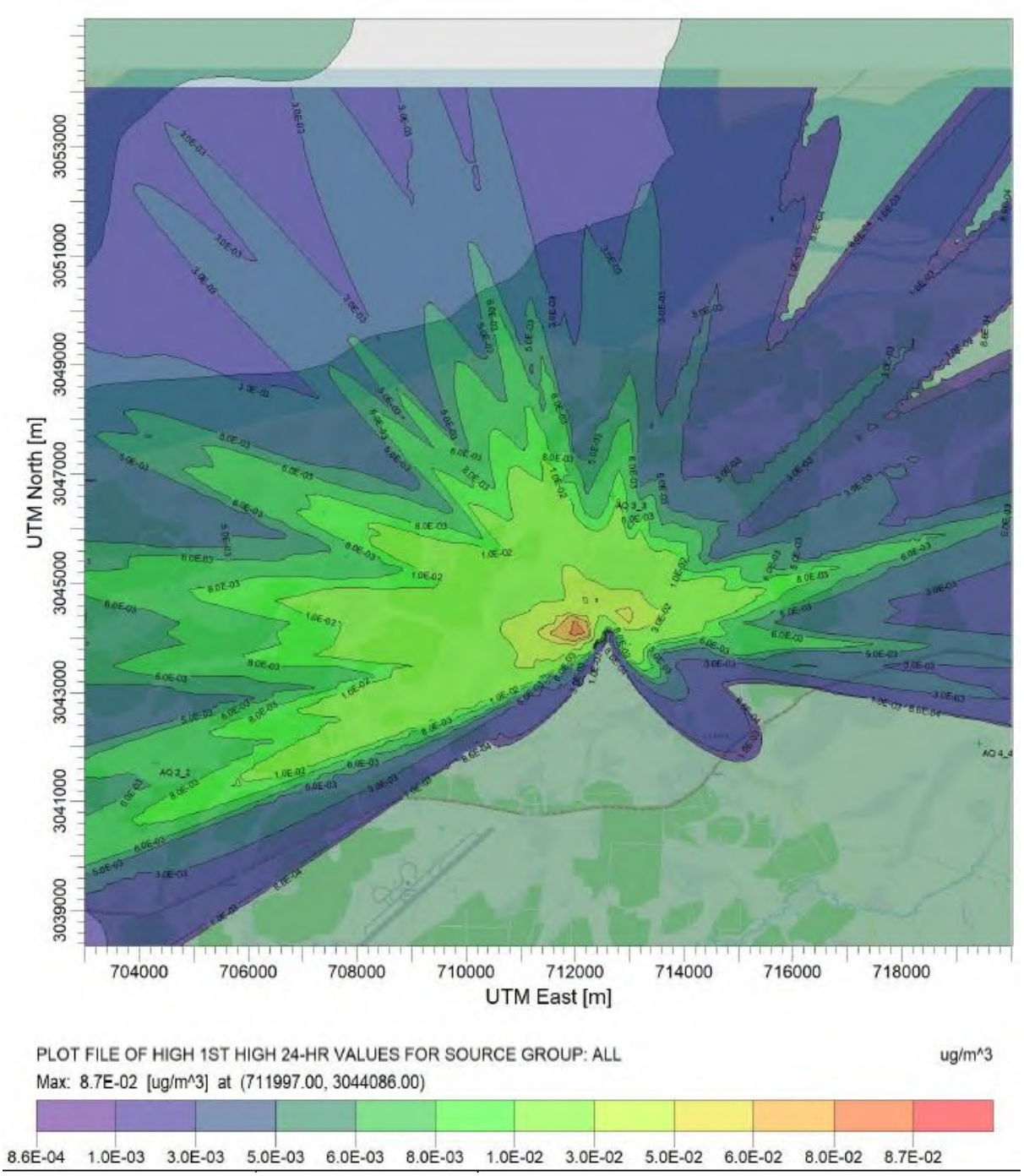


Figure 4.4 Predicted Incremental Concentration of HC -operation of DG sets and Test Flaring of Well

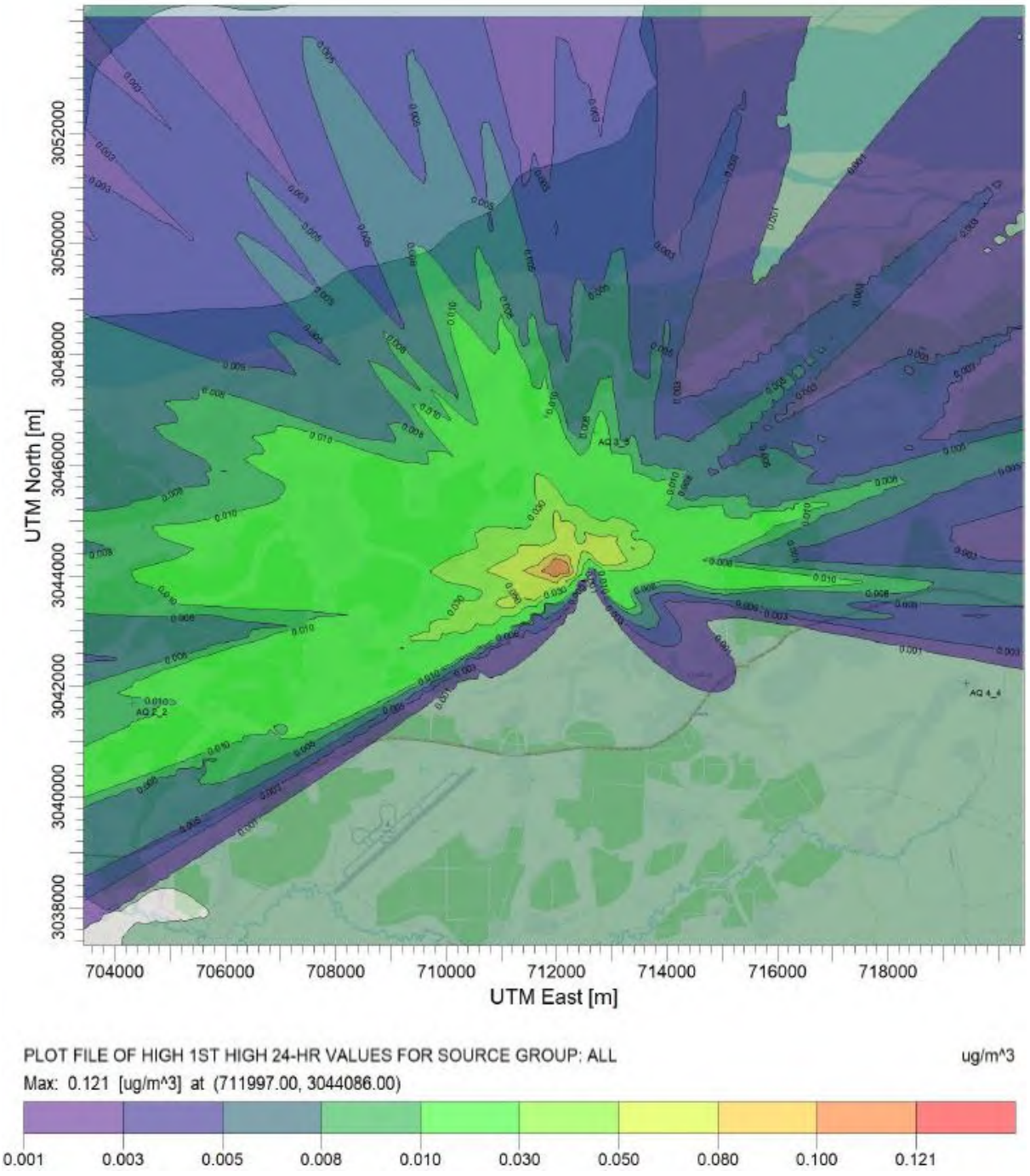
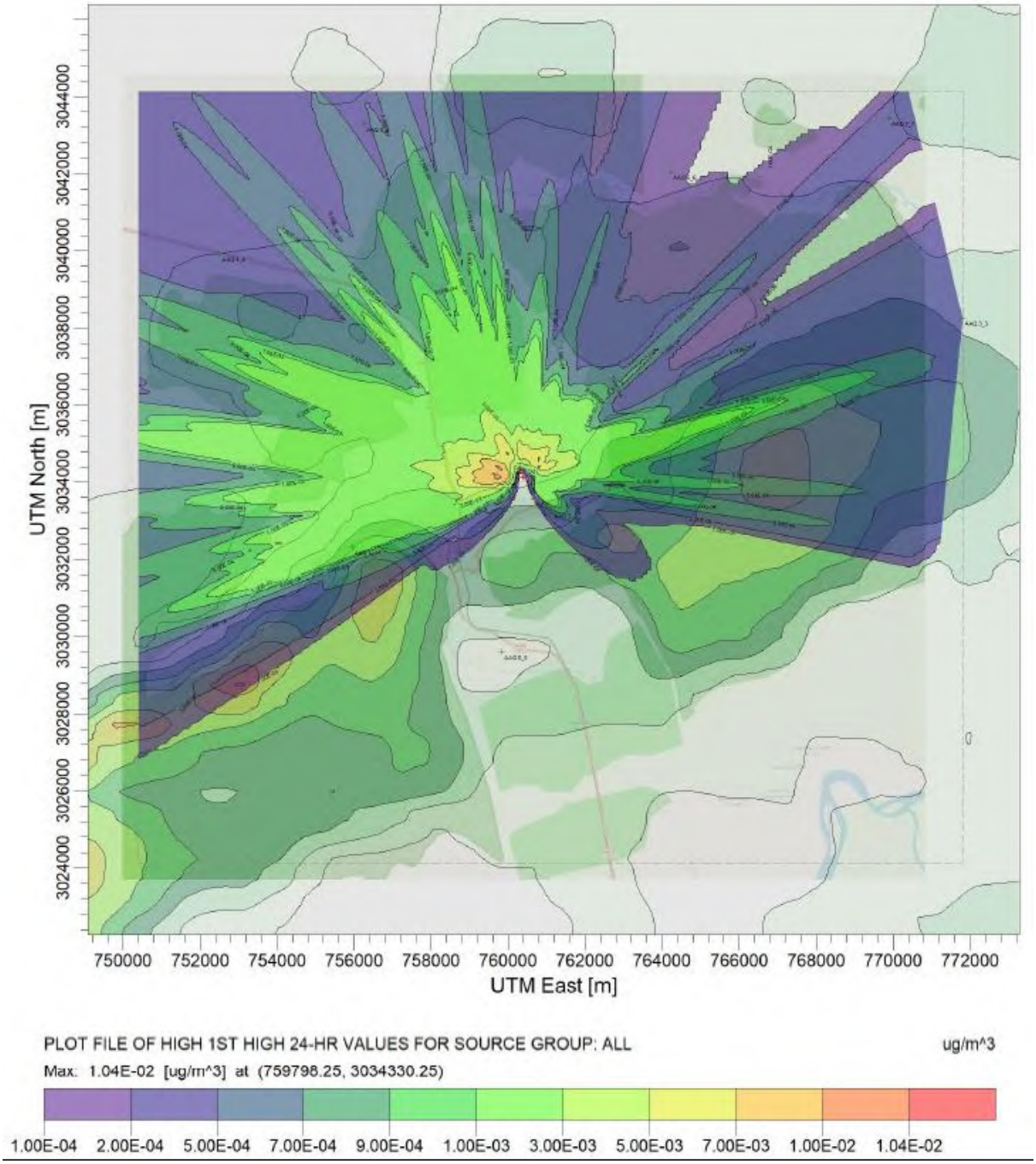


Figure 4.5 Predicted Incremental Concentration of SO_2 - operation of DG sets and Test Flaring of Well



The predicted Ground Level Concentrations (GLC) for PM, NOx, SO_2 and HC at different locations where air monitoring was conducted is provided in **Table 4.3.**

Figure 4.6 Predicted Incremental Concentration of NO_x- Flaring from production Facility and operation of GG

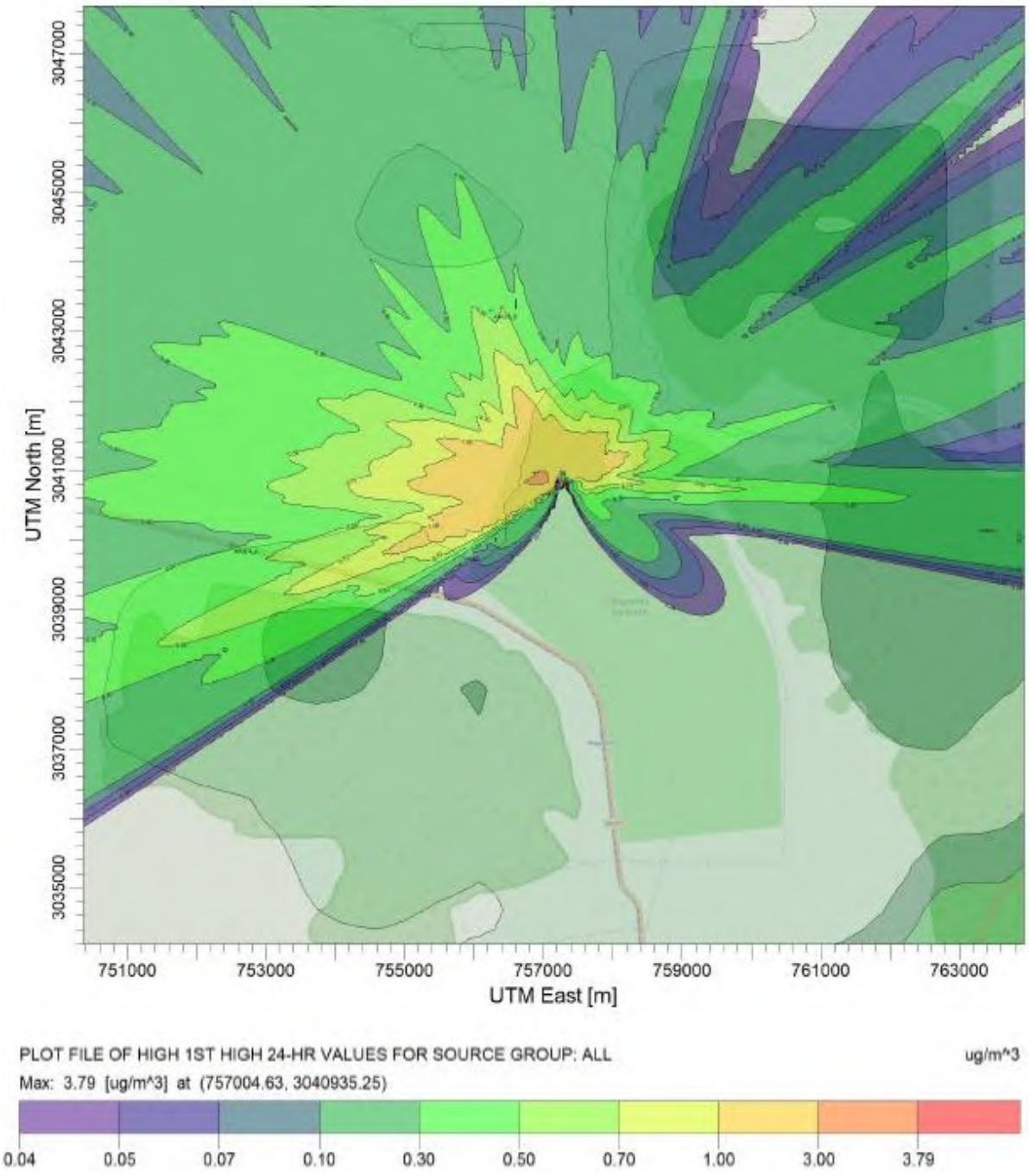
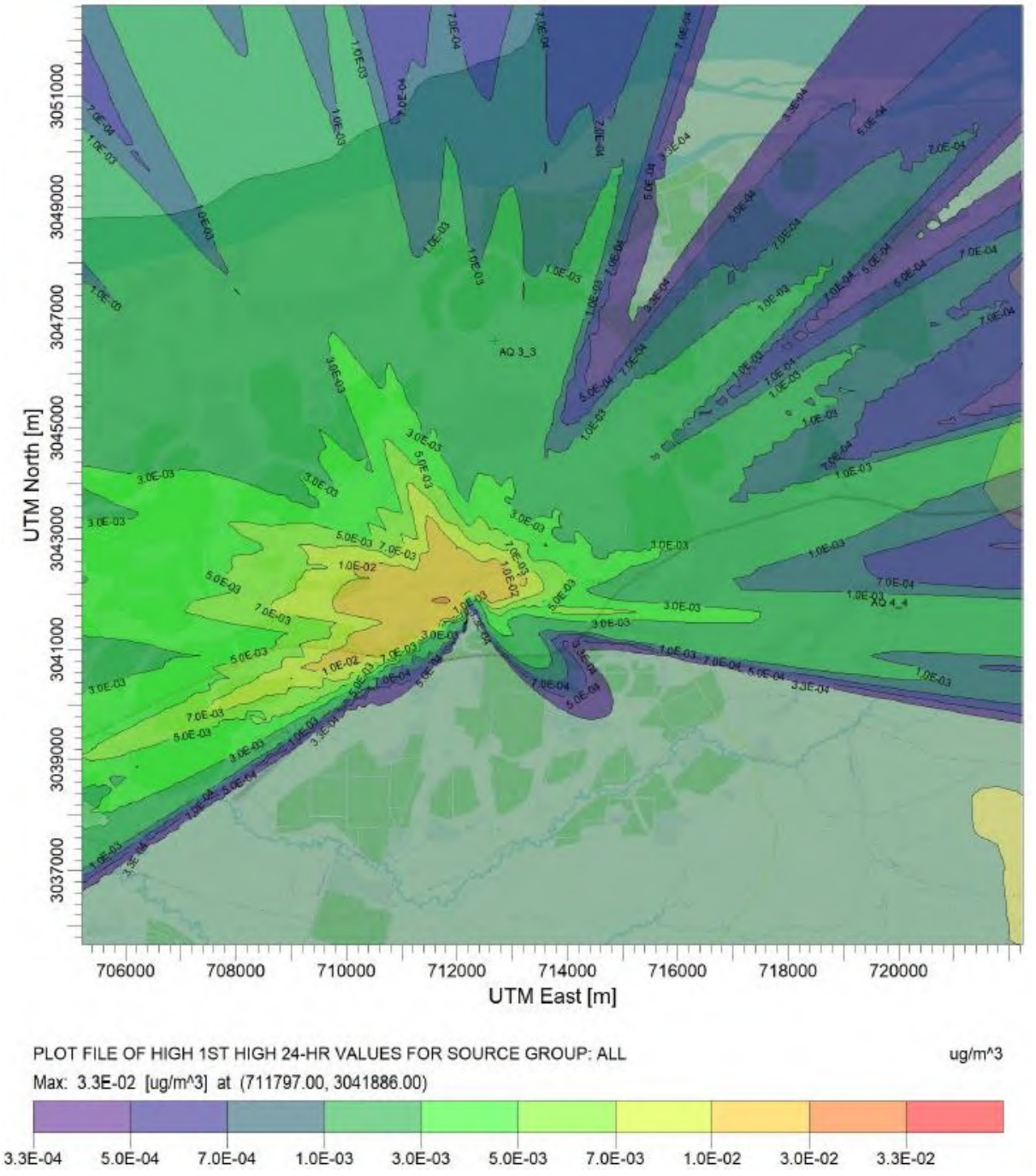


Figure 4.7 Predicted Incremental Concentration of HC - Flaring from production Facility and operation of GG



The predicted Ground Level Concentrations (GLC) for PM, NOx, SO_2 and HC at different locations where air monitoring was conducted is provided in ***Table 4.3.***

Table 4.4 Projected Air Quality Concentrations at ambient air quality monitoring location

Monitoring Location	Drill Sites												Production Facilities					
	DG+Test Flaring -NOx			DG+Test Flaring –PM#			DG+Test Flaring –HC*			DG+Test Flaring –SO_2			Flaring +operation of GG sets HC*			Flaring +operation of GG sets Nox		
	Incremental concentration ($\mu g/m^3$)	Baseline Concentration ($\mu g/m^3$)	Incremented Concentration ($\mu g/m^3$)	Incremental concentration ($\mu g/m^3$)	Baseline Concentration ($\mu g/m^3$)	Incremented Concentration ($\mu g/m^3$)	Incremental concentration ($\mu g/m^3$)	Baseline Concentration ($\mu g/m^3$)	Incremented Concentration ($\mu g/m^3$)	Incremental concentration ($\mu g/m^3$)	Baseline Concentration ($\mu g/m^3$)	Incremented Concentration ($\mu g/m^3$)	Incremental concentration ($\mu g/m^3$)	Baseline Concentration ($\mu g/m^3$)	Incremented Concentration ($\mu g/m^3$)	Incremental concentration ($\mu g/m^3$)	Baseline Concentration ($\mu g/m^3$)	Incremented Concentration ($\mu g/m^3$)
AAQ-1	31.340	23.220	54.560	0.010	77.280	77.290	0.011	1241.5	1241.511	0.0015	9.8	9.80145	0.000	1241.5	1241.500	0.000	23.220	23.220
AAQ-2	21.433	22.720	44.153	0.004	80.570	80.574	0.005	1020.5	1020.505	0.0007	9.4	9.40066	0.000	1020.5	1020.500	0.000	22.720	22.720
AAQ-3	4.558	23.040	27.598	0.002	78.170	78.172	0.003	1209	1209.003	0.0003	9.3	9.30026	0.011	1209	1209.011	0.050	23.040	23.090
AAQ-4	9.055	21.720	30.775		76.170	76.170	0.003	1111.5	1111.503	0.0004	10.4	10.40037	0.031	1111.5	1111.531	0.260	21.720	21.980
AAQ-5	0.000	23.940	23.940	0.000	76.540	76.540	0.000	1254.5	1254.500	0	9.7	9.7	0.000	1254.5	1254.500	0.000	23.940	23.940
AAQ-6	4.634	22.370	27.004	0.001	76.610	76.611	0.001	1144	1144.001	0.0002	9.5	9.50015	0.013	1144	1144.013	0.080	22.370	22.450
AAQ-7	8.756	24.110	32.866	0.002	77.810	77.812	0.003	1150.5	1150.503	0.0003	8.8	8.80031	0.009	1150.5	1150.509	0.050	24.110	24.160
AAQ-8	15.687	22.450	38.137	0.003	78.140	78.143	0.004	1118	1118.004	0.0004	10.5	10.50043	0.064	1118	1118.064	0.460	22.450	22.910

PM_{10} *values have been considered* Baseline values for total hydrocarbon only considered*

Mitigation Measures: The proposed mitigation measures are as follows:

To minimise emission of fugitive dusts the following measures would be adopted:

- Carry out regular water sprinkling at the site during dry season especially during the construction and decommissioning activities;
- Efforts would be made to maintain the stockpile against the wall or obstruction so that it works as a windbreak and the fugitive emissions by strong winds can be avoided;
- The trucks used for transport of fill material during the site preparation and debris transport during the decommissioning shall be provided with impervious sheeting;
- During construction, the approach road will be kept clean, free from mud and slurry to prevent any entrainment of dust;
- Waste from construction site will not be burned;
- Location of construction materials will be away from nearby worker's camps;
- Proper handling of materials to ensure minimal emission of dust.

To minimise emission from the vehicles, equipment and machinery the following measures would be adopted:

- Movement of construction vehicles will be minimised and a speed of 20 km/hr will be enforced along the access and approach roads;
- All diesel-powered equipment will be regularly maintained and idling time reduced to minimise emissions;
- Low sulphur diesel (S < 50 mg/kg i.e., 0.005%) will be used in diesel powered equipment and best management practices would be adhered to;
- Vehicle / equipment air emissions will be controlled by good practice procedures (such as turning off equipment when not in use); and
- Vehicle / equipment exhausts observed emitting significant black smoke in their exhausts would be serviced/replaced.

To minimise the adverse impacts of flaring the following measures should be adopted:

- Proper engineering controls to ensure complete combustion of gas;
- No cold venting will be resorted instead flaring will be done with combustion efficient elevated flare tip; and
- Location of flare stacks to be chosen considering the sensitive receptors adjoining the site.

Residual Impact: Considering the implementation of above mentioned mitigation measures, the residual impact on ambient air quality is assessed to be **minor** (Refer **Annexure 4.3** Impact Significance Matrix with mitigation).

4.2.6 Potential Impact on Noise Quality

Source of Impact: The potential impacts on noise quality may arise out of the following:

- Pre-drilling phase, Associated facilities and pipeline laying:
  - Operation of machineries & equipment;
  - Vehicular traffic;
  - Operation of DG sets.
- Drilling phase:
  - Operation of DG sets and drilling rig
  - Operation of machineries & equipment;
  - Vehicular traffic.
- Decommissioning phase:
  - Demobilization activity
  - Vehicular traffic.

Embedded Control Measures: The project embedded control measures are as follows:

- Well maintained equipment and vehicles will be used;
- All DG sets would be provided with acoustic enclosures; and
- Appropriate PPEs (e.g. ear plugs) will be used for by workers while working near high noise generating equipment.

Assessment of Impact: The potential impact due to above-mentioned activities has been discussed in following section.

Operation of construction machinery/equipment: The construction activities such as transportation of raw materials for civil works, operation of heavy equipment and construction machinery are likely to cause increase in the ambient noise levels in and around the drill sites. The noise generated from the above mentioned activities likely to be attenuated within 500m from the drill sites. The noise generated from drill sites may cause discomfort for the villagers within 500m.

Noise from Vehicular Traffic: As vehicles supplying, material and manpower to the site will pass through site access and approach road, it will result in increase in traffic density (compared to existing traffic) in the approach road and resultant significant increases in noise levels in the settlements immediate adjacent to the road. The impact will be more significant for residents living adjacent to the approach road where houses are located very close to the road. The noise pressure level caused by movement of a heavy truck, at a distance of about 5 m from the road, has been measured to be as high as 75- 80 dB(A) though it gets averaged out when expressed in Leq terms. This may cause considerable incremental noise disturbances to residents near site approach roads.

Operation of drilling rig and ancillary equipment: Operational phase noise impacts are anticipated from operation of drilling rig and ancillary equipment *viz*. shale shakers, mud pumps and diesel generators. Studies indicate that noise generated from operation of drilling rig generally varies in the range of 88-103 dB(A). Other contributors of high noise level at the well site include shale shakers, mud pumps and diesel generators. The average equivalent noise levels of drilling rig and ancillary equipment is estimated to 95 dB(A).

Further, considering drilling to be a continuous operation, noise generated from aforesaid equipment has the potential to cause discomfort to the local communities residing in proximity (within 500m) of the rig facility. Occupational health and safety impacts *viz*. Noise Induced Hearing Loss (NIHL) is also anticipated for personnel working close to such noise generating equipment until they are wearing appropriate personnel protective equipment.

Noise Level Prediction

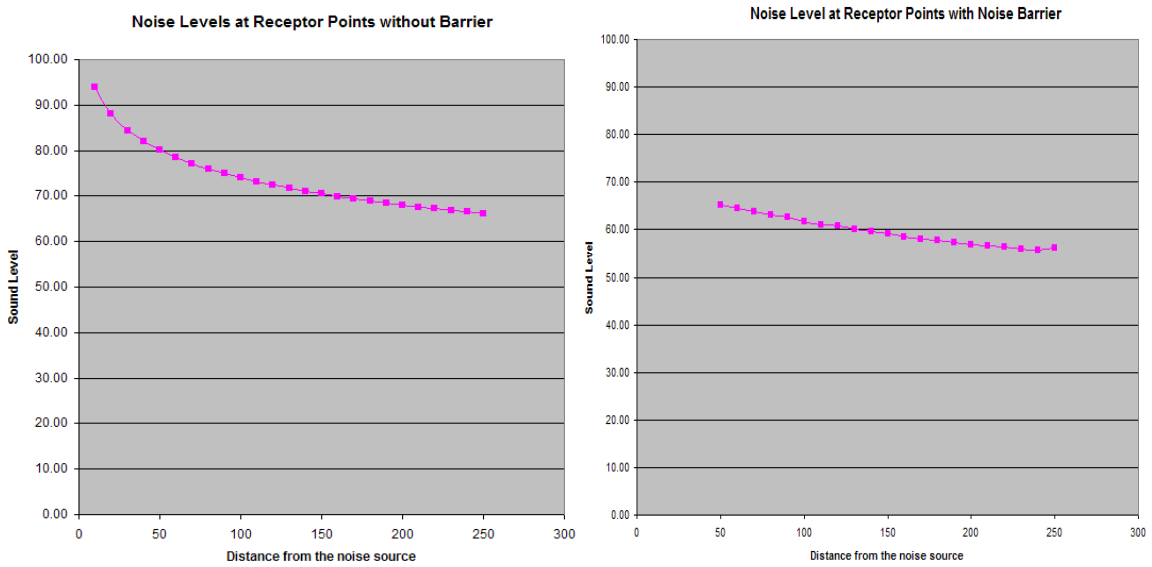
A noise modelling exercise has been undertaken based on standard noise attenuation equations to predict noise levels from drilling rig near sensitive receptors. A noise attenuation plot has been developed considering natural attenuation by distance with noise level predictions only expected to help in planning and decision-making. The equivalent noise level as measured at the residential areas ranges between 40.1-53.2 dB(A) at day time and between 37.5-46.9 dB(A) at night time. The equivalent day time noise values at all the 8 stations were in compliance to the day time standard of 55 dB(A) for residential areas. The equivalent night time noise values at seven locations viz. were in compliance to the night time standard of 45 dB(A) for residential areas. The cumulative noise generated from rig, mud pump, DG sets and shale shakers was calculated to be 95.0 dB(A). Noise attenuation equations (without any noise barrier) show that the normal attenuated noise at any receptor points located at a distance of about 100 m and 200 m from the fence-line of the rig, will be in the range of about 75.0dB(A) and 69.0 dB(A) respectively. In the absence of an acoustic barrier, the predicted noise levels were found to exceed the daytime noise standard of i.e. 55dB (A) which may lead to discomfort to neighbouring communities of villages that are present within 250m of the proposed locations.

The scale of impact of the above mentioned activities is considered to be **high** as the changes of baseline noise level the immediate vicinity of the drill sites are likely to regularly exceed the standard regularly. The extent of impact is considered as **local** as noise would be attenuated within 0.5 km of the drill sites. The duration of impact is also considered as **medium-term** spread across several phases of the project lifecycle. The magnitude of impact assessed to be **medium**. The sensitivity of the receptors is **high** as human receptors are present within 0.25 km of all the proposed locations and. The impact on ambient noise level assessed to be **major** (*Refer to **Table 4.6:** Impact Significance Matrix without mitigation measures*).

Mitigation Measures: With the introduction of a noise barrier such as a screen at the fence-line with a height of 4 m the noise level may be reduced. This control measure will reduce the noise levels near sensitive receptors at 50m to about 65.98 dB (A). The noise level can further be reduced by usage of screen that has absorptive surfaces such as vinyl sound insulating sheets[1]. These surfaces would help absorb the noise and reduce it to acceptable levels. However, a detailed noise modelling exercise to look at option of noise reductions will be conducted at the design stage to determine the barrier specifications. The noise attenuation plot with and without acoustic barrier is presented in **Figure 4.8**.

[1] https://www.indiamart.com/proddetail/armacell-armasound-barrier-e-acoustic-insulation-19849575333.html

Figure 4.8 Predicted Noise Pressure Levels at Receptor Points (with & without barrier)



The additional mitigation measures as proposed are as follows:

- Maintenance of vehicles and machineries;
- Provide portable metal noise barriers (screens) at fence line facing nearby receptors and areas surrounding drilling equipment generating high noise levels;
- Provide Personnel Protective Equipment (PPE) like ear plugs/muffs to workers at site;
- Restriction of unnecessary use of horns by trucks and vehicles near settlement areas; and
- Provide noise barrier in sensitive locations.

Residual Impact: Considering the implementation of above mentioned mitigation measures, the residual impact on noise quality is assessed to be **moderate** (*Refer to **Table 4.7** Impact Significance Matrix with mitigation*).

4.2.7 Potential Impact on Road & Traffic

Source of Impact: The source of impact is additional traffic load during:

- Predrilling Phase, production installations and laying of pipeline
  - Transportation of construction materials and manpower;
  - Transportation of drilling rig and machineries;
- Drilling phase
  - Transportation of drilling chemical and fuel
  - Transportation of manpower
- Decommissioning phase

- Transportation of drilling rigs and machineries.

Assessment of Impact: Total 2200 PCU was recorded at the traffic monitoring at Pengeri station and 3380 PCU was recorded at Bogapani station. As per observation made for traffic density, on an average 227 PCU was recorded per hour at Pengeri and 290 PCU per hour was recorded at Bogapani station.

Approximately, 100 trucks/trailers (350 PCU) load materials will be transported to drill site during construction phase which will be approximately 15.91% and 10.65% of the traffic load respectively for Digboi-Pengeri road and NH-38. During drilling activity 5-7 trucks/trailers (18-25 PCU) load materials will be transported to drill site; additionally, 10 to 15 (22-33 PCU) vehicles will be required for transport of site workers.

It is noted that NH-38 and Digboi-Pengeri road will be the main road for transportation of construction material and drilling rig and machineries.

The increase of traffic during construction phase will not cause perceptible changes in the existing road traffic, for Digboi-Pengeri road and NH-38, however, movement of 100 trucks/trailers within the site access roads passing through the villages may cause impact to the existing road infrastructure. The increase of traffic may cause community health and safety of the nearby villagers and sensitive man-made habitat like schools. Impact on community health & safety discussed in following section.

The scale of impact of traffic movement due to the proposed project is considered to be **medium** as the increase of traffic during construction phase will cause changes in the existing road traffic within the villages access roads (however, no perceptible change to the existing traffic load is expected during operation phase). The extent of impact is considered as **local** as impact would be on the access and approach roads to the site. The duration of impact is also considered as **medium-term** spread across several phases of the project lifecycle. The magnitude of impact assessed to be **medium**. The sensitivity of the receptors is **medium** as human receptors are present adjacent the access routes and likely to be affected by the project. The potential impact on road and traffic due to operational traffic is assessed to be **moderate** (*Ref. **Table 4.6:** Impact Significance Matrix without mitigation*).

Mitigation Measures: Precautions as mentioned will be taken to minimize impact on road and traffic:

- Avoid the traffic movement during school hours and market times;
- Avoid traffic movement during night time in proximity to the forest areas;
- Regular maintenance of the access roads;
- Deploying traffic supervisors at important road junctions and near sensitive receptors (eg. schools) for maintenance of project traffic.

Residual Impact: Considering the implementation of above mentioned mitigation measures, the residual impact disturbance/ discomfort to local people due to increase of traffic is assessed to be **minor** (*Refer to **Table 4.7** Impact Significance Matrix with mitigation*).

4.2.8 Potential Impact on Surface Water Quality

Source of Impact: Potential impact on surface water quality could arise due to the following activities;

- Predrilling phase, construction of production installations and laying of pipeline:
  - Surface runoff from construction site, spill area;
- Drilling phase:
  - Surface runoff from drill sites;
  - Accidental discharge from waste pit.
- Decommissioning phase:
  - Surface runoff from site.
- Operation of production installations
  - Surface runoff

Embedded Control Measures: The embedded control measures are as follows:

- Septic tanks and soak pits have been considered in the design of the OIL's camps for treatment of the domestic black water;
- Process wastewater would be treated in mobile Effluent Treatment Plant (ETP) at drill sites.

Assessment of Impact: The potential impact due to above-mentioned activities has been discussed in following section.

Surface run-off from the site: The site development activity *viz*. site clearance and stripping of top soil during site construction may result in increase in soil erosion that might lead to an increased silt load in the surface run-off. The surface run off from drilling waste (cuttings and drilling mud) storage areas, hazardous waste (waste oil, used oil, etc.) storage areas and chemical storage areas is likely to be contaminated. To prevent these run-offs, waste pits (dimensions given in *Section 2.8.3*), storm water drains and tankers (that will regularly carry the treated water) will be provided during drilling phase. Further, the boundaries of the waste pits will be raised to prevent any runoff. All the proposed locations are located within 500m of a stream that drains into either Buri Dihing River, Dumduma River.
Any accidental runoff from drill sites and production installations will create an adverse impact upon the receiving streams. This situation is likely to be more pronounced considering high rainfall received in these areas. The surface run offs may contain high sediment load, oil residues, organic wastes, etc. The higher value of suspended solid and organic rich sediment load may affect the lowering of DO levels and affect the aquatic ecology. Impact on aquatic ecology discussed in ecological impact assessment *Section 4.2.12*.

The Burhi Dihing River, Dumduma River are ecologically sensitive in terms of fish habitat, breeding and nursing ground for fishes. The water quality of the river is fit for outdoor bathing (CPCB Use Class Category B) and also no major contamination was recorded (*Refer to Section 3.3.8*).

Surface run-off, from drill site can cause reversible damage to water quality but likely to easily revert to earlier stage with mitigation, hence, scale of impact is ***medium***. The duration of impact will be **short term**; i.e. surface runoff may get accidentally discharged at the time of rainfall and formation water may get discharged accidentally. The extent of impact is ***regional*** as treated surface run-off may reach beyond 0.5 km from the drill sites***.*** The impact magnitude is assessed to be **small.**

The Burhi Dihing River, Dumduma River are ecologically sensitive in terms of fish habitat, breeding and nursing ground for fishes. Hence the sensitivity of the habitat is assessed to be **medium.**

The potential impact on surface water quality is assessed to be ***minor*** (*Refer to* ***Table 4.6:*** *Impact Significance Matrix without mitigation*).

Mitigation Measures: The mitigation measures are as follows:

- Construction activities *viz*. stripping, excavation etc., during monsoon season will be restricted to the extent possible;
- Channelize all surface runoff from the construction site through storm water drainage system and provide adequate size (of minimum one hour retention time) double chambered sedimentation tank;
- All chemical and fuel storage areas, process areas will have proper bunds so that contaminated run-off cannot escape into the storm-water drainage system;
- An oil-water separator will be provided at the storm water drainage outlet, to prevent contaminated run-off;
- Spill kits to be used for removal of any oil or chemical spillage on site;
- Additional storage area to be provided to store formation water within the drill site.

Residual Impact: Considering the implementation of above mentioned mitigation measures, the residual impact on surface water quality due to above mentioned activity is still assessed to be **minor** (Refer to **Table 4.7** Impact Significance Matrix with mitigation).

4.2.9 Potential Impact on Ground Water Resource

Source of Impacts: Potential impact on ground water resource could arise due to:

- Predrilling phase
  - Approx. 8 m^3/day (5 m^3/day for construction activity and 3 m^3/day for domestic use) for a period one month.
- Drilling phase
  - Approximately 50 m^3/day per well (39 m^3/day freshwater and 11 m^3/day recycled water) will be required,
  - Generation of formation water during drilling activity.
- Operation of Production facilities
  - Approximately 20 m^3/day will be required for the entire operation period,

Embedded Controls

- Use of mostly water based mud for drilling
- Proper engineering controls for the drilling and cementing operations
- Impervious storage area to be provided especially for fuel & lubricant, chemical, hazardous waste etc.

Assessment of Impact: The potential impact on groundwater resource has been discussed in following section.

Abstraction of ground water: The required water of 39 m^3/day freshwater for drilling activities will be sourced from ground water. As per CGWB ground water resource estimation the district is reported under “safe” category. Net groundwater availability of Tinsukia district net groundwater availability in the district is 1590.6 mcm while annual ground water draft is 166.97 mcm. Drilling is a temporary activity (approx 90 days) hence; impact on ground water resource will be low if OIL abstains from drawing water from the groundwater aquifers from which local people draw water.

Ground water cutting during drilling activity: The estimated depth of the drilling is 3900 m. During drilling activity, different aquifer will be intersected. The intersected ground water (formation water) will come out to surface with drill cuttings and mud. However, the well will be immediately protected by providing casing and cementing. This will prevent the mixing of ground water from different aquifers. It is estimated that 7-10 m^3/day of formation water may be discharged during the drilling activity which will be treated in ETP and will be reused.

This quantity of formation water and abstracted water is very low compared to likely potential yields of aquifers hence the scale of impact is **low**. The geographical extent of potential impact due to withdrawal of water is anticipated to be **regional**, impact duration is expected to be **medium term i.e.** across some phases during the entire duration of the project. The sensitivity is **low**, as the water resource is categorized as safe by CGWB. The impact on ground water resources is assessed to be **minor** (Refer to **Table 4.6:** Impact Significance Matrix without mitigation).

4.2.10 Potential Impact on Ground Water Quality

Source of Impact: Potential impact on ground water quality could arise due to contamination from fuel & chemical storage, hazardous waste storage, cutting and waste mud storage.

Embedded Control Measures: The project embedded control measures are as follows:
The drill cutting along with spent mud will be stored in HDPE lined pit.
After the drilling activity, this waste pit will be capped by HDPE liner and soil will be put over it.
Impervious storage area to be provided especially for fuel & lubricant, chemical, hazardous waste etc.

Impact Assessment: The potential impact on groundwater quality is discussed below:

Contamination from fuel, lubricant & chemical storage areas, drill cutting & waste mud storage and disposal area: Fuels, chemical lubricant etc., would be stored at a designated paved area within drill site. Thus, contamination of groundwater can happen due to accidental spillage of fuel, lubricants and chemicals from storage areas and during the transfer of fuels and chemicals.

The drill cutting and the spent mud would be stored in HDPE lined pits at site. Improper lining system or any puncture in the liner system can lead to the potential leakage of chemical like cadmium, mercury, etc. (present of mud chemical) and has potential to contaminate soil and subsequently ground water. Leachate will be generated, if the rainwater percolates into waste disposal area. This leachate can pass through the any puncture in the liner system and will have potential to contaminate the ground water.

Contamination during drilling of wells: The other impact on the groundwater quality will be due to the drilling activity. Water based mud will only be used as discussed in Section 2.7. However, eco-friendly polymer mud system will also be used if required for deeper sections after providing intimation to the Pollution Control Board. Possibility of contamination of subsurface and unconfined aquifers may also exist if the casing and cementing of the well is not carried out properly leading to infiltration or seeping of drilling chemicals or mud into porous aquifer region.

Considering project embedded control measures, the scale of impact is considered to be **low**. The geographical extent of potential impact due to above activity is anticipated is **local**; however, impact duration of impact is considered to be **long-term**- contamination may spread beyond lifecycle of the project. The impact magnitude is assessed to be **low**. The sensitivity is **high**, as the water is unpolluted and provides services as drinking water, domestic uses and irrigation for the area. The impact on ground water quality assessed to be **moderate.** (Refer to **Table 4.6:** Impact Significance Matrix without mitigation).

Mitigation Measures: The proposed mitigation measures are as follows:

- Prevent & mitigate spill of paint/fuel within the construction site;
- Conduct all the fuel transfer operations in paved areas;
- Regularly monitoring the ground water quality in the vicinity of the well sites.

Residual Impact: Considering the implementation of above mentioned mitigation measures, impact on ground water quality is assessed to be **minor** (Refer to **Table 4.7** Impact Significance Matrix with mitigation).

4.2.11 Potential Impact Terrestrial Ecology

Potential Impact on Terrestrial Flora

Source of Impact: The potential impacts on terrestrial ecology may arise due to:

- Vegetation clearance;
- Fugitive dust emission and deposition on vegetation;
- Laying of pipeline.

Embedded Control Measures: The control measures are as follows:

- Water sprinkling for dust suppression;
- Engineering control measures to minimise the noise level from construction machineries and equipment.

Impact Assessment: The potential impact on terrestrial ecology is discussed below:

Vegetation Clearance: The existing vegetation (if any) at the proposed drill sites and production facilities, approach roads and RoU of the pipeline will be felled for site development.

The ecological survey in the study area reveals that the vegetation species composition non-forest areas include planted species in agricultural lands, homestead plantation and tea garden areas. In these habitats the cleared vegetation can be brought back to near original condition with plantation programme. No facility is planned within forest area. The scale of impact can be considered as ***low***. Clearance of vegetation would happen in area of approximately 3 ha per well site, for each production facilities, up to 7 ha, clearance of vegetation will be required. Pipelines will be laid in 10 m RoU for interconnected pipelines. Extent of impact will be within the scattered project sites; hence, extent of impact will be ***regional***. The clearance of vegetation and change of land use hence, duration of impact is ***long term***. Impact magnitude will be ***medium***.

The vegetation in the non-forest areas where the proposed facilities are planned comprise of planted species and the habitat cannot be considered as sensitive hence, the resource sensitivity would be **low**.

Overall impact significance would be **minor**.

Fugitive Emission: The fugitive emissions are likely to be generated during site construction and decommissioning phases. Due to relatively large particulate matter sizes associated with the fugitive emission from construction site and the relatively short release height of the pollutants, such negative impacts are usually confined in relatively small areas; estimated to be 100 to 200 m from the construction site. The deposited particulate matter in non-forest areas may smother the plant leaf surfaces reducing photosynthesis levels within 100 – 200 m from the proposed project sites. The major vegetated areas of project sites include the homestead plantations, tea garden and agricultural land. However, few wells are in proximity to the forest areas where the emitted dust may impact the forest vegetation, requiring additional mitigation measures.

Air Emission: The major pollutant from the operation of DG sets is NOx. The baseline average NOx level in the area varies from 21.72 µg/m^3 to 24.11 µg/m^3. The operation of DG sets will also contribute NOx emissions. The predicted concentration of NOx from DG sets (baseline concentration + incremental concentration) will be 23.94 µg/m^3 to 54.56 µg/m^3.

Flare sets

Nitrogen-containing air pollutants can affect vegetation indirectly, via chemical reactions in the atmosphere, or directly after being deposited on vegetation, soil or water. The critical level (CLE) is the concentration in the atmosphere above which these is direct adverse effects on receptors, such as plants, ecosystems may occur. The Critical Levels for NO_2 is cited in 'Effects of nitrogen containing air pollutants: critical levels; Air Quality Guidelines – Second Edition[1]'.

Table 4.5 Critical Levels for NO_2

Concentration (µg/m^3)	Exposure Time	Remarks
95	4 hours	The incremental value of NO_2 in ambient air during the current drilling programme clearly indicates that concentration will be below critical level.
30	Annual mean	
800	1 hour	
60	Growing season	
40	Winter	

Source: WHO. 2000. Effects of nitrogen containing air pollutants: critical levels; Air Quality Guidelines – Second Edition

With respect to critical level value, the NO_2 levels in ambient air during the current drilling and production programme is expected to be low. Hence, the proposed drilling activity is not envisaged to cause damage to the vegetation in the area and the scale of impact will be **low**. Duration of impact will be **long term** i.e. during the entire drilling phase and extent of impact will be **regional** as emission from DG sets may reach a distance of 2-3 km (refer **Table 4.3**). The impact magnitude is assessed to be **medium**. The tree species present in the area are common and not under any threatened category hence the resource sensitivity would be **small**. Overall impact on vegetation due to air emissions is assessed to be **minor**.

The tree species present in the agricultural lands, tea plantation and homestead plantation are common and does not represent any ecosensitive habitat hence the resource sensitivity would be

[1] http://www.euro.who.int/__data/assets/pdf_file/0005/123098/AQG2ndEd_11no2level.pdf?ua=1

low;. Overall impact on terrestrial flora is assessed to be **minor** (Refer to **Table 4.6:** Impact Significance Matrix without mitigation).

Mitigation Measures
A range of measures will be adopted to mitigate potential impacts on the terrestrial flora including the following.

- The working area which has to be disturbed will be kept minimum at all times;
- Sourcing of timber and fuel wood from forest area will be prohibited;
- Regular maintenance of vehicles and machineries to control noise and air pollutant emission;
- All diesel-powered equipment will be regularly maintained and idling time reduced to minimize emissions;
- Low sulphur diesel (S<0.005%) will be used in diesel powered equipment and best management practices would be adhered to;
- Vehicle / equipment exhausts observed emitting significant black smoke in their exhausts will be serviced/ replaced;
- Fugitive dust will be suppressed with periodic water sprinkling.

Residual Impact: Considering the above mentioned mitigation measures, the residual impact on terrestrial flora is assessed to be **minor** (Refer to **Table 4.7** Impact Significance Matrix with mitigation).

4.2.11.1 Potential Impact on Terrestrial Fauna

Source of Impact: The potential impacts on terrestrial fauna may arise due to:

- Vegetation clearance;
- Illumination from site;
- Drilling activities resulting in fugitive particulate emissions and noise & vibrations; and
- Laying of pipeline.

Embedded Control Measures: The control measures are as follows:

- Water sprinkling for dust suppression;
- Engineering control measures to minimise the noise level from construction machineries and equipment.

Impact Assessment: The potential impact on terrestrial fauna is discussed below:

Vegetation Clearance: Vegetation clearance from the drill sites, access roads and pipeline RoU and production facilities will cause loss of habitat for the terrestrial fauna. There will be 14 wells & 3 production installations in the tea garden areas, 8 wells in homestead plantation areas and 4 wells in agricultural lands, with very low/scattered vegetation hence vegetation clearance is not expected to cause habitat fragmentation for the faunal species. Moreover, the IUCN threatened species found at the non-forest areas are Asian Elephant and Common Leopard.

Clearance of vegetation would not disturb the species composition of the area and clearance would happen in small area (approximately 3 ha. for each well; 7 ha for production facilities and 10 m RoU

for interconnected pipelines). The scale of impact can be considered as ***small*** for non-forest areas and the habitat can be easily regenerated through plantation. Extent of impact will be within the project site; hence, extent of impact will be ***local***. The clearance of vegetation will present ***long term*** impact as the vegetation could not be recovered easily. Impact magnitude will be **small**.

The sensitivity of species at the non-forest areas would be **high** as few Schedule I species and IUCN Endangered species (Asian elephant) may experience the impact. There is proximity of Dehing Patkai National Park and other sensitive reserve forest areas within the Block. Also there are two Elephant corridors (Bogapani and Golai-Powai) at the western portion of the Block where seasonal movement of elephants take place.

Overall impact significance would be **moderate**.

Noise Emission & Illumination: The proposed wells and production installations are located in rural settings and tea garden areas. Noise generated from various operational activities from the proposed locations during the drilling phase in presence of fence line barrier (*refer Potential Impact on Noise Quality Section 4.2.6*) is expected to get attenuated to baseline levels within 200-300 m from the drilling locations. As there is no natural wildlife habitat within 300 m of proposed drill sites and production facilities the incremental noise levels is not expected to cause significant disturbance to faunal species. However, few wells are located in proximity to the forest areas where, noise levels from the drill sites may cause disturbance for the forest fauna.

In the present study identified impacts on the herpetofauna, birds and mammals particularly on threatened and Schedule-I species of the landscape is presented below.

Impacts on Herpetofauna

Monitor lizards and pythons are often hunted or killed out of fear by local people. Therefore, it is recommended that during construction and operation phases, no workers shall be involved in killing of such species. It is recommended that prior to clearing vegetation from proposed project area; if the species is found in the construction area, then OIL should ensure safe rehabilitation of this species in to surrounding safe habitats. Local forest officials should be consulted in rehabilitating these individuals from project area to forest area.

There is also change of road kill of these species due to the movement of Project related vehicles. Islam and Saikia (2014)[1] , however, in their study had not reported road kill of these species from Jeypore RF area. However, maintenance of speed of vehicles in proximity to the forest areas and vegetated homestead plantation area to be followed.

Impacts on Avifauna

Degradation of air, soil and water quality would lead to degradation of vegetation and habitats of birds. Increased noise levels, light and disturbance levels would result in their displacement from the drill site and its immediate surroundings.

Sound or vocal signals (call, song) play a significant role in avian communication system[2] [3] [4] that includes partner selection, pair maintenance, parent-offspring interaction, cohesiveness among flock or family, alarm call and many more. Vocal communication is even effective over distance where communication through visual signalling is not possible. In their environment birds must be able to

[1] Mazedul Islam and Prasanta Kumar Saikia. 2014. A study on the road-kill herpetofauna of Jeypore Reserve Forest, Assam NeBIO. Vol. 5, No. 1, 78-83

[2] Kumar A. Acoustic Communication in Birds. Resonance. June 2003.

[3] J Podos and D L Moseley. Vocal Communication in Birds. 2009.

[4] Kroodsma DE, Byers BE. The Function(S) of Bird Song. 1991

discriminate their own song's and those of other species apart from any background noise[1]. Birds can tolerate continuous (e.g., up to 72 hours) exposure to noises up to 110 dB(A) without experiencing hearing damage or permanent threshold shift. A *Permanent Threshold Shift* (PTS), or permanent hearing loss, occurs if the intensity and duration of the noise is sufficient to damage the delicate inner ear sensory hair cells. At continuous noise levels below 110 dB(A) down to about 93 dB(A), birds can experience a temporary threshold shift. Temporary Threshold Shift (TTS) lasts from seconds to days depending on the intensity and duration of the noise to which the animal was exposed.

Noisy environment may result in displacement of avian species. Studies carried out on impact of Highway noise[2] (Reijnen and Foppen 1994, 1995[3]; Reijnen *et al.* 1995a, b; reviewed in Reijnen *et al.* 1995c) (Stone, 2000)[4], indicate lower breeding and less density near the source of sound (Highway).

Operation of drill sites will contribute to the higher illumination levels in the area. Light from the drill sites could be perceived by the animals either directly within direct line of sight, or as sky glow. Sky glow is the diffused glow caused from the light that is screened from view, but through reflection and refraction, the light creates a glow in the atmosphere. Sky glow is affected by cloud cover and other particles in the air. Clouds and particles reflect light adding to sky glow.

Studies were referred on artificial lighting's contribution to avian mortality due to disorientation[5]. Illumination effects include temporal niche partitioning; altered repair and recovery of physiological function; interference with detection of predators and environmental resources, signalling, and camouflage; changes in reproductive behaviour; and alterations in circadian rhythms[6].

It is often noticed, that construction workers engage in hunting of birds. Therefore, it is recommended that OIL should put in place all pollution control measures during construction, drilling and production phases which would not result in degradation of air, soil, water qualities of the surrounding area. It is also recommended that construction workers shall be strictly instructed so that they don't engage in hunting of birds. As vultures are reported in the area discussion should be undertaken with the local villagers to identify any vulture nests are found close to the drill sites or production facilities.

Impacts on Mammalian Fauna

Occurrences of mammals in the study area are mainly due to the overall ecological condition which provides them suitable habitats where they feed, rest and breed in the region. Degradation of air, soil and water quality would lead to degradation of vegetation and the overall quality of their habitats. Increased noise, light and disturbance levels would also result in their displacement from the Project sites and immediate surroundings. The major sources of noise pollution from the project activity include operation and movement of equipment and vehicles, operation of generator sets, drilling operation etc. The noise pollution could be a direct disturbance that may scare or frighten the wild

[1] Dooling, R.J. 1982. Auditory perception in birds. In: Acoustic communication in birds (volume 1):95-129. Academic Press, New York

[2] Reijnen *et al.*, supra note 29; R. Foppen & R. Reijnen, The Effects of Car Traffic on Breeding Bird Populations in Woodland. II. Breeding Dispersal of Male Willow Warblers (Phylloscopus trochilus) in Relation to the Proximity of a Highway, 31 J. Applied Ecology 95–101 (1994).

[3] Reijnen, R., and Foppen, R. (1995). The effects of car traffic on breeding bird populations in woodland. IV. Influence of population size on the reduction of density close to the highway. J. Appl. Ecol. 32, 481-491

[4] Stone, E. (2000). Separating the noise from the noise: a finding in support of the Niche Hypothesis, that birds are influenced by human-induced noise in natural habitats. Anthrozoos. 13, 225-231.

[5] Cabrera-Cruz SA, Smolinsky JA & Buler JJ (2018) Light pollution is greatest within migration passage areas for nocturnally-migrating birds around the world. Nature Scientific Reports 8:e3261.

[6] Rodríguez A, Holmes ND, Ryan PG, Wilson K-J, Faulquier L, Murillo Y, Raine AF, Penniman J, Neves V, Rodríguez B, Negro JJ, Chiaradia A, Dann P, Anderson T, Metzger B, Shirai M, Deppe L, Wheeler J, Hodum P, Gouveia C, Carmo V, Carreira GP, Delgado-Alburqueque L, Guerra-Correa C, Couzi F-X, Travers M & Le Corre M (2017) A global review of seabird mortality caused by land-based artificial lights.
Conservation Biology 31:986-1001.

animals, restriction on movement of wildlife, artificial lighting at drill sites and production installation may pose serious impacts during breeding season as it may lead to stress.

The sense of hearing is highly developed and specialized in the mammals relative to other tetrapods (Stebbins 1978 [1]; Harrison 1984 [2]). Earlier studies have indicated that sound levels above about 90 dB are likely to be aversive to mammals[3] and are associated with a number of behaviours such as retreat from the sound source, freezing, or a strong startle response.

Operation of drill sites will contribute to the higher illumination levels in the area. Light from the drill sites could be perceived by the animals either directly within direct line of sight, or as sky glow. Activity periods of animals were generally classified into four categories: diurnal (day-time), nocturnal (night-time), crepuscular (twilight), and cathemeral (day and night time). A study conducted for light impacts on animals in Manas Nation Park, Assam[4] classified faunal species into the following categories

- Diurnal: *Martes flavigula, Lutrogale perspicillata, Herpestes urva, Herpestes auropunctatus, Herpestes edwardsii, Cuon alpinus, Elephas maximus, Sus scrofa*, Terrestrial birds (*Gallus gallus, Lophura leucomelanos, Pavo cristatus*) and primates (*Macaca mulatta, Macaca assamensis, Trachypithecus pileatus*).
- Nocturnal: *Prionailurus bengalensis, Viverra zibetha*, *Viverricula indica, Neofelis nebulosa*, *Lepus nirgicolis, Caprolagus hispidus* and *Hystrix brachyura*.
- Cathemeral: *Paradoxurus hermaphroditus, Panthera tigris, Panthera pardus* and *Ursus thibetanus, Bos gaurus, Bubalus arnee, Muntiacus muntjak, Hyelaphus porcinus, Rusa unicolor*

Aschoff (1960)[5] referred that nocturnal species decrease activity in constant light while diurnal species increase their activity. The activity patterns of particularly the nocturnal animals would likely to be impacted due to the illumination at drill sites. Illumination effects include temporal niche partitioning; altered repair and recovery of physiological function; interference with detection of predators and environmental resources, signalling, and camouflage; changes in reproductive behaviour; and alterations in circadian rhythms[6].

The drill site would be illuminated with artificial lighting as drilling is conducted continuously for 24 hours and thus may cause significant alternation of existing illumination levels in the area and may disturb the local fauna as well as the fauna (particularly birds and mammals).

Taking presence of sensitive ecological habitats, IUCN Threatened and few Schedule I species into account, in proximity to the proposed well sites, the sensitivity of ecological habitat is considered as **high**.

The scale of impact is considered to be **medium** as disturbance to fauna may occur due to illumination from the drill site may affect the faunal species. The extent of impact is considered to be **regional** i.e. within 5 km of the proposed drill sites and production facilities. The duration of impact

[1] Stebbins, W.C. 1978. Comparative biology of hearing in the mammals. (Abstract only). J. Acoust. Soc. Am. 64(Suppl, 1):15.

[2] Harrison, J.M. 1984. The functional analysis of auditory discrimination. J. Acoust. Soc. Am. 75:1845-1854.

[3] Effect of Aircraft Noise and Sonic Boom on Domestic Animals and Wildlife: A Literature Synthesis. 1988. Engineering and Services Center US Air force. Fish and Wildlife Service, US Department of the Interior.

[4] Bhatt U.M, Habib B, Sarma H.K & Lyngdoh S.L. 2018.Catch me if you can: Species interactions and moon illumination effect on mammals of tropical semi-evergreen forest of Manas National Park, Assam, India, doi: http://dx.doi.org/10.1101/449918.

[5] Aschoff, J. Exogenous and Endogenous Components in Circadian Rhythms. Cold Spring Harb. Symp. Quant. Biol. 25, 11–28 (1960).

[6] Rodríguez A, Holmes ND, Ryan PG, Wilson K-J, Faulquier L, Murillo Y, Raine AF, Penniman J, Neves V, Rodríguez B, Negro JJ, Chiaradia A, Dann P, Anderson T, Metzger B, Shirai M, Deppe L, Wheeler J, Hodum P, Gouveia C, Carmo V, Carreira GP, Delgado-Alburqueque L, Guerra-Correa C, Couzi F-X, Travers M & Le Corre M (2017) A global review of seabird mortality caused by land-based artificial lights.
Conservation Biology 31:986-1001.

will be **medium-term** during the entire drilling phase only. The magnitude of the ecological impact would be **medium**. The impact significance on terrestrial ecology is thus assessed to be **major.**

Mitigation Measures
A range of measures will be adopted to mitigate potential impacts on the terrestrial ecology and biodiversity, including the following.

- The working area which has to be disturbed will be kept minimum at all times;
- Sourcing of timber and fuel wood from natural vegetated area will be prohibited;
- Regular maintenance of vehicles and machineries to control noise and air pollutant emission;
- All diesel-powered equipment will be regularly maintained and idling time reduced to minimise emissions;
- Low sulphur diesel (S<0.005%) will be used in diesel powered equipment and best management practices would be adhered to;
- Vehicle / equipment exhausts observed emitting significant black smoke in their exhausts will be serviced/ replaced;
- Restrict all noise generating operations, except drilling, to daytime;
- Fugitive dust will be suppressed with periodic water sprinkling;
- Provide portable noise barriers high noise generating areas and along the fence line adjoining sensitive locations;
- Appropriate shading of lights to prevent scattering;
- The movement of construction vehicles will be minimised and a speed of 20 km/hr will be enforced along the access and approach roads.
- Drilling of wells in proximity to the elephant corridors (Well 822, 835, 836) to avoid the seasonal elephant movement months September-February.

Residual Impact: Considering the above mentioned mitigation measures, the residual impact on ecology and biodiversity is assessed to be **negligible** for impact due to air emissions and **moderate** for impacts due to noise and illumination (*Refer to **Table 4.7** Impact Significance Matrix with mitigation*).

4.2.12 Impact on Aquatic Ecology

Source of Impact: Impacts to the aquatic habitat during construction phase may happen due to:

- Untreated surface runoff from site; and
- Subsurface contamination leading to nearby water body.

Embedded Control Measures: The control measures are as follows:

- Treatment of domestic waste water through septic tank and soak pit;
- Storage of diesel, lubricant and waste oil on paved surface with secondary containment;
- Treatment of process effluent and re-use in the process.

Impact Assessment:

Surface Runoff: Surface runoff from the drill sites contaminated with sediment, site may reach Buri Dihing River, Dumduma River through small drainage channels and increase the suspended solids load of the river water. Increase of suspended solid will increase the turbidity of river water that ultimately will adversely affect the Dissolved Oxygen (DO) level in the water. The turbid water and lower DO will affect the primary productivity of the impacted areas of the rivers.

During site development and drilling activities, operation of machineries and vehicles will take place at site. For the operation of construction machineries and vehicle, oil (diesel) and lubricant will be utilised; accidental spillage and leakage of oil and lubricant is likely to be mixed up with surface runoff. Runoff water contaminated with oil and grease has the potential to impact water quality of the receiving waterbody. The degradation of water quality will affect the primary productivity of Burhi Dihing River, Dumduma River etc.

In case of any discharge of oil/condensate from the well sites in case of any unprecedented incident like blowout the oil/condensate will affect the aquatic habitat and species of the surrounding areas. The probable impacts are described below;

There are several classes of molecular hydrocarbons present in oil and natural gas. One group, the aromatics including Polynuclear Aromatic Hydrocarbons (PAH) poses a significant threat to wildlife because of toxic and mutagenic effects (Akcha *et al.* 2003[1]). PAHs are some of the last components of oil to degrade and can persist in the environment for many years, even where oil is no longer visually apparent (Mendelssohn *et al.* 2012[2]). In order for hydrocarbon metabolites to have a direct biological effect on terrestrial vertebrates, they must enter the individual, typically via ingestion, inhalation, or absorption (Smith *et al.* 2007[3]). For most organisms, the primary route of PAH exposure in oil-affected habitats is through the ingestion of contaminated soils, sediments, and diet items.

Biotransformation of PAHs in aquatic organisms occurs to varying degrees depending on a number of factors, including the rate of uptake, metabolic capability, physical condition, feeding strategy, and age (James, 1989[4]; Cerniglia & Heitkamp 1989[5]). Consequently, species that feed heavily on sediment-associated invertebrates tend to be at greater risk of PAH exposure relative to higher-order consumers (Brooks *et al.* 2009[6]). In aquatic organisms, exposure to PAHs can occur through dermal exposure, respiration, or consumption of contaminated prey (e.g., annelids, molluscs) or sediment (Cerniglia & Heitkamp 1989). Molluscs generally have lower PAH-metabolizing capability compared to certain species of polychaetes, crustaceans, and fish (Meador *et al.*, 1995[7]).

Fish - In contrast PAHs are readily metabolized by teleost fish. As a result of this rapid metabolism and elimination in fish, concentrations of parent PAHs are negligible in muscle and other tissues.

[1] Akcha F, Burgeot T, Narbonne JF, Garrigues P. 2003. Metabolic activation of PAHs: Role of DNA adduct formation in induced carcinogenesis. Pages 65–80 in Douben PE, ed. PAHs: An Ecotoxicological Perspective. Wiley.

[2] Lin Q, Mendelssohn IA. 2012. Impacts and recovery of the Deepwater Horizon oil spill on vegetation structure and function of coastal salt marshes in the northern Gulf of Mexico. Environmental Science and Technology 46: 3737–3743

[3] Smith PN, Cobb G, Godard-Codding C, Hoff D, McMurry S, Rainwater T, Reynolds K. 2007. Contaminant exposure in terrestrial vertebrates. Environmental Pollution 150: 41–64.

[4] James, M. O. (1989). Biotransformation and deposition of PAH in aquatic invertebrates. In Metabolism of Polycyclic Aromatic Hydrocarbons in the Aquatic Environment (ed. U. Varanasi), pp. 69–91. Boca Raton, FL: CRC Press.

[5] Cerniglia, C. E. and Heitkamp, M. A. (1989). Microbial degradation of polycyclic aromatic hydrocarbons (PAH) in the aquatic environment. In Metabolism of Polycyclic Aromatic Hydrocarbons in the Aquatic Environment (ed. U. Varanasi), pp. 41–68. Boca Raton, FL: CRC Press.

[6] Brooks AC, Gaskell PN, Maltby LL. 2009. Importance of prey and preda¬tor feeding behaviors for trophic transfer and secondary poisoning. Environmental Science and Technology 43: 7916–7923

[7] Meador, J. P., Stein, J. E., Reichert, W. L. and Varanasi, U. (1995). Bioaccumulation of polycyclic Aromatic hydrocarbons by marine organisms. In Reviews of Environmental Contamination and Toxicology (ed. G. Ware), pp. 79–165. New York: Springer

While the reproductive toxicity of PAHs in female fish is well established (e.g., Johnson *et al.*, 1998[1], 2008[2]; Anderson *et al.*, 1996[3]; Ridgway *et al.*, 1999[4]), less information is available on the effects of PAHs on reproductive function in male fish, as most of the results are contradictory. But reduced female fertility will always lead to reduced reproductive rate. More over PAH are associated with endocrine disruption in fish, disruption in embryonic and larval development[5].

Amphibians - Uptake through the skin is particularly important in amphibians (Smith *et al.* 2007), especially in the presence of ultraviolet light, which may increase PAH toxicity (Malcolm & Shore 2003[6]). PAH is generally associated with alterations in healthy metamorphosis timelines and development outcomes (e.g. physical mutations) (Hersikorn & Smits. 2011[7]). Studies conducted on Frog eggs from *Rana* sp. were severely affected (higher mortality rate) by hydrocarbon (naphthalene (two rings), phenanthrene (three rings) and pyrene (four rings) exposure (Marquis *et al.* 2006[8]).

Turtles - Aquatic reptiles such as turtles have been studied in relation to PAH toxicity. Findings from a study aiming to determine the impact of oil pollution within the Nigerian Delta, Nigeria, showed that 50% of turtle species were absent following an oil spill and a strong decline in the numbers of turtles for those species which were able to survive the catastrophic pollution event was observed (Luiselli & Akani 2003[9]). Reasons for these decreases are attributed to either migration of the turtle species to more pristine areas or death due to being smothered with oil leading them not being able to regulate their body temperatures, breathe, see, swim efficiently or reproduce[10].

The extent of impact will be **regional** as surface run-off from the drill sites might reach Buri Dihing River, Dumduma River through small streams. The duration of impact will be **medium term**; i.e. mainly during monsoon season. Oil and chemicals present in the surface runoff will be lower in volume and diluted after reaching Buri Dihing River, Dumduma River. Oil and chemical may be deposited at the benthic ecosystem of the rivers hence the scale of the impact would be **medium**. The impact magnitude is assessed to be **medium**.

The Buri Dihing River, Dumduma River are ecologically sensitive in terms of fish habitat, breeding and nursing ground for fishes. Hence the sensitivity of the habitat is assessed to be **medium**.

The potential impact on aquatic ecology due to above mentioned activity is assessed to be **moderate**.

Mitigation Measures:

A range of measures will be adopted to mitigate potential impacts on the ecology and biodiversity, including the following:

[1] Johnson, L. L., Landahl, J. T., Kubin, L. A., Horness, B. H., Myers, M. S., Collier, T. K. and Stein, J. E. (1998). Assessing the effects of anthropogenic stressors on Puget Sound flatfish populations. Journal of Sea Research 39, 125–137.
[2] Johnson, L. L., Arkoosh, M. R., Bravo, C. F., Collier, T. K., Krahn, M. M., Meador, J. P.,Myers, M. S., Reichert, W. L. and Stein, J. E. (2008). The effects of polycyclic aromatic hydrocarbons in fish from Puget Sound Washington. In The Toxicology of Fishes (eds. R. T. DiGiulio and D. E. Hinton), pp. 874–919. Boca Raton, FL: CRC Press.
[3]Anderson, M. J., Miller, M. R. and Hinton, D. E. (1996). In vitro modulation of 17-b-estradiolinduced vitellogenin synthesis: effects of cytochrome P4501A1 inducing compounds on rainbow trout (Oncorhynchus mykiss) liver cells. Aquatic Toxicology 34, 327–350.
[4]Ridgway, L. L., Chapleau, F., Comba, M. E. and Backus, S. M. (1999). Population characteristics and contaminant burdens of the white sucker (Catostomus commersoni) from the St. Lawrence River near Cornwall, Ontario and Massena, New York. Journal of Great Lakes Research 25, 567–582.
[5] Collier TK Arkoosh MR, Dietrich J, Incardona J. Effects on Fish of Polycyclic Aromatic Hydrocarbons (PAHs) and Naphthenic Acid Exposures. 2013.
[6] Malcolm HM, Shore RF. 2003. Effects of PAHs on terrestrial and freshwater birds, mammals, and amphibians. Pages 225–242 in Douben PE, ed. PAHs: An Ecotoxicological Perspective. Wiley
[7] Hersikorn BD, Smits JEG (2011) Compromised metamorphosis and thyroid hormone changes in wood frogs (*Lithobates sylvaticus*) raised on reclaimed wetlands on the Athabasca oil sands. Environ Poll 159:596–601
[8] Marquis O, Millery A, Guittonneau S, Miaud C (2006) Toxicity of PAHs and jelly protection of eggs in the common frog Rana temporaria. Amphibia-Reptilia 27:472–475
[9] Luiselli L, Akani GC (2003) An indirect assessment of the effects of oil pollution on the diversity and functioning of turtle communities in the Niger Delta, Nigeria. Animal Biodivers Cons 26(1):57–65
[10] Ball A, Truskewycz A. Polyaromatic Hydrocarbon Exposure: An Ecological Impact Ambiguity. 2013.

- Earth works and other construction activities during heavy rains to be avoided;
- Sedimentation tank and oil-water separator will be installed at peripheral drains developed along the well pad sites to control any accidental discharge before it reaches any surface water body;
- Spill kits to be used for removal of any oil or chemical spillage on site;
- Additional storage area to be provided to store formation water within the drill site;
- Proper monitoring of indicator species will be carried out and compared to baseline conditions to understand any negative impacts.
- Oil booms, sorbents, dispersants will be kept on site to contain any oil spill to the nearest receiving waterbody.

Residual Impact: The residual impact on aquatic ecology and biodiversity with mitigation measures will be low in scale, hence magnitude will be small which with medium sensitivity will be result in **minor** impact significance (*Refer to **Table 4.7:** Impact Significance Matrix with mitigation*).

4.2.13 Potential Impact on Socio-economic Environment

A socio economic impact assessment facilitated an understanding of the needs, demands, preferences, capacities, constraints of and benefits to the people in the vicinity of the Project operation. It was undertaken primarily to enhance the understanding of other relevant factors such as social organizations and networks, livelihood patterns, social infrastructure etc. The assessment attempts to predict and evaluate future impacts of project upon people, their physical and psychological health and well-being, their economic facilities, cultural heritage, lifestyle and other value system.

The assessment of socio-economic impacts due to the proposed drilling and production activity have considered the following context and project activities:

- Non-forest lands will be also procured from locals and tea garden authorities for drill sites and production facilities in agriculture lands, homestead plantation areas and tea garden areas. However, no physical displacement due to land lease is envisaged at drill site and production facility installation
- There will be incremental change in the workforce during construction and operations phase. A majority of the workforce is likely to be from the local areas.

Source of Impact

- Loss of livelihood/income to the locals
- Conflict with local people

Embedded Control Measures

- As non-forest land that are to be procured, OIL will discuss with them and provide compensation to them;
- OIL organize continuous consultation with the local people and also timely disclosure of project activities;
- OIL has established grievance redressal process to deal with conflict with local communities.

Assessment of Impacts

Loss of livelihood /income*:* As discussed in Section 4.2.1; 26 developmental wells will be drilled and 3 production facilities and with associated road infrastructure will be constructed in different location within Dibrugarh districts. Approximately 3 ha. land would require for drilling and 7 ha for production facilities which will be purchased from local communities. Discussion with OIL officials reveals that mostly agricultural, tea garden and homestead plantation land will be selected and no physical displacement during land procurement is anticipated. Affected landowners will be adequately compensated for the land parcels, any assets over the land and for the standing crop.

Community consultation reveals that the dependency of the landowner in case of generation of livelihood is limited as most of the agricultural land in this region is classified as mono-cropped agricultural land hence the resource sensitivity is medium. As discussed, only 3 ha land for a drill site and 7 ha. land for a production facility will be procured from different location within the Tinsukia districts hence extent of impact would be local. Land procurement will cause permanent change of land use hence the scale of impact would be high and duration would be permanent. Impact magnitude is assessed to be **medium**. As the land parcels to be acquired will be 3 ha each for 26 drilling sites and up to 7 ha each for three production facilities, there will be diverse receptors for individual land parcels who will be adequately compensated, therefore receptors sensitivity would be medium. The impact significance would be **moderate**.

Conflict with Local People: Consultations in the neighbouring villages indicate that the people in the area look forward to new employment to be generated by the Project. Even though OIL/its contractors would endeavour to provide maximum employment to the local people, there would be constraints due to the lack of required technical skills and expertise in the local population. So, certain percentage of semi-skilled and highly skilled migrant labour would be used by contractors for manning these activities. It is anticipated that occasional conflicts would arise with the local community over the recruitment of migrant workers.

Conflict with local people may also arise due to different Project activities *viz*. movement of vehicles, generation of dust and noise due to Project activities, use and damage of common property resources etc. The receptor sensitivity would be **high** as drill site and access road is near habitat area. The scale of the impact would be ***medium*** as people in this region are familiar with the oil and gas-drilling activities. Apart from that, OIL also has structured grievance redressal procedure to deal with the community conflicts. The extent of the impact would be ***local*** as it would be limited to immediate vicinity of the sites selected for drilling activity and production facility and access roads. The duration of the impact would be ***short term*** as conflict may arise at any point of time during the project activity; however, the same is expected to be addressed through active grievance redressal system of OIL. The magnitude of impact is assessed to be **small**. The significance of impact would be **moderate** (Refer to **Table 4.6** Impact Significance Matrix without mitigation).

Mitigation Measures

- Communication in the nearby villagers during the construction phase and the installation of an effective grievance redressal mechanism;
- Migrant labours would be provided training on local culture and traditions;
- Labours to be provided with proper sanitation facilities.
- Implement effective social development programmes for people living surrounding the Project sites.

Residual Impact: Considering the above-mentioned mitigation measures the residual impact will remain same, i.e. **moderate** (*Refer to **Table 4.7** Impact Significance Matrix with mitigation*).

4.2.13.1 Loss of Livelihood and Fragmentation of Land Due to Pipeline Laying

Maximum 10 meter RoU will be required for laying of oil pipeline and as per planning majority of the pipeline will be routed through agricultural land and tea garden areas. However, the land required for RoU of the pipeline will not be purchased and it will remain with the land owner for future agricultural use. Parcels of land along the proposed RoU for laying of oil pipeline may get fragmented due to the linear nature of the oil/gas pipeline. This may either lead to partial loss of cultivable land or even creation of orphan lands which may be rendered too small or unviable for cultivation for agriculture. However, all the agricultural land in this area are mono cropped in nature i.e. the agricultural activity is limited to three to four month in a year. Moreover, laying of pipeline would take 3-4 months only and land could be used for agriculture after the laying of the pipelines with restricted use. The landowners will be compensated as per the provisions of the Petroleum and Minerals Pipelines (Acquisition of Right of User in Land Act, 1962 as amended up to 2012 hence the receptor sensitivity will be ***medium***.

As this impact is limited to the oil pipeline laying site hence the impact extent will be ***regional*** and duration will be ***short-term*** as it is limited to construction period. It is understood that landowner can use this land for agriculture purpose once the construction activity will be over hence the scale of the impact will be ***medium*** and the magnitude will be ***small*** and with receptors ***medium*** sensitivity significance of the impact will be ***minor.***

Benefit to Local Enterprises

The project is likely to influence development of entrepreneurs in the area. The local enterprises, particularly involved in production and sale of construction materials are expected to be potential benefactors of the civil works to be undertaken for the project. Similarly, local transporters of construction materials will also benefit from the project.

Employment Generation

The construction phase of the project is likely to generate both direct and indirect opportunities for employment. The estimated direct employment would be approximately 50 un-skilled workers during the peak construction phase that will primarily sourced from nearby villages. Indirect employment would be primarily in the supply chain as vendors, which are anticipated to be set up to support the construction. The local people are expected to be having options for such indirect employment, even if they are not directly involved as construction labour. Overall construction activity would have positive impact on the socio-economic conditions in general and employment scenario in particular in the study area.

4.2.14 Potential Impact on Occupational Health & Safety

Construction Phase

Source of Impact: Occupational health and safety impacts during construction phase are anticipated primarily from:

- Operation of construction machineries/equipment;
- Exposure to high noise generation areas.

Embedded Control Measures: The project embedded control measures are as follows:

- Provision of proper PPEs for the contractor workers onsite;
- Provision of drinking water facility, sanitation and cooking facilities.

Assessment of Impacts:

Impact on occupational health and safety of contractor workers is anticipated from exposure to high noise generated from operation of heavy machineries/equipment and fugitive dust generated from material stockpiles, earth works and vehicular emission. It is estimated that about 40-50 workers will be deployed by the contractor at each drill site and 10 workers in the production facility. The outstation project workforce will be housed in labour camp located within the drill site. Continuous exposure of workers to high noise levels and fugitive dust and inadequate facilities and unhygienic conditions at such camps may lead to adverse health impacts *viz*. headache, asthma, allergy, hearing loss etc. indicating a ***high*** receptor sensitivity. However, extent of the impact is limited to the well site and production facility only hence the impact will be ***local***. Also considering the temporary nature of the construction phase activities, intermittent operation of machineries/equipment duration will be ***short term*** and with provision of proper PPEs and training for the workers scale of the impact will be ***low***. Hence, the impact magnitude for occupation health and safety due to above mentioned construction activities is assessed to be **medium and** significance would be **moderate** (Refer to **Table 4.6** Impact Significance Matrix without mitigation).

Mitigation Measures: The mitigation measures are as follows:

- Provision of healthy living conditions will be ensured in the contractor labour camp as per National Policy on Safety, Health & Environment at Work Place;
- Exposure of workers operating near high noise generating sources will be reduced to the extent possible;
- Health surveillance of contractor workforce will be conducted;
- Occupational health and safety of contractor workforce will be assured through the formulation of an “Occupational Health & Safety Management Plan”.

Residual Impact: Considering the implementation of abovementioned mitigation measures, impact on occupational health and safety is assessed to be **minor** (Refer to **Table 4.7** Impact Significance Matrix with mitigation).

Operational Phase

Source of Impact: The source of occupational health and safety could arise from:

- Operation of rig and machineries,
- Exposure in high noise generation area.

Embedded control measures: The control measures are as follows:

- All potential occupational health hazards will be identified;
- Permit to work system to be in place;
- Provision of PPE’s to all workers.

Assessment of Impact:
Major occupational health risks encountered in proposed drilling activity include noise from drilling activity, operation of heavy vehicles and machinery, handing of chemicals etc. both in drill site and production facility.

Drilling Activity: Continuous exposure of workers involved in drill activity to high noise levels may lead to adverse health impacts viz. headache, hearing loss etc. which indicates a **high** receptor sensitivity. It is understood that extent of the impact is limited to the well site only hence the impact will be **local**. As the drilling activity will be continues maximum up to 3 months and intermittent operation of machineries/equipment duration will be **short term** and with provision of proper PPEs and training of the workers scale of the impact will be **low** and magnitude of the impact would be small. Hence, the impact significance of occupation health and safety due to above mentioned construction activities is assessed to be **moderate** (Refer to **Table 4.6** Impact Significance Matrix without mitigation).

Production Facility: Main impact on occupational health safety in production facility will be limited to operation of heavy vehicles and machinery, handing of chemicals etc. However, involved of the personal in a production facility per shift is maximum upto 10 person and it is understood that they will be trained. Hence, the resource sensitivity will be **medium**. As all the activity of production facility will be carried out within secure premise extent of impact will be **local**. In an oil and gas site production installation will be **permanent** in nature and continues is operation up to 20 years hence the impact will be permanent in nature. As the risk level of a production facility is high as it is handling highly inflammable hydrocodone embedded control of any production facility is very strong so the scale of the impact will be **medium**. Hence, the magnitude of the impact will be **medium** and significant of the impact is assessed to be **moderate** (Refer to **Table 4.6** Impact Significance Matrix without mitigation).

Mitigation measures: The mitigation measures are as follows:

- Regular onsite surveillance to be conducted so that the workers use the designated PPEs all the time;
- Health surveillance will be conducted of personnel working in the aforesaid areas;
- Regular health and safety training to be provided to workers.

Residual Impact: Considering the implementation of above mentioned mitigation measures, impact on occupational health and safety is assessed to be **minor** (Refer to **Table 4.7** Impact Significance Matrix with mitigation).

4.2.15 Potential Impact on Community Health and Safety

Source of Impact: The community health and safety impacts may arise due to:

- Changes in environmental quality,
- Influx of non-resident workers to the area;
- Movement of project traffic.

Embedded Control Measures: The embedded control measures are as follows:

- Engineering control measures to minimize the noise level from construction machineries;
- Dust suppression measures.

Assessment of Impact

***Dust and Noise Discomfort*:** Proposed project site is surrounded by several rural settlements. Inhabitants residing close to site and access roads will get affected due to noise and dust generated from vehicular movements, site preparation operation of machineries, construction activities etc. The construction noise level will be attenuated within 200 m from the construction site. Incremental noise level will remain within the ambient noise quality standard for residential area. The scale of impact is assessed to be **low.**

***Influx of non-residential workers*:** Approximate 50 workers will be employed during the construction phase of the project and it is anticipated that about 50% of the workers would be non-locals. The influx of workers to the community may cause impacts to public health, especially an increase in prevalence of diseases. Influx of migrant labours during construction can cause mixing of the migrant workforce with the local people. This mixing of the groups may cause some adverse impacts to public health in the neighbouring villages with the potential for spread of infectious diseases such as AIDS.

Improper sanitation facilities and disposal of municipal solid waste from the construction labour camps can also trigger vector borne diseases. Measures such as proper collection, storage and disposal of wastes, construction of septic tanks to prevent contamination of water resources from sanitary effluents generated from labour camps will be implemented. Taking these measures into account, the scale of impact is assessed to be **low**.

***Traffic Movement in site approach road*:** An increase in traffic during the peak construction activities and may create public safety issues for residents. Potential impacts may include blocking access, congestion and traffic accidents along the approach road. With mitigation measures as speed control in place the scale of impact to communities from heavy vehicular movement is assessed to be **low.**

As mentioned above that most of the well site, production facility and access road will be located adjacent to the habitation area hence the receptor sensitivity will be **high**. However all the drill site and production facility will be stand alone and any impact arises from the facility will be affect the nearby area of the drill site hence the extent of the impact will be **local**. It is understood that all the impact will be limited to the construction phase and affect will be over after completion of the construction hence the duration of the impact will be **short term**. It can also be anticipated that with proper embedded control all the impact will be very limited hence, the scale of the impact will be **medium**. Then the impact magnitude on community health and safety due to above mentioned activities is assessed to be **medium** and significance of impact will be **moderate** (Refer to **Table 4.6** Impact Significance Matrix without mitigation).

Mitigation Measures: The following mitigation measures will be put in place to reduce impacts to community to as low as reasonably practicable:

- Emphasizing safety aspects among drivers, particularly with regard to safe driving speeds;
- Ensuring that only licensed drivers are employed by the project;
- Avoiding peak hours for heavy vehicles movement where possible;
- Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure;
- Collaboration with local communities and responsible authorities to improve signage, visibility and awareness of traffic and pedestrian safety.

Residual Impact: Considering the above mentioned mitigation measures, the residual impact on community health and safety is assessed to be **minor** (Refer to **Table 4.7** Impact Significance Matrix with mitigation).

4.2.16 Cumulative Impacts

Cumulative impacts are incremental impacts that are caused on resources or receptors together with other third party planned or reasonably defined developments (that are known at the time of risks or impacts identification process is conducted) and that take place simultaneously in time and space within the same area of influence (study area) of a project under consideration. Thus, the cumulative impacts are combined effects together with other past, present and reasonably foreseeable future projects.

Impacts of all existing oil and gas drilling activities of OIL in the area having common study areas on physical, biological and social components of environment have been captured through baseline data collected for this EIA.

Impacts of all existing oil and gas drilling activities of OIL in the area as well of other third parties projects having common study areas on physical, biological and social components of environment have been captured through baseline data collected for this EIA.

New projects proposed for OIL in the area includes oil and gas exploratory and developmental activities in the following blocks;

1. Naharkatia-Deohal-Bogapani-Nagajan Area
2. Mechaki Block
3. West Mechaki Block

OIL has limited number of rigs for drilling operation in the entire Upper Assam Area. As per general drilling practice of OIL, one well is drilled at a time in a Block the duration of drilling activity at each location is expected to take 1.5-2.0 months. At any given time, it is unlikely that drilling of two wells are drilled simultaneously in the same locality in a Block. Similarly, as per general practice of OIL drilling is not conducted at overlapping areas of two adjacent blocks simultaneously. Hence, cumulative impacts of drilling of wells in Dumduma-Pengeri Area are not anticipated.

Moreover, after the drilling either the drilled well is put to production or abandoned. For wells put in production with mitigation measures and pollution treatment facilities in place environmental impacts of the operational activities comply with the prescribed norms of MoEF&CC and State Pollution Control Board. So, it is unlikely that there would be any significant cumulative impacts caused because of the drilling activities being planned in the Dumduma-Pengeri Area and other Oil and Gas exploration and development Blocks of OIL in areas adjacent to Dumduma-Pengeri Area.

Table 4.6 Impact Significance Matrix without Mitigation Measures

Impact	Nature			Type			Duration			Extent			Scale			Magnitude					Sensitivity			Significance			
	Negative	Positive	Neutral	Direct	Indirect	Induced	Shor term	Medium term	Long term	Local	Regional	National	Low	Medium	High	Positive	Negligible	Small	Medium	Large	Low	Medium	High	Negligible	Minor	Moderate	Major
Aesthetic & visual	■			■			■		■	■				■					■			■				■	
Land Use	■			■					■	■					■				■		■		■		■		■
Soil Quality	■			■				■		■				■					■			■				■	
Topography and Drainage	■			■				■		■				■				■				■			■		
Air Quality	■			■				■			■			■					■			■				■	
Noise Quality	■			■				■		■					■				■				■			■	
Road & Traffic	■			■				■			■			■					■			■				■	
Surface Water Quality	■			■			■				■			■				■					■			■	
Ground water resource	■			■				■			■		■					■			■				■		
Ground Water Quality	■			■				■			■			■					■			■				■	
Terrestrial Flora	■			■				■	■	■	■		■	■				■	■		■		■		■		■
Terrestrial Fauna	■			■				■	■	■	■		■	■				■	■		■		■		■		■
Aquatic Ecology	■			■	■		■				■			■				■					■			■	

Impact	Nature			Type			Duration			Extent			Scale			Magnitude					Sensitivity			Significance			
	Negative	Positive	Neutral	Direct	Indirect	Induced	Shor term	Medium term	Long term	Local	Regional	National	Low	Medium	High	Positive	Negligible	Small	Medium	Large	Low	Medium	High	Negligible	Minor	Moderate	Major
Livelihood & Income generation																											
Conflict with local people																											
Benefit to Local Enterprises																											
Employment Generation																											
Occupational health & safety																											
Community health & safety																											

Table 4.7 Impact Significance Matrix with Mitigation Measures

Impact	Nature			Type			Duration			Extent			Scale			Magnitude					Sensitivity			Significance			
	Negative	Positive	Neutral	Direct	Indirect	Induced	Shor term	Medium term	Long term	Local	Regional	National	Low	Medium	High	Positive	Negligible	Small	Medium	Large	Low	Medium	High	Negligible	Minor	Moderate	Major
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Impact	Nature			Type			Duration			Extent			Scale			Magnitude					Sensitivity			Significance			
	Negative	Positive	Neutral	Direct	Indirect	Induced	Shor term	Medium term	Long term	Local	Regional	National	Low	Medium	High	Positive	Negligible	Small	Medium	Large	Low	Medium	High	Negligible	Minor	Moderate	Major
Conflict with local people																											
Benefit to Local Enterprises																											
Employment Generation																											
Occupational health & safety																											
Community health & safety																											

5. ANALYSIS OF ALTERNATIVES

This section provides an analysis of alternatives in relation to the conception and planning phase of the project. This includes the following:

5.1 Background

Analysis of alternatives has been carried out considering the technical and operational feasibility of the proposed oil and gas developmental Project. For the proposed development following alternatives have been discussed:

- Selection of sites for drilling of developmental wells, setting up of production facilities and camp sites,
- Options available on use of drilling mud and sites for disposal of related wastes,
- Options on selection of route of pipelines connecting developed wells with production facilities, and
- Methodologies used for pipelines laying.

Implications to physical environment and social conditions were also considered as part of these assessments to the extent possible. The following alternatives to the proposed project were analysed to minimise and or prevent any potential environmental and social impacts.

5.2 Alternatives of Developmental Wells & Production Facilities

The proposed project being an expansion within PMLs in Dumduma-Pengeri there are no alternatives considered for location of PMLs. OIL has a commitment to the Government of India to undertake a development work program within a specified timeframe to assess the petroleum potential within contracted to ensure energy security in the country.

5.2.1 Selection of Sites for Drilling of Developmental Wells

Sites selection within PMLs for developmental wells drilling are identified based on hydrocarbon prospects available in Dumduma-Pengeri and ensuring to have minimal adverse impact on environmental and social footprints, with aim to maximise the hydrocarbons recovery from within PMLs. Utmost care has been taken up in selecting drilling sites to minimize impact on forest resources prevailing within the Dumduma-Pengeri.

5.2.2 Selection of Sites for Production Facilities

The selection of sites for three production facilities is based on best possible way to tap hydrocarbon resources from development wells sites within PMLs.

5.2.3 Selection of Camp Sites

To minimize impact on existing environmental and social resources prevailing within Dumduma-Pengeri, camp sites for the drilling crew will be set up within sites selected for another nearby drilling location which is not going to be used immediately. No additional sites will be selected for camp sites.

5.2.4 Selection of Routes of Rig Movement

In general, it is intended to make as much as possible use of the existing infrastructure. Where this infrastructure is considered inadequate for rig mobilisations, OIL may find suitable alternative routes and or upgrade the available infrastructure. OIL will intimate to local administration before

mobilization/demobilization about rig movement to ensure minimum disturbance is caused to existing traffic flow and general public.

5.3 Options for Use of Drilling Mud & Disposal of Drilling Wastes

The options available on use of drilling mud include water-based drilling mud (including polymer-based mud) (WBM) and non – aqueous drilling muds i.e., synthetic based mud (SBM) and oil-based mud (OBM).

To make drilling safe and environmentally acceptable, drilling mud selection depends upon conditions of well bore, geological formation, gas hydrates, mud density etc.

5.3.1 Selection of Drilling Fluids

Water based muds are safe for enviornment as it conforms to the requirement laid down in the EP Rules, 1986 defining use of drilling fluids (WBM, SBM or OBM) under GSR # 546 of 2005. The chemcial additives used for preparation of drilling fluids should have low toxicity i.e., 96 hours LC50 > 30,000 mg/litre as per mysid toxicity or toxicity test conducted on locally available sensitive sea species. The chemicals used (maining organic constituents) should be biodegradable.

OIL proposes to use WBM for drilling of all the 68 developmental wells. A typical WBM consist of 75% of water, 15% barite, 7% bentonite and remaining salts and additives.

5.3.2 Selection of Sites for Disposal of Inert Drilling Wastes

In absence of availability of secured landfill available within Assam State, all inert drill cuttings and spent water-based drilling mud will be disposed of in HDPE lined (impervious) pits capped with HDPE liner and covered with soil and provided with leachate collection system as per prior approval of State Pollution Control Board before it is abandoned onsite as per requirements included in the EPA Rules, 1986 GSR # 546 of 2005.

5.4 Alternatives for Pipelines

The Project includes laying of 6 inches to 30 inches diameter pipelines for conveying of oil/gas pipelines connecting production wells with the production facilities. No major alternatives are available as the Project requires conveying of hydrocarbon resources from selected production wells sites to planned production facilities.

The location of new pipelines will be laid by ensuring minimum risks to existing homestead, ecologically sensitive locations and existing infrastructure. Thus, pipelines routings shall be optimized to have least interference with existing resources and receptors.

5.5 No Project Scenario

The no project scenario has been analysed to understand what would be reasonably expected to occur in the near future if the proposed drilling and production of hydrocarbon are not conducted in the area. In such a scenario, there would not be any pressure on use of local resources and infrastructure, and no adverse effect on local ecology or incremental pollution to baseline environmental components (air, water and noise levels). At the same time, there would not be any positive impact on socioeconomic status of the area resulting from direct and indirect economic benefits that such a project can provide.

Oil and gas exploration, development and production activities will lead to exploration and development of new hydrocarbon reserves in the country leading to energy security for the country; provision of more royalty to Assam and Government of India; increase in employment and business opportunity for the local people; development of infrastructure (roads, culverts, bridges, schools etc.) in the area.

In case of no project scenario, there would not be any production of the untapped hydrocarbon reserves of Dumduma-Pengeri Area. There would also be no opportunity of employment and induced development associated with the drilling and production of hydrocarbons in the area.

Thus, the proposed Project scenario involving the drilling and production of hydrocarbons is a preferred scenario compared to no project scenario.

6. ENVIRONMENTAL MONITORING PROGRAMME

Monitoring is one of the most important components of a management system. Monitoring needs to be carried out to determine performance of implementation of proposed mitigation measures and to show case compliance of the regulatory requirements during the cycle of project implementation. Monitoring indicators have been developed for each of the activity considering the mitigation measures proposed. Indicators have been developed for ascertaining the environmental quality and performance of the EMP implementation through Environmental Quality Indicators (EQI's) and Environmental Performance Indicators (EPI's) respectively which focus not only on quantifying or indexing activity-environment interactions that may potentially impact the environment but at the same time also help in comparing different components of environmental quality against previously established baseline values. Monitoring results will be documented, analyzed and reported internally to GM – Safety & Environment of Safety and Environment (S&E) department of OIL. Monitoring requirements have been described in the following **Table 6.1**. Frequency of monitoring and responsibility of carrying out the monitoring have also been presented in the table below.

Table 6.1 Proposed Monitoring Program

A) Environmental Performance Monitoring

EPI No.	Environmental Performance Indicator (EPI)	Monitoring Parameter	Location
A.	**Design & Planning Stage**		
A.1	Proximity of sensitive environmental habitat	Maintain safe distance between the drill site and sensitive environmental habitat	Site
A.2	Proximity of nearest habitation	Maintain safe distance between the drill site and nearest habitation	Site
A.3	Flood History	Maintain site elevation above HFL at site considering return period of major floods	Site
A.4	Location and land required	Number of affected landowners are adequately compensated for the area procured for drill/production sites (Ha)	Site
A.5	Approval / Authorization of quarries	Validity of the Approval / Authorization	Quarry
A.6	Land use	Land use type – ensure no forest or sensitive site is affected	Quarry/ Borrow Area
A.7	Haul Routes	Distance of quarry / borrow area from project site Ensure good condition of haul road	Quarry / Borrow Area
B.	**Site Development**		
B.1	Topsoil stripping and storage	Storage of collected topsoil be at planned site as per defined procedures	Site
B.2	Local drainage pattern	Ensure cross drainage structures are constructed to actual number of cross drainage structures designed	Site
B.3	Fugitive emission of dust during site preparation	Ensure fugitive dust control measures are in place. Make visual observations of dust in air by haziness	Site & approach roads
B.4	Air emissions from vehicles and machinery	$PM_{2.5}$, PM_{10}, NOx, SO_2, CO, HC, VOC based on emission factors Visual observation of emissions (black signifying more pollution) % of vehicles possessing valid PUC Certificates	Exhausts
B.5	Noise emissions from vehicles and machinery	Sound pressure level in dB(A) at fenceline and nearby receptors	Site & approach road
B.6	Accident reporting	Number of casualties / Number of fatalities	Site & Haul Routes
B.7	Fugitive emission of dust during material handling and storage	Ensure fugitive dust control measures are in place. Make visual observations of dust in air by haziness	Near stockpiles and storages
C.	**Drilling & Testing**		
C.1	Gaseous pollutant emissions from DG Set	Pollutant concentrations in gaseous emissions and maintenance parameters (air, fuel filters & air-fuel ratio) of DG sets influencing air emissions Visual observation of exhaust smoke characteristics	DG Stack
C.2	Noise emission from DG Sets	Sound pressure level in dB(A)	Near noise sources (5m)
C.3	Noise emission from rig	Sound pressure level in dB(A) Number of cases of workers not using PPE	On the rig floor Near noise sources (5m) Site

EPI No.	Environmental Performance Indicator (EPI)	Monitoring Parameter	Location
C.4	Accident reporting	Number of casualties / Number of fatalities	Site
C.5	Spilled Chemicals/Oil	Area of Spill / Quantity Spilled / Severity of Spill / Characterization of Spilled Substances for Contaminants (Heavy Metals, Toxics, etc.)	Site
C.6	Fugitive emission of cement dust during handling and storage	Visual observation of cement dust in air by haziness	Near stockpiles and storages
C.7	Runoff from temporary storage areas	Supervision of functioning of conduits / drains, channels	Site
C.8	Emissions from Flaring	Ensure no cold venting is done. Flaring should not give black soot. Total CO, total hydrocarbon, Non-Methane Hydrocarbons, NOx emission estimates based on emission factors	Flare Stack
C.9	Drill cutting storage and disposal	Total volume generated Concentration of hazardous constituents as per Hazardous Waste Management and Handling Rules CPCB Onshore discharge standards for Oil & Gas Extraction Industry	At storage location
D.	**Decommissioning/ Site Closure**		
D.1	Sound Noise pressure level in dB(A)	Measure sound pressure levels at fenceline and nearby receptors	Site & Approach road
D.2	Air emissions from vehicles	Standards of vehicular emission Visual observation of emissions (black signifying more pollution)	Exhausts
D.3	Fugitive emission of dust during transport of drilling facilities	Ensure fugitive dust control measures are in place. Make visual observations of dust in air by haziness	Near stockpiles and storages
E.	**Operation of Production facilities**		
E.1	Gaseous pollutant emissions from GG Set	Pollutant concentrations in gaseous emissions of GG sets	GG Stack
E.2	Noise Emission	Measure sound pressure levels in dB(A) at equipment source, fenceline and nearby receptors	High noise generating equipment

B) Environmental Quality Monitoring

EQI No.	Environmental Performance Indicator (EQI)	Monitoring Parameter	Location	Period & Frequency	Responsibility
A.	**Site Development for Wells, Production facilities and Pipelines**				
A1	Soil Fertility	Fertility parameters like pH, NPK ratio, Total Carbon, etc.	Site & adjacent areas- three locations	Once before site preparation	OIL/Contractor
A2	Quality of water	Analysis of Parameters as per CPCB Use-class	Natural drainage channel receiving run-off; 1-2 location, based on availability	Once during site works	OIL/Contractor
A4	Ambient Air Quality	Measurement of PM_{10}, $PM_{2.5}$, NOx, SO_2, CO, HC using ambient air sampler	At Surrounding receptor points; three	Once during site works	OIL/Contractor

EQI No.	Environmental Performance Indicator (EQI)	Monitoring Parameter	Location	Period & Frequency	Responsibility
A5	Ambient noise quality	Hearing / perception Measurement of Noise Pressure Level in dB(A)	At surrounding receptor points – three locations	Once during site works	OIL/Contractor
A6	Soil Contamination	Analysis for suite of contaminants (heavy metals, TPH, organics, pesticides).	Site, adjacent areas and Waste disposal site	In event of spills over an area of 10 sq.m	OIL/Contractor
B.	**Drilling & Testing**				
B1	Ambient Air Quality	Measurement of PM_{10}, $PM_{2.5}$, NOx, SO_2, CO, HC using ambient air sampler	At Surrounding receptor points– three locations	Twice during drilling and testing	OIL/Contractor
B2	Stack Emission Monitoring	Measurement of PM_{10}, $PM_{2.5}$, NOx, SO_2, CO, HC	At three DG sets within drill site	Once during drilling	OIL/Contractor
B3	Ambient noise quality	Hearing / perception Measurement of Sound Pressure Level in dB(A)	At surrounding receptor points- three locations	Twice during drilling and testing	OIL/Contractor
B4	Workplace Noise Monitoring	Hearing / perception Measurement of Noise Pressure Level in dB(A)	5 locations within drill site	Twice during drilling and testing	OIL/Contractor
B5	Soil Contamination	Analysis for suite of contaminants (heavy metals, TPH, organics, pesticides).	Site, adjacent areas and Waste disposal site	In event of spills over an area of 10 sq.m; once after drilling	OIL/Contractor
B6	Quality of water	Analysis of Parameters as per CPCB Use-class	Natural drainage channel receiving run-off– 3 locations	Once during drilling & testing	OIL/Contractor
B7	Treated water quality	Analysis of Parameters as per CPCB Discharge Standards for Oil and Gas Industry	Two from ETP and one from oil water separator	Once during drilling & testing	OIL/Contractor
B8	Groundwater Quality	Analysis of Parameters as per IS:10500, 2012	At surrounding receptor points- three locations	Once during drilling & testing	OIL/Contractor
C.	**Decommissioning / Closure**				
C1	Ambient noise quality	Hearing / perception Measurement of Noise Pressure Level in dB(A)	At surrounding receptor points- three locations	Once during decommissioning	OIL/Contractor
C2	Quality of water	Analysis of Parameters as per CPCB Use-class	Natural drainage channel receiving run-off	Once after decommissioning	OIL/Contractor
C3	Ambient Air Quality	Measurement of PM_{10}, $PM_{2.5}$, NOx, SO_2, CO, HC , using ambient air sampler	At Surrounding receptor points– three locations	Once during decommissioning	OIL/Contractor
C4	Soil Fertility	Fertility parameters like pH, NPK ratio, Total Carbon, etc.	Site & adjacent areas- three locations	Once after site restoration	OIL/Contractor
D.	**Operation of Production facilities**				
D.1	Ambient noise quality	Hearing / perception Measurement of Noise Pressure Level in dB(A)	At surrounding receptor points within 1 km- three locations	Once every six months	OIL/Contractor
D.2	Workplace Noise Monitoring	Hearing / perception Measurement of Noise Pressure Level in dB(A)	5 locations within drill site	Once every six months	OIL/Contractor

EQI No.	Environmental Performance Indicator (EQI)	Monitoring Parameter	Location	Period & Frequency	Responsibility
D.3	Ambient Air Quality	Measurement of PM_{10}, $PM_{2.5}$, NOx, SO_2, CO, HC , using ambient air sampler	At Surrounding receptor points–three locations	Once every six months	OIL/Contractor
D.4	Quality of water	Analysis of Parameters as per CPCB Use-class	Natural drainage channel receiving run-off	Once every six months	OIL/Contractor
D.5	Groundwater Quality	Analysis of Parameters as per IS:10500, 2012	At surrounding receptor points-three locations	Once every six months	OIL/Contractor
D.6	Soil Fertility	Fertility parameters like pH, NPK ratio, Total Carbon, etc.	Site & adjacent areas- three locations	Once every six months	OIL/Contractor
D.7	Treated water quality	Analysis of Parameters as per CPCB Discharge Standards for Oil and Gas Industry	Two from ETP and one from oil water separator	Once every six months	OIL/Contractor

7. ADDITIONAL STUDIES

7.1 Risk Assessment

This section on Risk Assessment (RA) aims to provide a systematic analysis of the major risks that may arise 26 nos. of onshore drilling wells, 03 nos. of production installations and laying of oil and gas pipelines. The RA process outlines rational evaluations of the identified risks based on their significance and provides the outline for appropriate preventive and risk mitigation measures. Results of the RA provides valuable inputs into the overall project planning and the decision making process for effectively addressing the identified risks. This will ensure that the project risks stay below As Low As Reasonably Practicable (ALARP) levels at all times during project implementation. In addition, the RA will also help in assessing risks arising from potential emergency situations like a blow out and develop a structured Emergency Response Plan (ERP) to restrict damage to personnel, infrastructure and the environment.

The risk study for the onshore drilling and testing activities has considered all aspects of operation of the drilling rig and other associated activities during the development phase. Loss of well control / blow-out and process/pipeline leaks constitute the major potential hazards that may be associated with the proposed onshore development and production of oil and natural gas at the identified well locations within the Dumduma-Pengeri Area.

The following section describes objectives, methodology of the risk assessment study and then presents the assessment for each of the potential risk separately. This includes identification of major hazards, hazard screening and ranking, frequency and consequence analysis for major hazards. The hazards have subsequently been evaluated through a criteria based risk evaluation matrix. Risk mitigation measures to reduce significant risks to acceptable levels have also been recommended as a part of the risk assessment study.

7.2 Objectives of the RA Study

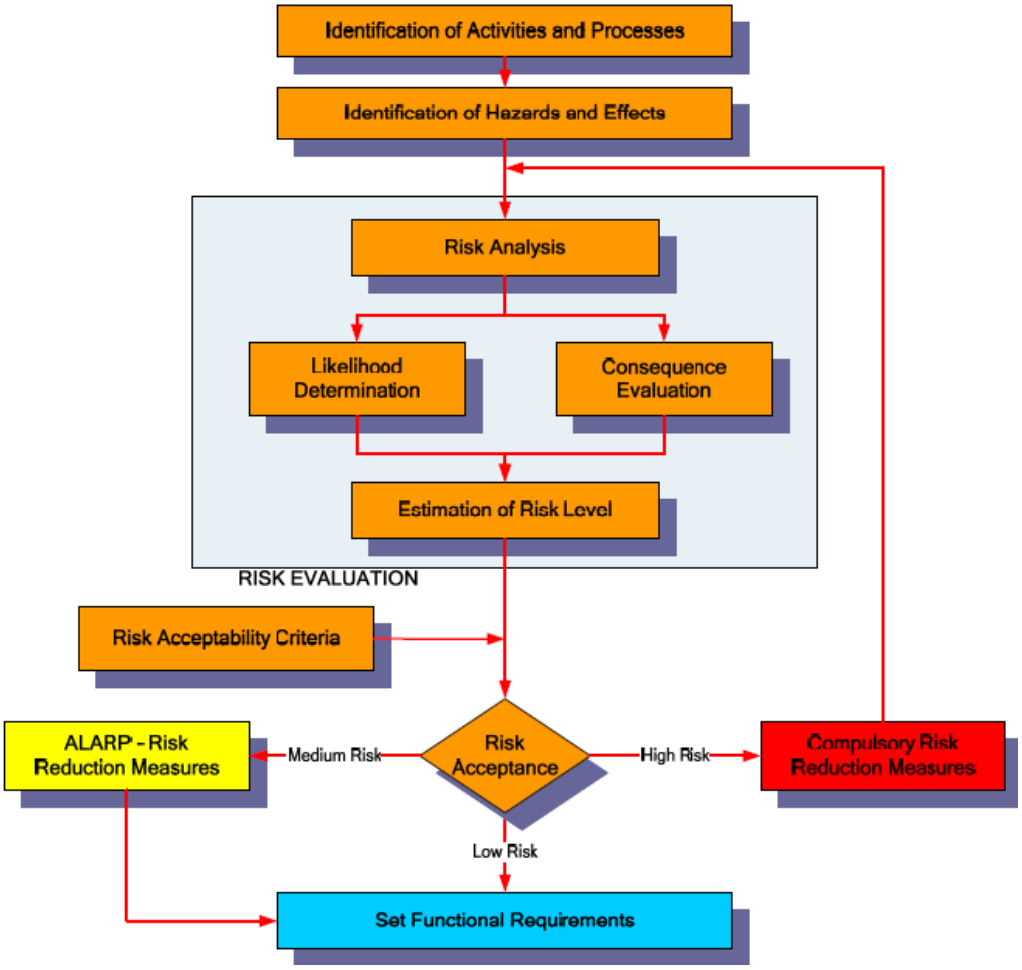
The overall objective of this RA with respect to the proposed project involves identification and evaluation of major risks, prioritizing risks identified based on their hazard consequences and formulating suitable risk reduction/mitigation measures in line with the ALARP principle. Hence in order to ensure effective management of any emergency situations (with potential individual and societal risks) that may arise during the exploration and development drilling activities, following specific objectives need to be achieved.

- Identify potential risk scenarios that may arise out of proposed development well drilling, operation of oil and gas pipelines and associated equipment’s, mud chemicals storage and handling etc.
- Analyse the possible likelihood and frequency of such risk scenarios by reviewing historical accident related data for onshore oil and gas industries.
- Predict the consequences of such potential risk scenarios and if consequences are high, establish the same by through application of quantitative simulations.
- Recommend feasible preventive and risk mitigation measures as well as provide inputs for drawing up of Emergency Response Plan (ERP) for the Project.

7.3 Risk Assessment Methodology

The risk assessment process is primarily based on likelihood of occurrence of the risks identified and their possible hazard consequences particularly being evaluated through most probable and worst case accident scenarios. With respect to the proposed Project, the methodology adopted for risk assessment is summarized in **Figure 7.1**.

Figure 7.1 Risk Assessment Methodology



7.3.1 Hazard Identification

Hazard identification for the purposes of this RA comprised of a review of the Project and associated activity related information provided by OIL. In addition, guidance provided by knowledge platforms/portals of the upstream oil & gas industry including OGP, ITOPF, EGIG and DNV, Norwegian Petroleum Directorate etc. are used to identify potential hazards that can arise out of proposed Project activities. Considering the applicability of different risk aspects in context of the development drilling operations to be undertaken in the identified well locations, there are three major categories of hazards that can be associated with proposed Project. These includes:

- Blowouts leading to uncontrolled well flow, jet fires, flash fire from flammable cloud, pool fires;
- Non-process fires / explosions, the release of a dangerous substance or any other event resulting from a work activity which could result in death or serious injury to people within the site;

- Leaks from interconnecting pipeline network pipeline leading to jet fire; and
- Any event which may result in major damage to the structure of the rig

Well control incident covers a range of events which have the potential of leading to blow-outs but are generally controlled by necessary technological interventions. Hence, such incidents are considered of minor consequences and as a result not well documented. Other possible hazard scenarios like mud chemical spills, falls, etc. has also not been considered for detailed assessment as preliminary evaluation has indicated that the overall risk that may arise out of them would be low. In addition, it is understood that, causative factors and mitigation measures for such events can be adequately taken care of through exiting safety management procedures and practices of OIL.

It must also be noted here that many hazards identified are sometimes interrelated with one hazard often having the ability to trigger off another hazard through a domino effect. For example, a large oil spill in most instances is caused by another hazardous incident like a blowout or process leak. This aspect has been considered while drawing up hazard mitigation measures and such linkages (between hazards) has also been given due importance for managing hazards and associated risks in a composite manner through OIL's Health, Safety & Environmental Management System (HSEMS) and through the Emergency Response Plan, if a contingency situation so arises.

Other risks associated with the projects (i.e. apart from blowout) including environment security, drilling and associated activities, and handling & storage of drilling fluid and chemicals along with their mitigation measures has been provided in **Annexure 7.1**.

7.3.2 Frequency Analysis

Frequency analysis involves estimating the likelihood of each of the failure cases identified during the hazard identification stage. The analysis of frequencies of occurrences for the key hazards that has been listed out is important to assess the likelihood of such hazards to unfold during the lifecycle of the Project. The frequency analysis approach for the proposed Project is based primarily on historical accident frequency data, event tree analysis and judgmental evaluation. Major oil and gas industry information sources viz. statistical data, historical records and global industry experience were considered during the frequency analysis of the major identified risks[1].

For RA for the proposed Project, various accident statistics and published oil industry databases have been consulted for arriving at probable frequencies of identified hazards. However, taking into account the absence of representative historical data/statistics with respect to onshore operations[2], relevant offshore accident databases have been considered in the frequency analysis of identified hazards. The same has been recommended in the "*Risk Assessment Data Directory" published by the International Association of Oil & Gas Producers (OGP). Key databases/reports referred as part of the RA study includes Worldwide Offshore Accident Databank (WOAD), Outer Continental Shelf (OCS) Reports, Norwegian Petroleum Directorate Directives, Offshore Reliability Data (OREDA) Handbook, HSE Offshore Incident Database, SINTEF Offshore Blowout Database etc*.

Based on the range of probabilities arrived at for different potential hazards that may be encountered during the proposed well development activities, following criteria for likelihood rankings have been drawn up as presented in the **Table 7.1**.

[1]It is to be noted that the frequency of occurrences are usually obtained by a combination of component probabilities derived on basis of reliability data and /or statistical analysis of historical data.

[2]Although Alberta Energy & Utilities Board (EUB) maintains a database for onshore incidents for the period 1975-1990 the same has not been considered in the context of the present study as the Alberta wells are believed to be sour with precaution being taken accordingly to minimize the likelihood of release

Table 7.1 Frequency Categories and Criteria

Likelihood Ranking	Criteria Ranking (cases/year)	Frequency Class
5	>1.0	Frequent
4	$>10^{-1}$ to <1.0	Probable
3	$>10^{-3}$ to $<10^{-1}$	Occasional/Rare
2	$>10^{-5}$ to $<10^{-3}$	Not Likely
1	$>10^{-6}$ to $<10^{-5}$	Improbable

7.3.3 Consequence Analysis

In parallel to frequency analysis, hazard prediction / consequence analysis exercise assesses resulting effects in instances when accidents occur and their likely impact on project personnel, infrastructure and environment. In relation to the proposed Project, estimation of consequences for each possible event has been based either on accident experience, consequence modelling or professional judgment, as appropriate.

Given the high risk perception associated with blow outs in context of offshore drilling operation, a detailed analysis of consequences has been undertaken for blow outs considering physical factors and technological interventions. Consequences of such accidental events on the physical, biological and socio-economic environment have been studied to evaluate the potential of the identified risks/hazards. In all, the consequence analysis considers the following aspects:

- Nature of impact on environment and community;
- Occupational health and safety;
- Asset and property damage;
- Corporate image
- Timeline for restoration of environmental and property damage
- Restoration cost for environmental and property damage

The following criterion for consequence rankings (**Table 7.2**) is drawn up in context of the possible consequences of risk events that may occur during proposed well drilling and development activities:

Table 7.2 Severity Categories and Criteria

Consequence	Ranking	Criteria Definition
Catastrophic	5	■ Multiple fatalities/Permanent total disability to more than 50 persons ■ Severe violations of national limits for environmental emission ■ More than 5 years for natural recovery ■ Net negative financial impact of >10 crores ■ Long term impact on ecologically sensitive areas ■ International media coverage ■ National stakeholder concern and media coverage
Major	4	■ Single fatality/permanent total disability to one or more persons ■ Major violations of national limits for environmental emissions ■ 2-5 years for natural recovery ■ Net negative financial impact of 5 -10 crores ■ Significant impact on endangered and threatened floral and faunal species ■ Loss of corporate image and reputation
Moderate	3	■ Short term hospitalization & rehabilitation leading to recovery ■ Short term violations of national limits for environmental emissions ■ 1-2 years for natural recovery ■ Net negative financial impact of 1-5 crores ■ Short term impact on protected natural habitats ■ State wide media coverage
Minor	2	■ Medical treatment injuries ■ 1 year for natural recovery ■ Net negative financial impact of 0.5 - 1 crore ■ Temporary environmental impacts which can be mitigated ■ Local stakeholder concern and public attention
Insignificant	1	■ First Aid treatment with no Lost Time Incidents (LTIs) ■ Natural recovery < 1year ■ Net negative financial impact of <0.5 crores. ■ No significant impact on environmental components ■ No media coverage

7.3.4 Risk Evaluation

Based on ranking of likelihood and frequencies, each identified hazard has been evaluated based on the likelihood of occurrence and the magnitude of consequences. Significance of risks is expressed as the product of likelihood and consequence of the risk event, expressed as follows:

Significance = Likelihood X Consequence

The **Table 7.3** below illustrates all possible product results for five likelihood and consequence categories while the **Table 7.4** assigns risk significance criteria in four regions that identify the limit of risk acceptability. Depending on the position of intersection of a column with a row in the risk matrix, hazard prone activities have been classified as low, medium and high thereby qualifying a set of risk reduction / mitigation strategies.

Table 7.3 Risk Matrix

Consequence ↑			Likelihood →				
			Frequent	Probable	Remote	Not Likely	Improbable
			5	4	3	2	1
	Catastrophic	5	25	20	15	10	5
	Major	4	20	16	12	8	4
	Moderate	3	15	12	9	6	3
	Minor	2	10	8	6	4	2
	Insignificant	1	5	4	3	2	1

Table 7.4 Risk Criteria and Action Requirements

Risk Significance	Criteria Definition & Action Requirements
High (16 - 25)	**"Risk requires attention"** – Project HSE Management need to ensure that necessary mitigation are adopted to ensure that possible risk remains within acceptable limits
Medium (10 – 15)	**"Risk is tolerable"** – Project HSE Management needs to adopt necessary measures to prevent any change/modification of existing risk controls and ensure implementation of all practicable controls.
Low (5 – 9)	**"Risk is acceptable" –** Project related risks are managed by well-established controls and routine processes/procedures. Implementation of additional controls can be considered.
Very Low (1 – 4)	**"Risk is acceptable" –** All risks are managed by well-established controls and routine processes/procedures. Additional risk controls need not to be considered

7.4 Identified Project Hazards

A comprehensive risk assessment study has been undertaken to assess and evaluate significance of identified risks in terms of severity of consequences and likelihood of occurrence. Three major categories of risks are identified in relation to proposed development Project as summarized below:

7.4.1 Blow Outs/Loss of Well Control

Blow out is an uncontrolled release of well fluid (primarily hydrocarbons viz. oil and/or gas and may also include drilling mud, completion fluid, water etc.) from an exploratory or development well. Blow outs are the result of failure to control a kick and regain pressure control and are typically caused by

equipment failure or human error. The possible blow out cause events occurring in isolation or in combination have been listed below:

- Formation fluid entry into well bore;
- Loss of containment due to malfunction (viz. wire lining);
- Well head damage (e.g., by fires, storms, dropped object etc.); and
- Rig forced off station (e.g., by anchor failure) damaging Blow Out Preventer (BOP) or wellhead.

The most common cause of blow out can be associated with the sudden/unexpected entry/release of formation fluid into well bore that may arise as a result of the following events as discussed in the **Box 7.1** below:

Box 7.1 Primary Causes of Blow Outs

Shallow gas
In shallow formations there may be pockets of shallow gas. In these instances, there is often insufficient mud density in the well and no BOP is in place. If the hole strikes shallow gas the gas may be released on the drilling rig very rapidly. Typical geological features which suggest the presence of shallow gas can then be detected. Historically, striking of shallow gas has been one of the most frequent causes of blowouts in drilling.

Swabbing
As the drill pipe is pulled upwards during trips out of the hole or upward movement of the drill string, the pressure in the hole beneath the drill bit is reduced, creating a suction effect. Sufficient drilling mud must be pumped down-hole to compensate for this effect or well fluids may enter the bore. Swabbing is also a frequent cause of drilling blowouts.

High formation pressure
Drilling into an unexpected zone of high pressure may allow formation fluids to enter the well before mud weight can be increased to prevent it.

Insufficient mud weight
The primary method of well control is the use of drilling mud; in correct operation, the hydrostatic pressure exerted by the mud prevents well fluids from entering the well bore. A high mud weight provides safety against well fluids in-flows. However, a high mud weight reduces drilling speed, therefore, mud weight is calculated to establish weight most suitable to safely control anticipated formation pressures and allows optimum rates of penetration. If the required mud weight is incorrectly calculated, then well fluid may be able to enter the bore.

Lost Circulation
Drilling mud circulation can be lost if mud enters a permeable formation instead of returning to the rig. This reduces the hydrostatic pressures exerted by the mud throughout the well bore and may allow well fluids from another formation to enter the bore.

Gas cut mud
Drilling fluids are denser than well fluids; this density is required to provide the hydrostatic pressure which prevents well fluids from entering the bore. If well fluids mix with the mud, then its density will be reduced. As mud is circulated back to surface, hydrostatic pressure exerted by the mud column is reduced. Once gas reaches surface it is released into the atmosphere.

Source: A Guide to Quantitative Risk Assessment for Offshore Installations; John Spouge – DNV Technical Publication 99/100a

For better understanding, causes of blow outs have been systematically defined in terms of loss of pressure control (failure of primary barrier), uncontrolled flow of fluid or failure of secondary barrier (BOP). The blow out incidents resulting from primary and secondary failures as obtained through

comprehensive root cause analysis of the Gulf Coast (Texas, OCS and US Gulf of Mexico) Blow Outs[1] during 1960-1996 have been presented in the **Table 7.5** below.

Table 7.5 Blow Out Cause Distribution for Failures - Drilling Operations

Sl. No.	Causal Factors	Blow Out Incidents (Nos.)
A.	**Primary Barrier**	
1	Swabbing	77
2	Drilling Break	52
3	Formation breakdown	38
4	Trapped/expanding gas	09
5	Gas cut mud	26
6	Low mud weight	17
7	Wellhead failure	05
8	Cement setting	05
B.	**Secondary Barrier**	
1	Failure to close BOP	07
2	Failure of BOP after closure	13
3	BOP not in place	10
4	Fracture at casing shoe	03
5	Failure to stab string valve	09
6	Casing leakage	06

Thus, underlying blowout causes as discussed in the above table can be primarily attributed to swabbing as the primary barrier failure which is indicative of insufficient attention given to trip margin and controlling pipe movement speed. Also, it is evident from the above table that lack of proper maintenance, operational failures and absence of BOPs as secondary barrier contributed to majority of blowout incidents (approx. 30 nos.) is recorded.

Blowout Frequency Analysis

Blow out frequency estimates is obtained from a combination of incident experience and associated exposure in an area over a given period. For the purpose of calculation of blow out frequency analysis in context of the present study involving developmental drilling, blow out frequencies per well drilled have been considered.

For onshore operations, comparable data were not found hence offshore data presented here, the fraction of subsea releases compiled by DNV have been considered for frequency analysis. Based on the given frequency and information provided by OIL on the proposed project drilling program the blow out frequency for the proposed Project has been computed as follows:

[1] "Trends extracted from 1200 Gulf Coast blowouts during 1960-1996" – Pal Skalle and A.L Podio

No of wells to be drilled per year = 9(A)

Blow out frequency for drilling (oil) = 2.62 X 10^{-5} per well drilled (B)

Blow out frequency for drilling (gas) = 2.16 X 10^{-5} per well drilled (C)

Frequency of blow out occurrence for (oil) = (A X B) = 9 X 2.62 X 10^{-5}
= 2.35 X 10^{-4} per well drilled

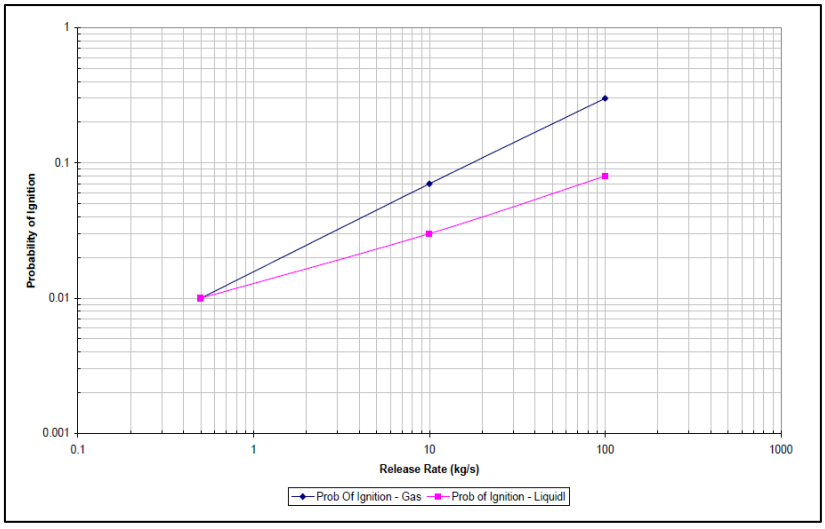
Frequency of blow out occurrence for development (gas) = (A X C) = 9 X 2.16 X 10^{-5}
= 1.94 X 10^{-4} per well drilled

Thus, the blow out frequency for the proposed project for oil and gas wells have been at **2.35 X 10^{-4} and 1.94 X 10^{-4} per well drilled per year respectively i.e., the likelihood of its occurrence is identified to be as "Not Likely**".

7.4.1.1 Blowout Ignition Probability

Review of SINTEF database indicates that a rounded ignition probability of 0.3 has been widely used for the purpose of risk analysis arising from blow outs. As per this database generally ignition occurred within first 5 minutes in approximately 40% of the blowouts leading to either pool and/or jet fire. Blow out leading to flammable gas release has a greater probability of ignition compared to liquid releases[1] (**Figure 7.2**).

Figure 7.2 Ignition Probability Vs Release Rate



An alternative to the blowout ignition probabilities given by the UKOOA look-up correlations can be obtained from Scandpowers's interpretation of the blowout data provided by SINTEF 2. The most significant category is that for deep blowouts which indicates an early ignition probability of 0.09. For the purpose of the RA study this can be taken as occurring immediately on release and calculation provided below:

[1]Fire and Explosion – Fire Risk Analysis by Daejun Change, Division of Ocean System and Engineering

No of wells to be drilled per year = 9 (A)

Blow out frequency for drilling (oil) = 2.62 X 10^{-5} per well drilled (B)

Blow out frequency for drilling (gas) = 2.16 X 10^{-5} per well drilled (C)

Blow out ignition probability = 0.09 (D)

Probability of Blow out ignition for drilling (oil) = (A X B X D) = 9 X 2.62 X 10^{-5} X 0.09
= 2.12 X 10^{-5}= ~ 0.0021%

Probability of Blow out ignition for drilling (gas) = (A X C X D) = 9 X 2.16 X 10^{-5} X 0.09
= 1.74 X 10^{-5}= ~ 0.0017%

Hence based on the aforesaid calculation the probability of ignition of blow out releases of hydrocarbons for the proposed development project for both oil and gas is computed to be around 2.12 X 10^{-5} (~0.0021%) and 1.74 X 10^{-5} (0.0017%) and can be "**Not Likely**".

7.4.1.2 Blowout Consequence Analysis

Blow out from a hydrocarbon development wells may lead to the following possible risk consequences:

- Jet fires resulting from ignited gas blow outs; and
- Oil slicks resulting from un-ignited oil pools.

Pool fire

A pool fire is a turbulent diffusion fire burning above a pool of vaporizing hydrocarbon fuel where the fuel vapour has negligible initial momentum. The probability of occurrence of pool fires for oil and gas exploration is high due to continuous handling of heavy hydrocarbons. The evaporation of hydrocarbons from a pool forms a cloud of vapour above the pool surface which, on ignition, leads to generation of pool fire.

For the purpose of consequence modelling for pool fires resulting from blow outs, following hypothetical scenarios in terms of hydrocarbon (particularly crude oil) release rates (**Table 7.6**) have been considered based on DNV Technica's FLARE program.

Table 7.6 Pool Fire Modelling Scenario

Scenario	Release Rate (kg/s)	Release Type
Scenario - I	1	Small
Scenario - II	10	Medium
Scenario – III (Worst Case)	50	Large

The release rates as specified for the aforesaid scenarios have been utilized in the computing the pool fire diameter utilizing the following equation and input parameters:

$$D = \sqrt{4Q/\pi b}$$

Where D = pool diameter (m)
Q = release rate (kg/s)

b = burning rate (kg/m^{2}s)

The mass burning rate for crude oil has been considered to be 0.05 kg/m^{2}s

Based on above equation, the pool fire diameter and the steady study burning areas computed for various release types have been presented in the **Table 7.7** below.

Table 7.7 Pool Fire Diameter & Steady State Burning Scenario

Scenario	Release Rate (kg/s)	Release Type	Pool fire diameter (m)	Steady State Burning Area (m2)
Scenario - I	1	Small	5.05	6.37
Scenario - II	10	Medium	15.96	63.69
Scenario - III	50	Large	35.69	318.47

The impact zone for long duration fires is conveniently described by thermal radiation contours and its effects on the people who are exposed to such radiation levels for one minute (60sec). The thermal radiation threshold values (measured in kilowatts per square meter) defined for crude oil pool fire consequence modelling is provided in **Table 7.8** below:

Table 7.8 Thermal Radiation Intensity Threshold Values Impact Criterion

Threshold Radiation Intensity	Threat Zone	Impact Criterion
5.0 kW/m^2	**Green**	■ Escape actions within one minute. ■ Cause second degree burns within 60 sec.
12.5 kW/m^2	**Blue**	■ Escape actions lasting for few seconds. ■ Cause second degree burns within 40 sec.
37.5 kW/m^2	**Red**	■ Results in immediate fatality. ■ Pain threshold is instantaneous leading to second degree burns within 8 sec.

For estimating the distance to a pool fire heat radiation level that could cause second degree burns and fatality for a maximum exposure of 60 sec the following EPA equation and input parameters are utilized.

$$X = H_c \sqrt{\frac{0.0001A}{5000\,\Pi\,(H_v + C_p\,(T_B - T_A))}}$$

Where:

X = distance to the heat radiation level (m)
HC = heat of combustion of the flammable liquid (joules/kg)
HV = heat of vaporization of the flammable liquid (joules/kg)
A = pool area (m^2)
CP = liquid heat capacity (joules/kg-^{o}K)
TB = boiling temperature of the liquid (^{o}K)
TA = ambient temperature (^{o}K)

For crude oil **HC = 42600000 joules/kg; HV = 957144 joules/kg; CP = 1892 joules/kg-^{o}K; TB = 633 ^{o}K** and **TA = 300 ^{o}K.** The following input parameter along with pool area (m^2) computed for blow out

risk scenarios provided the distance to the threshold heat radiation levels for the threat zones and have been presented in **Table 7.9** below:

Table 7.9 Distance to Thermal Radiation Threshold Levels

Release Type	Pool fire diameter (m)	Pool fire area (m2)	Distance to 5.0 kW/m2 (m)	Distance to 12.5 kW/m2 (m)	Distance to 37.5 kW/m2 (m)
Small	5.05	6.37	6.81	4.31	2.49
Medium	15.96	63.69	21.54	13.62	7.86
Large	35.69	318.47	48.16	30.46	17.59

The worst hazard for release and ignition of crude oil at a rate of **50kg/s** for a thermal radiation intensity of **37.5 kW/m^2** is likely to be experienced to a maximum distance of **17.59m** from the source with potential lethal effects experienced within 8 sec.

Risk Ranking – Blowout Pool Fire (Worst Case Scenario)

Likelihood ranking	**3**	**Consequence ranking**	**4**
Risk Ranking & Significance = 12 i.e. "Medium" i.e. Risk is Tolerable and can be managed through adoption of necessary controls.			

Ignition of Flammable Gas Release leading to Jet Fire

Jet fires are burning jet of gas or sprays of atomized liquids resulting from gas and condensate release from high pressure equipment and blow outs. Jet fires may also result in the release of high pressure liquid containing dissolved gas due to gas flashing off and turning the liquid into a spray of small droplets. In context of the present study, formation of jet fires can be attributed by the high pressure release and ignition of natural gas if encountered during exploration of block hydrocarbon reserves.

Natural gas as recovered from underground deposits primarily contains methane (CH_4) as a flammable component, but it also contains heavier gaseous hydrocarbons such as ethane (C_2H_6), propane (C_3H_8) and butane (C_4H_{10}). Other gases such as CO_2, nitrogen and hydrogen sulfide (H_2S) are also often present. Methane is typically 90 percent, ethane 5-15 percent, propane and butane, up to 5 percent. Thus, considering higher percentage of methane in natural gas, the thermo-chemical properties of the same has been utilized in the jet fire blow out consequence modelling. The following risk scenarios (**Table 7.10**) have been considered for nature gas release consequence modelling:

Table 7.10 Natural Gas Release/Flammable Vapour Cloud Formation Modelling Scenario from Blow Outs

Scenario	Release Rate (kg/s)	Release Type
Scenario - I	1	Small
Scenario - II	5	Medium
Scenario – III	10	Large
Scenario – IV	310	Worst Case

The modelling of nature gas releases has been carried out using ALOHA. A Flammable Level of Concern approach has been utilized for assessing safety risk associated with the release of flammable gases (here methane) from well blow outs. In ALOHA, a flammable Level of Concern

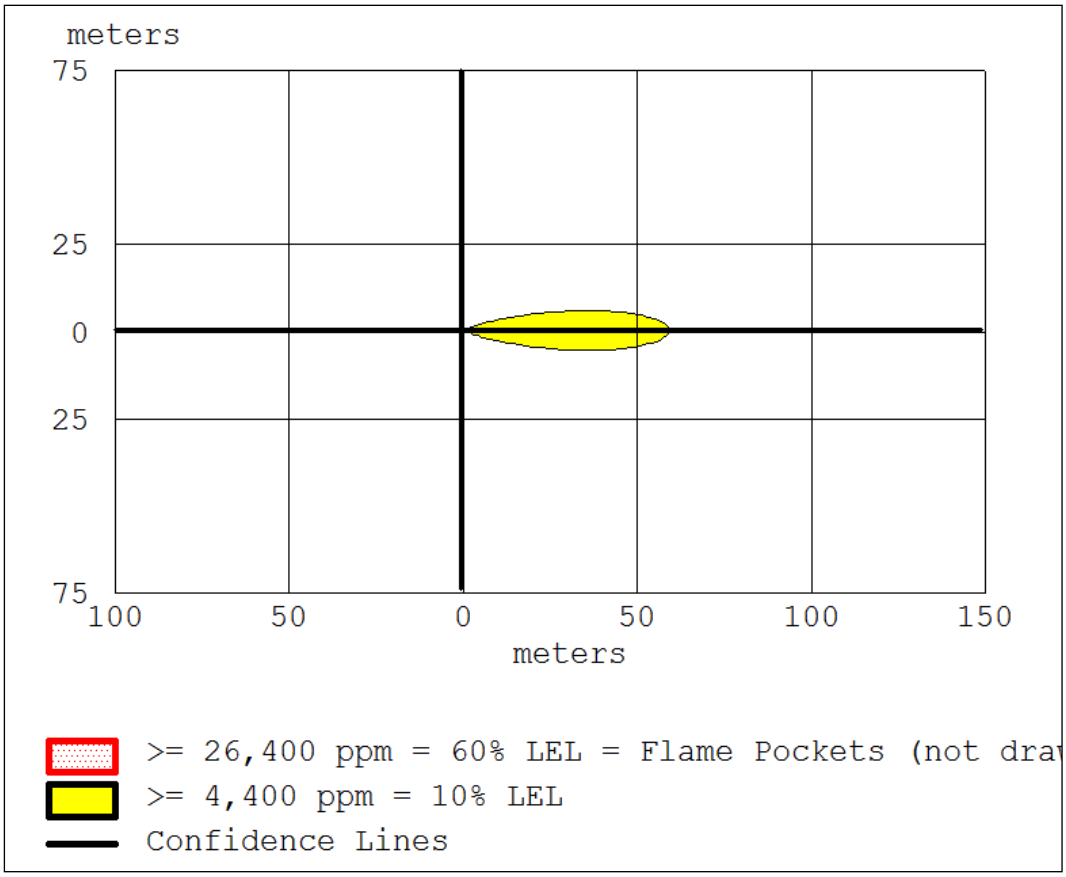
(LOC) is a threshold concentration of fuel in the air above which a flammability hazard may exist. While modelling the release of a flammable gas that may catch fire—but which is not currently burning—ALOHA can predict the flammable area of the vapour cloud so that flammability hazard can be established.

The flammable area is the part of a flammable vapor cloud where the concentration is in the flammable range, between the Lower and Upper Explosive Limits (LEL and UEL). These limits are percentages that represent the concentration of the fuel (that is, the chemical vapor) in the air. If the chemical vapor comes into contact with an ignition source (such as a spark), it will burn only if its fuel-air concentration is between the LEL and the UEL—because that portion of the cloud is already pre-mixed to the right mixture of fuel and air for burning to occur. If the fuel-air concentration is below the LEL, there is not enough fuel in the air to sustain a fire or an explosion—it is too lean. If the fuel-air concentration is above the UEL, there is not enough oxygen to sustain a fire or an explosion because there is too much fuel—it is too rich.

When a flammable vapor cloud is dispersing, the concentration of fuel in the air is not uniform; there will be areas where the concentration is higher than the average and areas where the concentration is lower than the average. This is called concentration patchiness. Because of concentration patchiness, there will be areas (called pockets) where the chemical is in the flammable range even though the average concentration has fallen below the LEL. Because of this, ALOHA's default flammable LOCs are each a fraction of the LEL, rather than the LEL itself. ALOHA uses 60% of the LEL as the default LOC for the red threat zone, because some experiments have shown that flame pockets can occur in places where the average concentration is above that level. Another common threat level used by responders is 10% of the LEL, which is ALOHA's default LOC for the yellow threat zone. The flammable LOC threat zones for methane release are as follows:
Red : 26,400 ppm = 60% LEL = Flame Pockets
Yellow: 4,400 ppm = 10% LEL

Well site risk contour maps for worst case scenario prepared based on ALOHA modelling of natural gas releases for flammable vapour cloud has been presented in **Figures 7.3-7.5** below.

Figure 7.3 Scenario I: Risk Contour Map



THREAT ZONE:
Threat Modelled: Flammable Area of Vapor Cloud

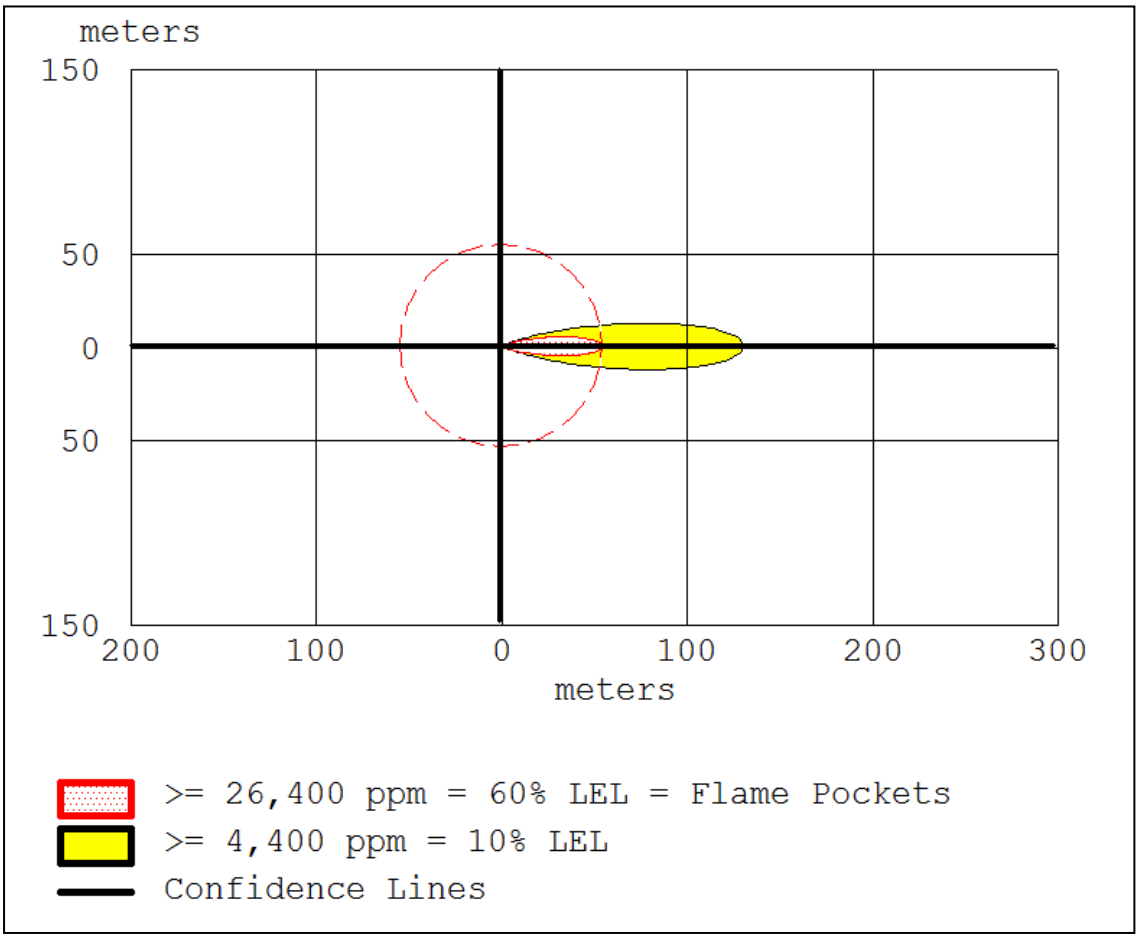
Model Run: Gaussian

Red : 25 meters --- (26,400 ppm = 60% LEL = Flame Pockets)

Note: Threat zone was not drawn because effects of near-field patchiness make dispersion predictions less reliable for short distances.

Yellow: 60 meters --- (4,400 ppm = 10% LEL)

Figure 7.4 Scenario II: Risk Contour Map



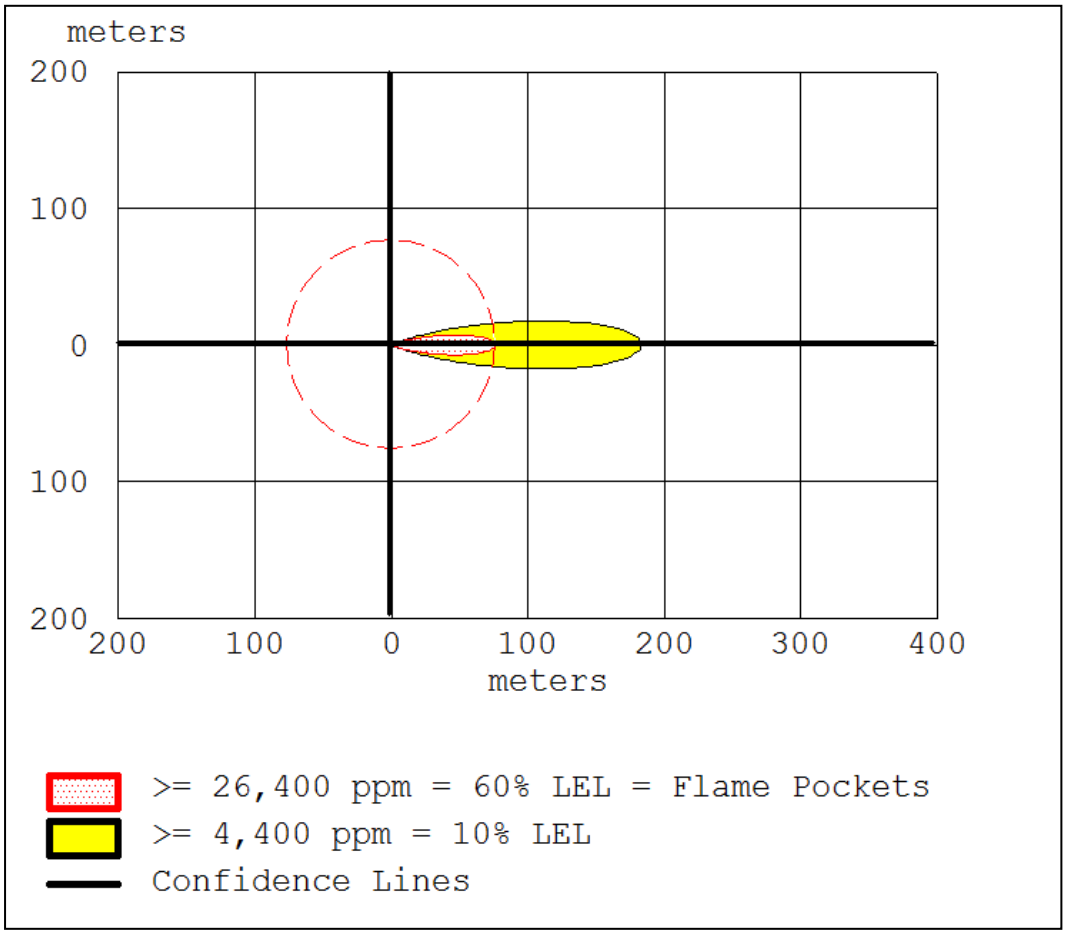
THREAT ZONE:
Threat Modeled: Flammable Area of Vapor Cloud

Model Run: Gaussian

Red : 55 meters --- (26,400 ppm = 60% LEL = Flame Pockets)

Yellow: 131 meters --- (4,400 ppm = 10% LEL)

Figure 7.5 Scenario III: Risk Contour Map



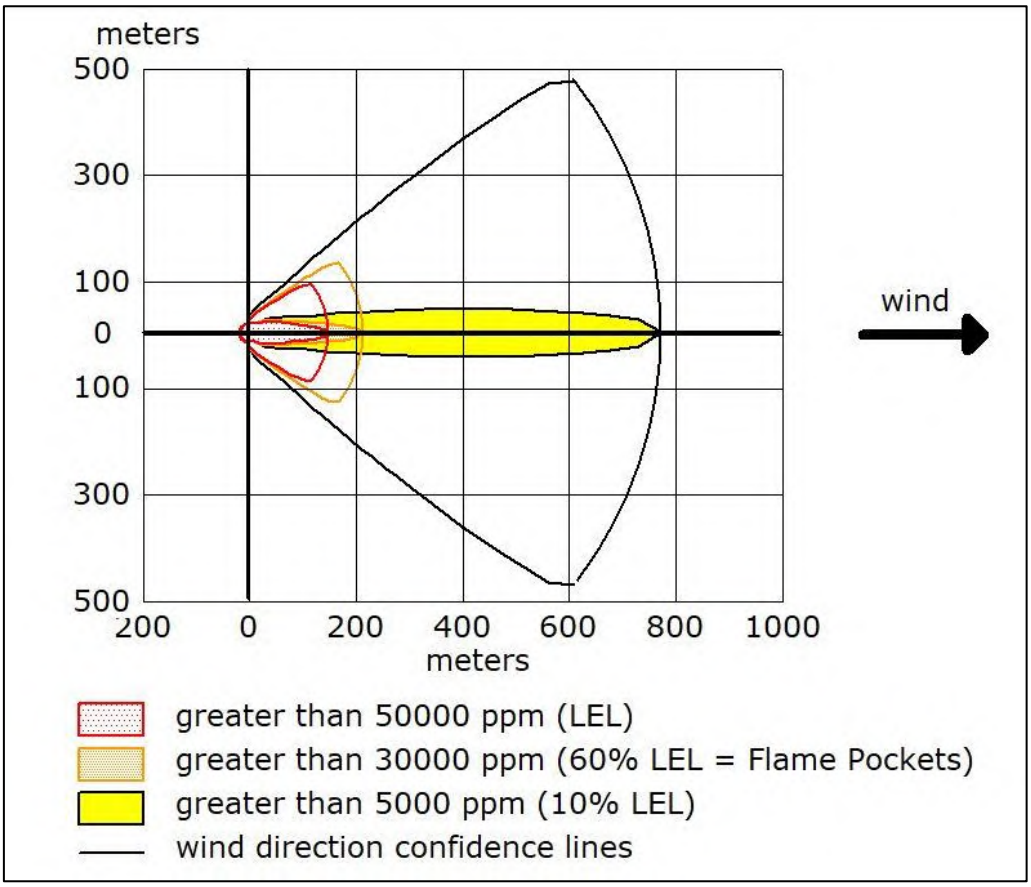
THREAT ZONE:
Threat Modelled: Flammable Area of Vapor Cloud

Model Run: Gaussian

Red : 77 meters --- (26,400 ppm = 60% LEL = Flame Pockets)

Yellow: 183 meters --- (4,400 ppm = 10% LEL)

Figure 7.6 Scenario IV: Risk Contour Map



THREAT ZONE:
Threat Modelled: Flammable Area of Vapour Cloud

Model Run: Gaussian

Red : 148 meters --- (50000 ppm = LEL)

Orange : 214 meters --- (30000 ppm = 60% LEL = Flame Pockets)

Yellow: 774 meters --- (5000 ppm = 10% LEL)

The zone of flammable vapour cloud calculated for hypothetical natural gas release under risk scenarios discussed in the earlier sections have been presented in the **Table 7.11** below.

Table 7.11 Zone of Flammable Vapour Cloud-Natural Gas Release Scenarion

Release Type	Release Rate (kg/s)	Red -60% LEL (m)	Orange	Yellow -10% LEL (m)
Small	1	25		65
Medium	5	55		131
Large	10	77		183
Worst Case	310	148 (LEL)	214 (60% LEL)	774

Hence for a worst case scenario the flammable vapour cloud zone/flame pockets' resulting from accidental release of natural gas due to blow out will be resulting in LEL concentration of 50,000 ppm at 148 m from source with the flammable gas concentration within this zone being 50,000 ppm i.e. LEL. For methane, the explosive limit ranges from 5% volume i.e. LEL to 15% by volume (which is the upper explosive limit). In the present worst case scenario modelled, the explosive range falls within 57 to 148 m.

Based on the flammable vapour cloud concentration modelled for the worst case scenario an effort was made to establish the overpressure (blast force zone) that may result from delayed ignition of vapour cloud generated from any such accidental release. For overpressure risk modelling using ALOHA a delayed ignition time of 5 minutes was considered of the vapour cloud mass. However the threat modelled revealed that Level of Concern (LOC) was never exceeded that may possibly lead to damage to property or life within the blast radius. The results have been provided in **Figure 7.7** below.

Figure 7.7 Scenario III (Worst Case) – Overpressure Risk Modelling

```
Threat Modeled: Overpressure (blast force) from vapor cloud explosion
Time of Ignition: 5 minutes after release begins
Type of Ignition: ignited by spark or flame
Level of Congestion: uncongested
Model Run: Gaussian
Explosive mass at time of ignition: 188 kilograms
Red    : LOC was never exceeded --- (8.0 psi = destruction of buildings)
Orange: LOC was never exceeded --- (3.5 psi = serious injury likely)
Yellow: LOC was never exceeded --- (1.0 psi = shatters glass)
```

The risk significance for the potential blow out scenario resulting from development drilling has been presented below. For calculating the risk significance, the likelihood ranking is considered to be "2" as the frequency analysis for blow outs incidents is computed at "~ 10^{-5}" whereas the consequence ranking has been identified to be as "4" given the worst case scenario modelling (blast overpressure) indicates that the LOC was never exceeded leading to multiple fatalities (For criteria ranking please refer to **Table 7.1 & 7.2**).

Risk Ranking – Blowout Natural Gas Release Overpressure (Worst Case Scenario)

Likelihood ranking	**2**	**Consequence ranking**	**4**
Risk Ranking & Significance = 8i.e. "Low" i.e. Risk is Acceptable and are managed by well-established controls and routine processes/procedures. Implementation of additional controls can be considered, as may be required.			

7.4.2 Hydrocarbons Leaks Due to Loss of Containment While Drilling & Testing

The releases of hydrocarbons that may be isolated from reservoir fluids include gas releases in the mud return area during drilling. The consequences of gas releases are described in this section. ALOHA model has been used to model the releases from failure of the test separator.

7.4.2.1 Frequency Analysis

Review of the hydrocarbon release database (HCRD) of 2003 for **One North Sea Platform** indicates the process gas leak frequencies for large releases (>10 kg/s) to be about **6.0×10^{-3} per year**. The

same frequency has been considered for potential release from leaks due to loss of containment while drilling.

7.4.2.2 Gas Releases during Drilling

a) Flash Fire

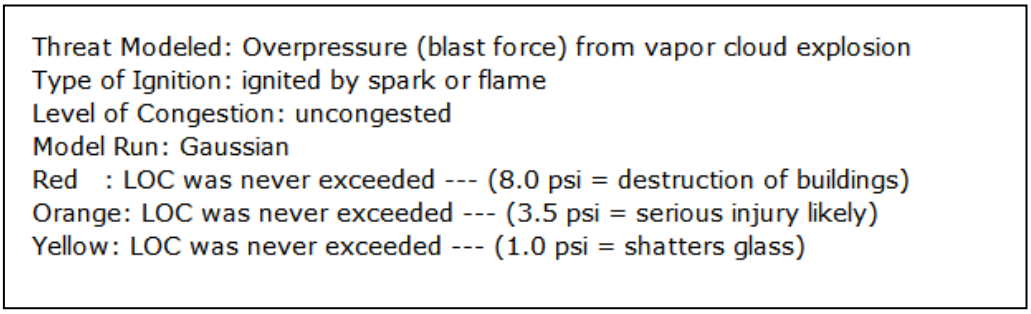
If gas is entrained in the mud then it could be released from the mud pits or shakers. The amount of gas returned is unlikely to be so great that a jet fire could occur, but the gas could build up into a flammable vapour cloud in the mud pit area. If the cloud then ignites it will result in a flash fire or vapour cloud explosion. Again, there is also the potential for a toxic cloud to be present if the release is during a period when sour crude is a possibility. The mud return typically contains around 50% water this means it cannot be ignited in liquid form so there is no danger of pool fires. Liquid mud fires are therefore not considered further.

The mud - gas separator can be other source that contains both flammable liquid and gas.

A well test separator rupture could result in release of gas when a gas cloud will form, initially located around the release point. If the release is ignited immediately then a fireball will be formed. If this cloud is not immediately ignited, then a vapour cloud will form, which will disperse with the wind and diluted as a result of air entrainment. The principal hazard arising from a cloud of dispersing flammable material is its subsequent (delayed) ignition, resulting in a flash fire. Large-scale experiments on the dispersion and ignition of flammable gas clouds show that ignition is unlikely when the average concentration is below the lower flammability limit (LFL).

As in the case for blow outs,) an effort was made to establish the overpressure (blast force zone) that may result from delayed ignition of vapour cloud generated from any such accidental release. For overpressure risk modelling using ALOHA a delayed ignition time of 5 minutes was considered of the vapour cloud mass. However the threat modelled revealed that Level of Concern (LOC) was never exceeded that may possibly lead to damage to property or life within the blast radius. The results have been provided in **Figure 7.8**.

Figure 7.8 Overpressure Risk Modelling – Well Releases during drilling

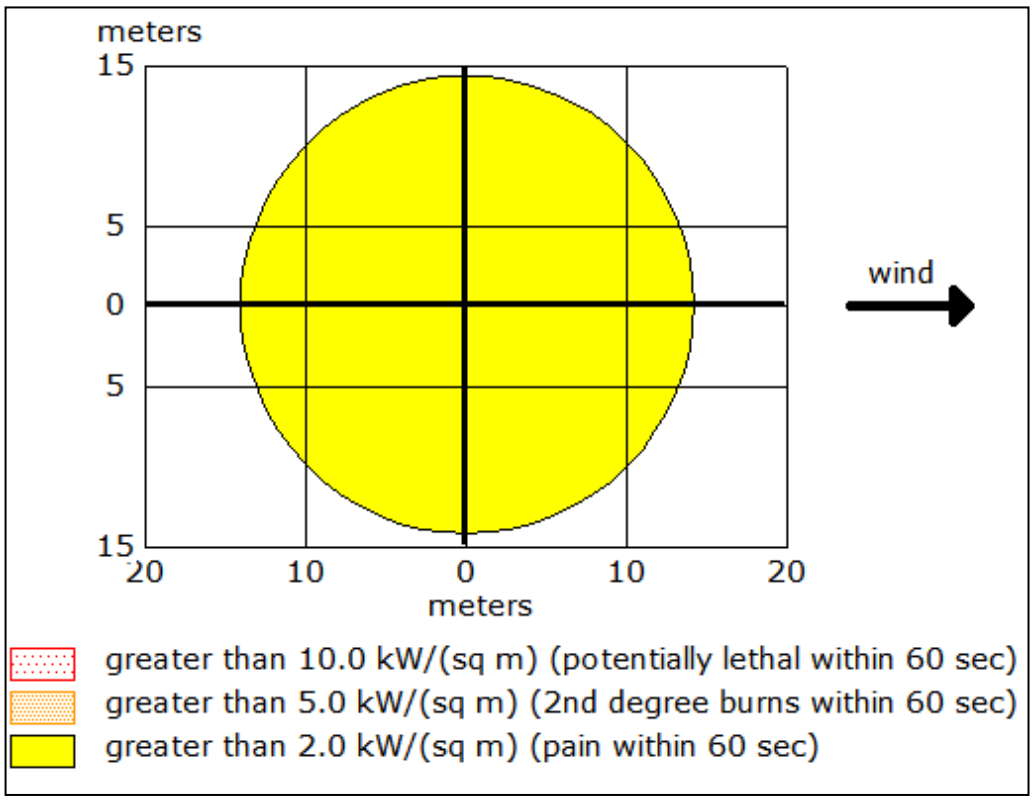


b) Jet Fire

The term jet fire is used to describe the flame produced due to the ignition of a continuous pressurised leakage from the pipe work. Combustion in a jet fire occurs in the form of a strong turbulent diffusion flame that is strongly influenced by the initial momentum of the release. Flame temperatures for typical jet flames vary from 1600°C for laminar diffusion flames to 2000°C for turbulent diffusion flames. The principal hazards from a jet fire are thermal radiation and the potential

for significant knock-on effects, such as equipment failure due to impingement of the jet fire. The thermal radiations distances due to Jet Flame are shown in **Figure 7.9** and **Figure 7.10** below.

Figure 7.9 Thermal Radiation Distances of Jet Flame due to Leak of 25 mm size



THREAT ZONE:
Threat Modeled: Thermal radiation from jet fire

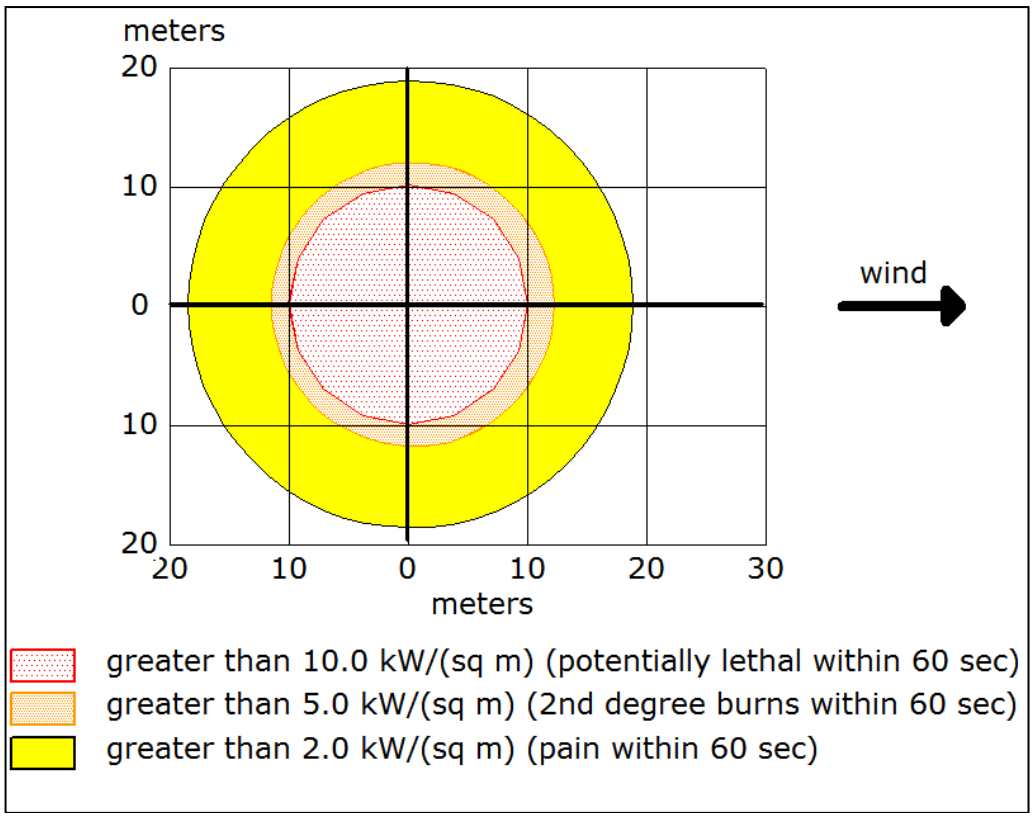
Model Run: Gaussian

Red: < 10 meters --- (10.0 kW/(sq m) = potentially lethal within 60 sec)

Orange: < 10 meters --- (5.0 kW/(sq m) = 2nd degree burns within 60 sec)

Yellow: 14 meters --- (2.0 kW/(sq m) = pain within 60 sec)

Figure 7.10 Thermal Radiation Distances of Jet Flame due to Leak of 50 mm size



THREAT ZONE:
Threat Modeled: Thermal radiation from jet fire

Model Run: Gaussian

Red : 10 meters --- (10.0 kW/(sq m) = potentially lethal within 60 sec)

Orange: 12 meters --- (5.0 kW/(sq m) = 2nd degree burns within 60 sec)

Yellow: 19 meters --- (2.0 kW/(sq m) = pain within 60 sec)

The zone of thermal radiation calculated for hypothetical release and ignition of natural gas during well testing have been presented in the ***Table 7.12*** below.

Table 7.12 Thermal Radiation Zone -Natural Gas Release Scenario during Well Testing

Release Type	Red (kW/sqm)	Orange (kW/sqm)	Yellow (kW/sqm)
Leak of 25 mm size	<10	<10	14
Leak of 50 mm size	10	12	19

Hence for a worst case scenario (50 mm leak) the ignition of natural gas release will be resulting in generation of thermal radiation which will be lethal within a maximum radius of 10m within 1 minute of its occurrence.

The risk significance for the potential well release scenario resulting from development drilling has been presented below. For calculating the risk significance, the likelihood ranking is considered to be

"3" as the frequency analysis for pipeline leak from jet fire is computed at "*6.0 X 10^{-3}*" whereas the consequence ranking has been identified to be as "4" given the worst case scenario modelling (blast overpressure)/jet fire indicates that the LOC was never exceeded leading to multiple fatalities (For criteria ranking please refer to **Tables 7.1 and 7.2**).

Risk Ranking – Jet Fire/Blast Overpressure from Well Releases (Worst Case Scenario)

Likelihood ranking	**3**	**Consequence ranking**	**4**
Risk Ranking & Significance = 12 i.e. "Medium" i.e. Risk is Tolerable and can be managed through adoption of necessary controls and technologies.			

7.4.3 Interconnecting Hydrocarbon Pipeline Network

As discussed in the project description section, the project involves laying of 100 km long assorted oil & gas flow lines/ delivery lines in Dumduma-Pengeri Area under Tinsukia district of Assam. Some of the key hazard likely to be associated with same has been presented below

- Jet fires associated with pipework failures;
- Vapour cloud explosions; and
- Flash fires.

Each of these hazards has been described below.

Jet Fire

Jet fires result from ignited releases of pressurized flammable gas or superheated/pressurized liquid. The momentum of the release carries the material forward in a long plume entraining air to give a flammable mixture. Jet fires only occur where the natural gas is being handled under pressure or when handled in gas phase and the releases are unobstructed.

Flash Fire

Vapour clouds can be formed from the release of vapour of pressurized flammable material as well as from non-flashing liquid releases where vapour clouds can be formed from the evaporation of liquid pools or leakage/rupture of pressurized pipelines transporting flammable gas.

Where ignition of a release does not occur immediately, a vapour cloud is formed and moves away from the point of origin under the action of the wind. This drifting cloud may undergo delayed ignition if an ignition source is reached, resulting in a flash fire if the cloud ignites in an unconfined area or vapour cloud explosion (VCE) if within confined area.

Vapour Cloud Explosion

If the generation of heat in a fire involving a vapour-air mixture is accompanied by the generation of pressure then the resulting effect is a
vapour cloud explosion (VCE). The amount of overpressure produced in a
VCE is determined by the reactivity of the gas, the strength of the ignition source, the degree of confinement of the vapour cloud, the number of obstacles in and around the cloud and the location of the point of ignition with respect to the escape path of the expanding gases.

However, in the case of the interconnecting gas pipeline network *jet fire* has been identified as the most probable hazard.

7.4.3.1 Pipeline Frequency Analysis

An effort has also been made to understand the primary failure frequencies of pressurised gas/oil to be transported through the interconnecting pipeline network. Based on the European Gas Pipeline Incident Data Group (EGIG) database the evolution of the primary failure frequencies over the entire period and for the last five years has been provided in **Table 7.13**.

Table 7.13 Primary Gas Pipeline Failure Frequency

Period	No. of Incidents	Total System Exposure (km.yr)	Primary failure frequency (1000 km.yr)
1970-2007	1173	$3.15.10^6$	0.372
1970-2010	1249	$3.55.10^6$	0.351
1970-2013	1309	$3.98.10^6$	0.329
1970-2016	1366	$4.41.10^6$	0.310
1970-2019	1411	$4.84.10^6$	0.292
1980-2019	1050	$4.36.10^6$	0.241
1990-2019	663	$3.63.10^6$	0.183
2000-2019	388	$2.64.10^6$	0.147
2010-2019	184	$1.42.10^6$	0.129
2015-2019	90	$0.71.10^6$	0.126

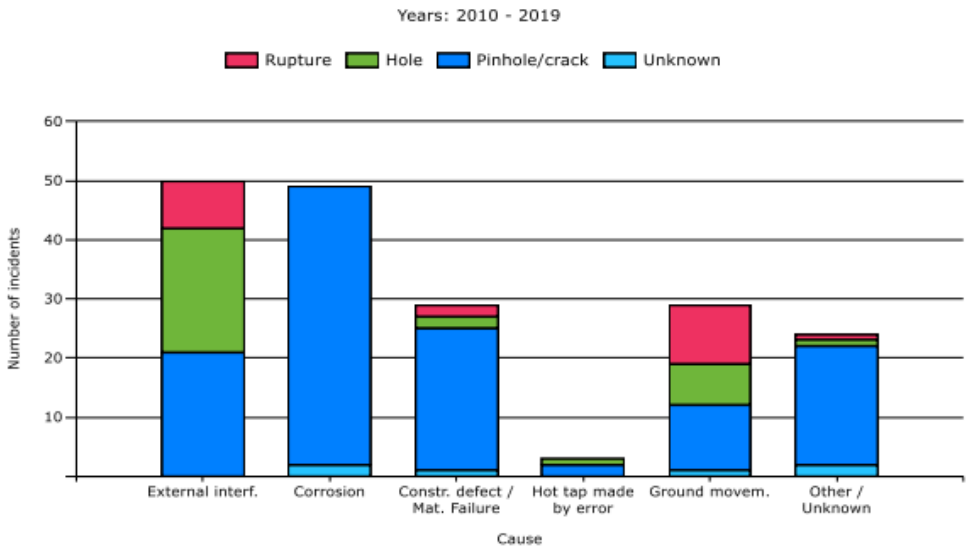
Source: 11th EGIG Report

As referred in the above table the overall failure frequency (0.33) of the entire period (1970-2013) is slightly lower than the failure frequency of 0.35 reported in the 8th EGIG report (1970-2010). The failure frequency of the last 5 years was found to be 0.16 per 1000km.year, depicting an improved performance over the recent years.

Incident Causes

Gas pipeline failure incidents can be attributed to the following major causes viz. external interference, construction defects, corrosion (internal & external), ground movement and hot tap. The distribution of incidents with cause has been presented in **Figure 7.11**.

Figure 7.11 Gas Pipeline Failure – Distribution of Incident & Causes



Source: 11th EGIG Report

The interpretation of the aforesaid figure indicated external interference as the major cause of pipeline failure contributing to about 48.4% of the total failure incidents followed by construction defects (16.7%) and corrosion related problems (16.1%). Ground movement resulting from seismic disturbance, landslides, flood etc. contributed to only 7.4% of pipeline failure incident causes.

Review of the 11th EGIG report indicates that primary failure frequency varies with pipeline diameter, and the same has been presented in **Table 7.14**.

Table 7.14 Primary Failure Frequency based on Diameter Class (1970-2013)

Nominal Diameter (inch)	Primary failure frequency (per km.yr)		
	Pinhole/Crack	Hole	Rupture
diameter < 5"	4.45×10^{-4}	2.68×10^{-4}	1.33×10^{-4}
5" ≤ diameter < 11"	2.80×10^{-4}	1.97×10^{-4}	6.40×10^{-5}
11" ≤ diameter < 17"	1.27×10^{-4}	0.98×10^{-4}	4.10×10^{-5}
17" ≤ diameter < 23"	1.02×10^{-4}	5.00×10^{-5}	3.40×10^{-5}
23" ≤ diameter < 29"	8.50×10^{-5}	2.70×10^{-5}	1.20×10^{-5}
29" ≤ diameter < 35"	2.30×10^{-5}	5.00×10^{-6}	1.40×10^{-5}
35" ≤ diameter < 41"	2.30×10^{-5}	8.00×10^{-6}	3.00×10^{-6}
41" ≤ diameter < 47"	7.00×10^{-6}	-	-
diameter ≥ 47"	6.00×10^{-6}	6.00×10^{-6}	6.00×10^{-6}

Source: 9th EGIG Report

The pipeline failure frequency viz. leaks or rupture for the natural gas pipeline has been computed based on the aforesaid table. Considering the interconnecting gas pipeline to be laid is likely to have the following diameters - 50mm (1.96 inches), 200mm (7.87 inches) to 300mm (11.81 inches), the failure frequency has been presented in **Table 7.15**.

Table 7.15 Interconnecting Pipeline - Failure Frequency

Sl. No	Pipeline Failure Case	EGIG Failure Frequency (per km.year)	Pipeline Dia (mm)	Avg. Pipeline Length (km)	Project Pipeline Failure Frequency (per year)	Frequency
1	Pipeline Rupture	1.33×10^{-4}	50	10	1.33×10^{-3}	Occasional/Rare
2	Pipeline Leak	4.45×10^{-4}	50	10	4.45×10^{-3}	Occasional/Rare
3	Pipeline Rupture	6.40×10^{-5}	200	180	11.52×10^{-3}	Occasional/Rare
4	Pipeline Leak	2.80×10^{-4}	200	180	5.04×10^{-2}	Occasional/Rare
5	Pipeline Rupture	4.10×10^{-5}	300	10	4.10×10^{-4}	Not Likely
6	Pipeline Leak	1.27×10^{-4}	300	10	1.27×10^{-3}	Occasional/Rare

Thus the probability of pipeline leak and rupture with respect to the interconnecting hydrocarbon pipeline network is identified to be as "*Occasional/Rare*".

Pipeline Failure – Ignition Probability

The ignition probability of natural gas pipeline failure (rupture & leaks) with respect to the proposed expansion project is derived based on the following equations as provided in the IGEM/TD/2 standard

$P_{ign} = 0.0555 + 0.0137pd2$; for $0 \le pd^2 \le 57$
(For pipeline ruptures)
$P_{ign} = 0.81$; for $pd^2 > 57$

$P_{ign} = 0.0555 + 0.0137(0.5pd2)$; for $0 \le 0.5pd^2 \le 57$
(For pipeline leaks)
$P_{ign} = 0.81$; for $0.5pd^2 > 57$

Where:

P_{ign} = Probability of ignition
p = Pipeline operating pressure (bar)
d = Pipeline diameter (m)

The ignition and jet fire probability of natural gas release from a leak/rupture of interconnected pipeline network is calculated based on the above equations and presented in **Table 7.16** below.

Table 7.16 Interconnecting Pipeline – Ignition & Jet Fire Probability

Sl. No	Pipeline Failure Case	Pipeline Dia (mm)	Project Pipeline Failure Frequency (per year)	Ignition Probability	Jet Fire Probability
1	Pipeline Rupture	50	1.33×10^{-3}	0.056	7.46×10^{-5}
2	Pipeline Leak	50	4.45×10^{-3}	0.055	2.48×10^{-4}
3	Pipeline Rupture	200	11.52×10^{-3}	0.064	7.48×10^{-4}
4	Pipeline Leak	200	5.04×10^{-2}	0.060	3.03×10^{-3}

Sl. No	Pipeline Failure Case	Pipeline Dia (mm)	Project Pipeline Failure Frequency (per year)	Ignition Probability	Jet Fire Probability
5	Pipeline Rupture	300	4.10×10^{-4}	0.076	3.14×10^{-5}
6	Pipeline Leak	300	1.27×10^{-3}	0.066	0.83×10^{-4}

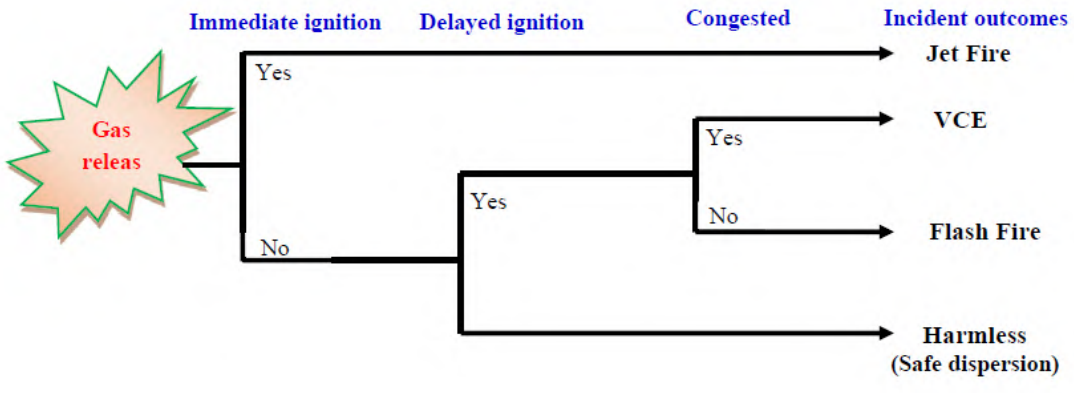
Hence from the above table it can be concluded that ignition probability of natural gas that may be released from the trunk and assorted pipelines due to any accidental event is mostly considered to be "***Not likely***".

7.4.3.2 Consequence Analysis – Pipelines & GCS

Pipelines generally contains large inventories of oil or gas under high pressure; although accidental releases from them are remote they have the potential of catastrophic or major consequences if related risks are not adequately analysed or controlled. The consequences of possible pipeline failure is generally predicted based on the hypothetical failure scenario considered and defining parameters such as meteorological conditions (stability class), leak hole & rupture size and orientation, pipeline pressure & temperature, physicochemical properties of chemicals released etc.

In case of pipe rupture containing highly flammable natural gas, an immediate ignition will cause a jet fire. Flash fires can result from the release of natural gas through the formation of a vapour cloud with delayed ignition and a fire burning through the cloud. A fire can then flash back to the source of the leak and result in a jet fire. Flash fires have the potential for offsite impact as the vapour clouds can travel considerable distances downwind of the source. Explosions can occur when a flammable gas cloud in a confined area is ignited; however where vapour cloud concentration of released material is lower than Lower Flammability Limit (LFL), consequently the occurrence of a VCE is highly unlikely. VCE, if occurs may result in overpressure effects that become more significant as the degree of confinement increases (Refer **Figure 7.12**).Therefore, in the present study, only the risks of jet fires for the below scenarios have been modelled and calculated.

Figure 7.12 Natural Gas Release – Potential Consequences



[*Source: "Safety risk modelling and major accidents analysisof hydrogen and natural gas releases: Acomprehensive risk analysis framework" - Iraj Mohammadfam, Esmaeil Zarei*]

Based on the above discussion and frequency analysis as discussed in the earlier section, the following hypothetical risk scenarios (Refer **Table 7.17**) have been considered for consequence analysis of the interconnecting pipelines.

Table 7.17 Interconnecting Pipeline Risk Modelling Scenarios

Scenario	Source	Pipeline dia (mm)	Accident Scenario	Design Pressure (bar)	Temperature	Potential Risk
1	Pipeline	50	Complete rupture	17.23	24°C	Jet Fire
2	Pipeline	300	Leak of 75mm dia	17.23	24°C	Jet Fire
3	Pipeline	300	Complete rupture	17.23	24°C	Jet Fire
4	Pipeline	200	Leak of 50mm dia	17.23	24°C	Jet Fire
5	Pipeline	200	Complete Rupture	17.23	24°C	Jet Fire

The pipeline failure risk scenarios have been modeled using ALOHA and interpreted in terms of Thermal Radiation Level of Concern (LOC) encompassing the following threshold values (measured in kilowatts per square meter) for natural gas (comprising of ~95% methane[1]) to create the default threat zones:

Red: 10 kW/ (sq. m) -- potentially lethal within 60 sec;

Orange: 5 kW/ (sq. m) -- second-degree burns within 60 sec; and

Yellow: 2 kW/ (sq. m) -- pain within 60 sec.

For vapour cloud explosion, the following threshold level of concern has been interpreted in terms of blast overpressure as specified below:

Red: 8.0 psi – destruction of buildings;

Orange: 3.5 psi – serious injury likely; and

Yellow: 1.0 psi – shatters glass

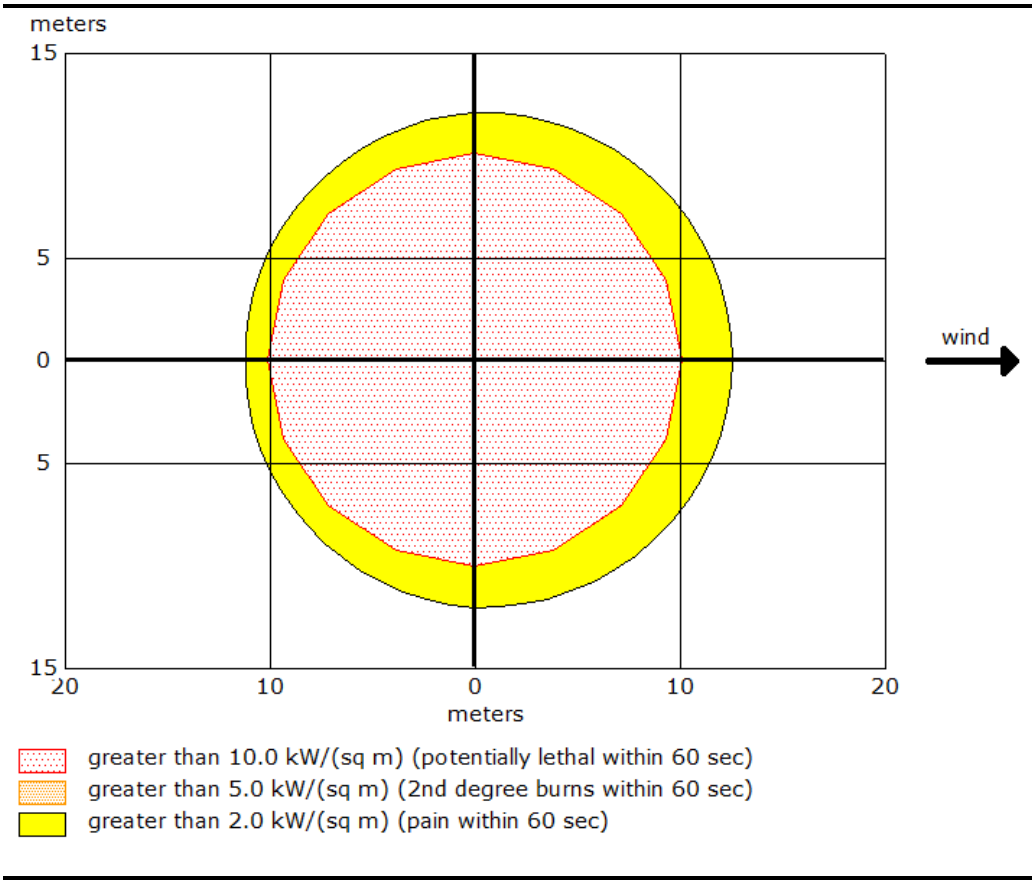
The risk scenarios modelled for pipeline failure has been presented below:

Scenario 1: 50mm dia Pipeline Complete Rupture

The jet fire threat zone plot for release and ignition of natural gas from 50 mm dia pipeline ruputre is represented in **Figure 7.13** below.

[1] https://www.naesb.org//pdf2/wgq_bps100605w2.pdf http://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=18&ved=0ahUKEwjF7MiDttPRAhVCMI8KHd7aD6cQFghrMBE&url=http%3A%2F%2Fwww.springer.com%2Fcda%2Fcontent%2Fdocument%2Fcda_downloaddocument%2F9781848828711-c1.pdf%3FSGWID%3D0-0-45-862344-p173918930&usg=AFQjCNEaJklfYKl3fRUdi6xiRYeW-FJb2A

Figure 7.13 Threat Zone Plot – 50mm dia pipeline complete rupture



Source: ALOHA

THREAT ZONE:

Threat Modeled: Thermal radiation from jet fire

Red : 10 meters --- (10.0 kW/ (sq. m) = potentially lethal within 60 sec)

Orange: 10 meters --- (5.0 kW/ (sq. m) = 2nd degree burns within 60 sec)

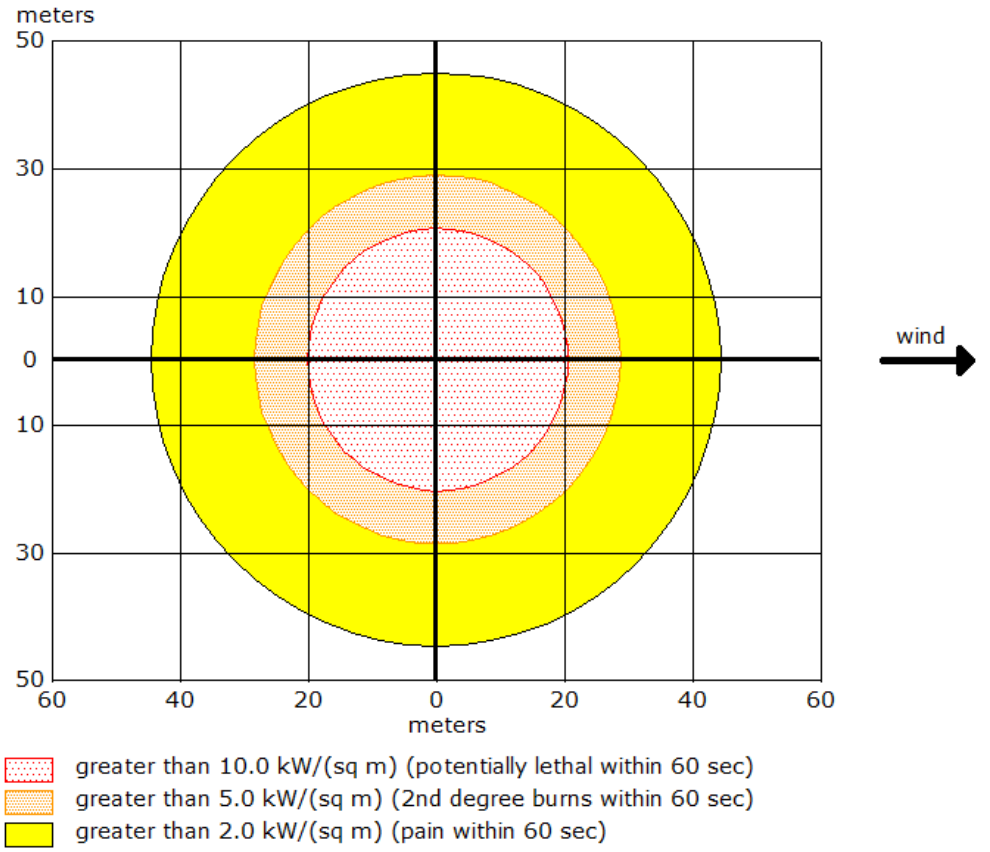
Yellow: 13 meters --- (2.0 kW/ (sq. m) = pain within 60 sec)

The worst hazard for release and ignition of natural gas from the 50m dia pipeline rupture will be experienced to a maximum radial distance of 10m from the source with potential lethal effects within 1 minute.

Scenario 2: 300mm dia Pipeline Leak (75mm dia)

The jet fire threat zone plot for release and ignition of natural gas from 300mm dia pipeline leak of 75mm dia is represented **Figure 7.14**.

Figure 7.14 Threat Zone Plot – 300mm dia pipeline leak (75mm dia)



Source: ALOHA

THREAT ZONE:

Threat Modeled: Thermal radiation from jet fire

Red : 21 meters --- (10.0 kW/ (sq. m) = potentially lethal within 60 sec)

Orange: 29 meters --- (5.0 kW/ (sq. m) = 2nd degree burns within 60 sec)

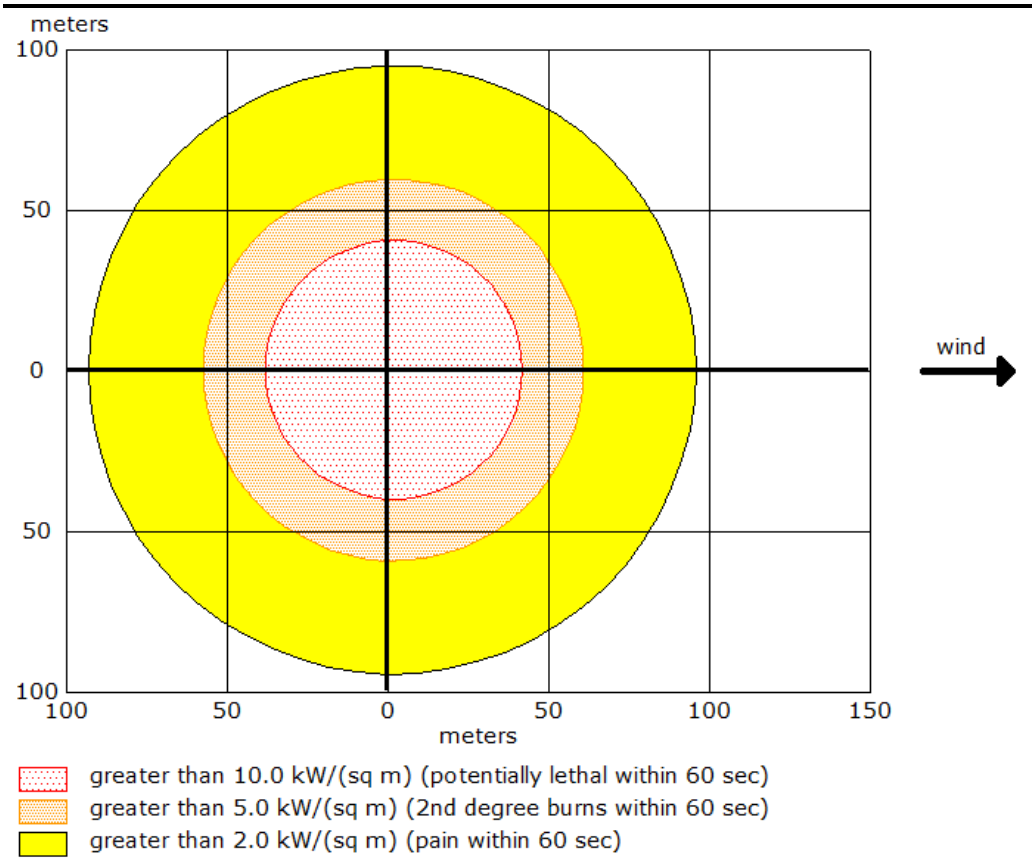
Yellow: 45 meters --- (2.0 kW/ (sq. m) = pain within 60 sec)

The worst hazard for release and ignition of natural gas from 300m dia pipeline leak of 75mm dia will be experienced to a maximum radial distance of 21m from the source with potential lethal effects within 1 minute.

Scenario 3: 300mm dia Pipeline Rupture

The jet fire threat zone plot for release and ignition of natural gas from 300m dia pipeline rupture is represented **Figure 7.15**.

Figure 7.15 Threat Zone Plot – 300mm dia pipeline rupture



Source: ALOHA

THREAT ZONE:

Threat Modeled: Thermal radiation from jet fire

Red : 41 meters --- (10.0 kW/ (sq. m) = potentially lethal within 60 sec)

Orange: 61 meters --- (5.0 kW/ (sq. m) = 2nd degree burns within 60 sec)

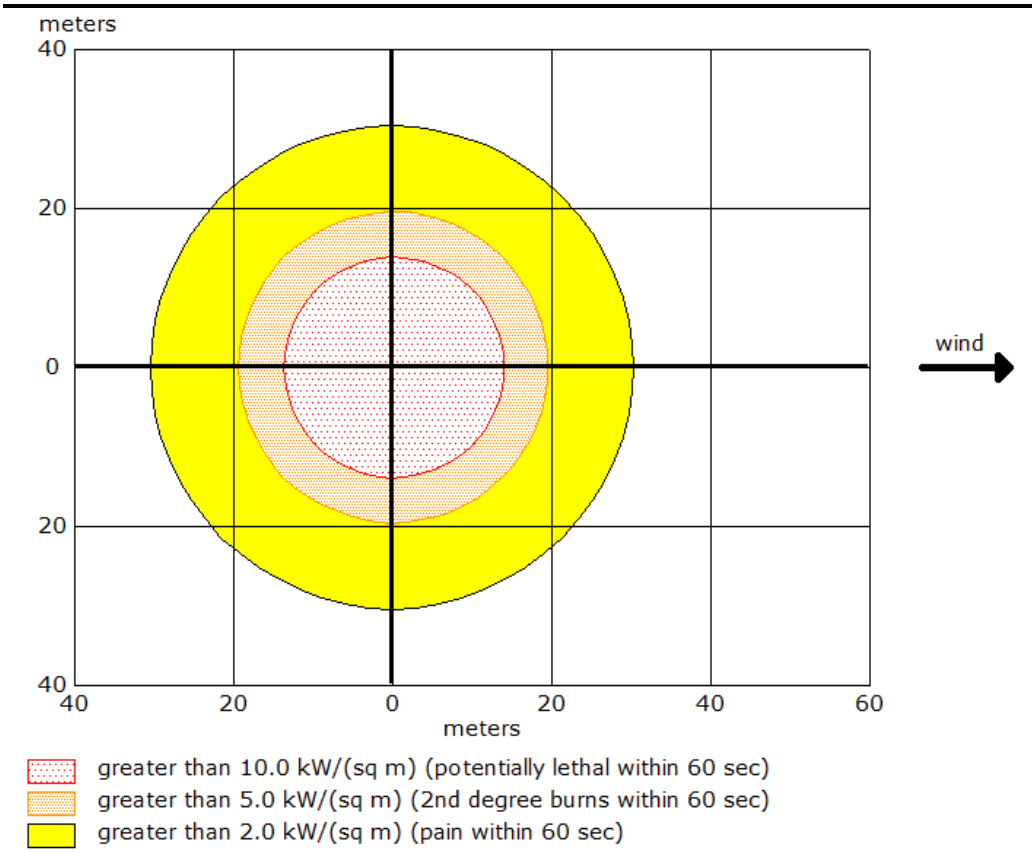
Yellow: 96 meters --- (2.0 kW/ (sq. m) = pain within 60 sec)

The worst hazard for release and ignition of natural gas from 300mm dia pipeline rupture will be experienced to a maximum radial distance of 41m from the source with potential lethal effects within 1 minute.

Scenario 4: 200mm dia Pipeline Leak (50mm dia)

The jet fire threat zone plot for release and ignition of natural gas from 200mm dia pipeline leak of 50mm dia is represented **Figure 7.16**.

Figure 7.16 Threat Zone Plot –200mm dia pipeline leak (50mm dia)



Source: ALOHA

THREAT ZONE:

Threat Modeled: Thermal radiation from jet fire

Red : 15 meters --- (10.0 kW/ (sq. m) = potentially lethal within 60 sec)

Orange: 21 meters --- (5.0 kW/ (sq. m) = 2nd degree burns within 60 sec)

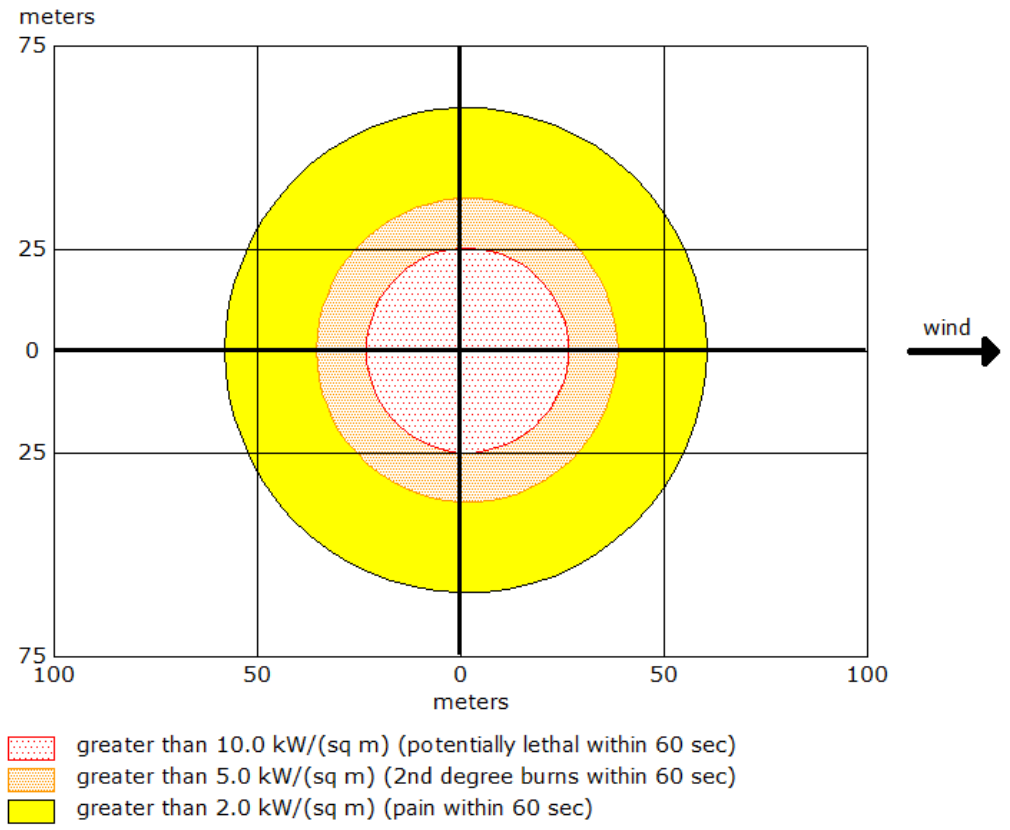
Yellow: 31 meters --- (2.0 kW/ (sq. m) = pain within 60 sec)

The worst hazard for release and ignition of natural gas from 200mm dia pipeline leak of 50mm dia will be experienced to a maximum radial distance of 15m from the source with potential lethal effects within 1 minute.

Scenario 5: 200mm dia Pipeline Rupture

The jet fire threat zone plot for release and ignition of natural gas from 200mm dia pipeline rupture is represented in **Figure 7.17**.

Figure 7.17 Threat Zone Plot –200mm dia pipeline rupture



Source: ALOHA

THREAT ZONE:

Threat Modeled: Thermal radiation from jet fire

Red : 28 meters --- (10.0 kW/ (sq. m) = potentially lethal within 60 sec)

Orange: 38 meters --- (5.0 kW/ (sq. m) = 2nd degree burns within 60 sec)

Yellow: 60 meters --- (2.0 kW/ (sq. m) = pain within 60 sec)

The worst hazard for release and ignition of natural gas from 200mm dia pipeline rupture will be experienced to a maximum radial distance of 28m from the source with potential lethal effects within 1 minute.

For VCE modelled for catastrophic failure of interconnecting pipeline the LOC level was never exceeded

THREAT ZONE:

Threat Modeled: Overpressure (blast force) from vapour cloud explosion

Type of Ignition: ignited by spark or flame

Level of Congestion: uncongested

Model Run: Heavy Gas

Red : LOC was never exceeded --- (8.0 psi = destruction of buildings)

Orange: LOC was never exceeded --- (3.5 psi = serious injury likely)

Yellow: LOC was never exceeded --- (1.0 psi = shatters glass)

For calculating the risk significance of natural gas pipeline, the likelihood ranking is considered to be "3" as the probability of pipeline rupture is computed to be ~10^{-4} per year; whereas the consequence ranking has been identified to be as "3" as given for a worst case scenario (rupture) lethal effects is likely to be limited within a radial zone of ~41m. Further as discussed in the earlier section, adequate number of gas leak and fire detection system of appropriate design will be provided for the interconnecting pipeline network including GCS to prevent for any major risk at an early stage of the incident.

Risk Ranking – Pipeline Rupture (Worst Case Scenario)

Likelihood ranking	**3**	**Consequence ranking**	**3**
Risk Ranking & Significance =9 i.e. "Low" i.e. Risk is Acceptable and can be managed through use of existing controls with the option for installation of additional controls, if necessary.			

7.4.4 OCS Tank Failure

This section assesses the risks resulting from the storage of crude oil at the OCS in two production tanks of 795 KL capacity each.

7.4.4.1 Frequency Analysis

The most credible scenario of a storage tank will be pool fire. In order to determine the probability of a pool fire occurring, the failure rate needs to be modified by the probability of the material finding an ignition source. The probability of a pool fire occurring in the event of a release is therefore equal to the product of the failure rate and the probability of ignition. The frequency of the release scenarios identified in the earlier section is represented in **Table 7.18** below. The ignition probability is dependent on a number of factors including the type of site, the release rate and the type of material released.

Table 7.18 Tank Failure Frequency

Sl. No	Type of Release	Failure Rate (per vessel per year)	Frequency
1	Catastrophic tanks failure	5.0 x 10-6	Remote
2	Small bund fire	9.0 x 10-5	Remote

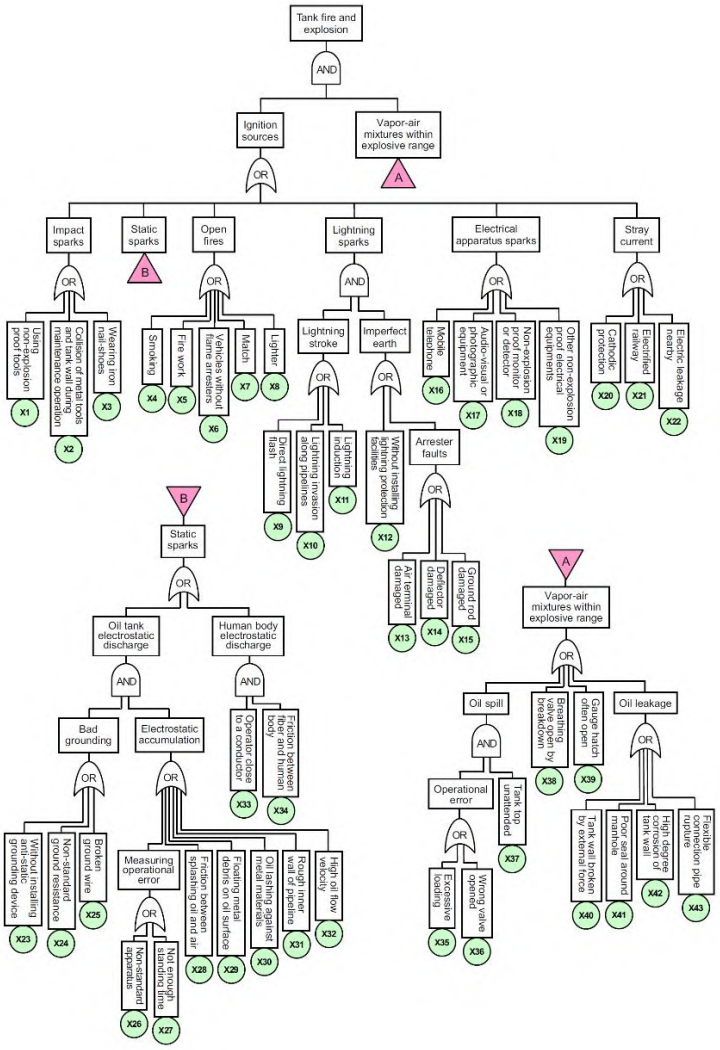
Sl. No	Type of Release	Failure Rate (per vessel per year)	Frequency
3	Large bund fire	6.0 x 10-5	Remote

Source: OGP Risk Assessment Data Directory Report No 434 – 3, March 2010, Section 2 – Summary of Recommended Data

7.4.4.2 Event Tree Analysis

Event tree analysis (ETA) is used to model the evolution of an event from the initial release through to the final outcome such as jet fire, fireball, flash fire etc. This may depend on factors such as whether immediate or delayed ignition occurs, or whether there is sufficient congestion to cause a vapour cloud explosion. The event tree for fire and explosion for an oil storage tank is shown in **Figure 7.18.**

Figure 7.18 Scenario III: Risk Contour Map



Source: Fuzzy Fault Tree Analysis for Fire and Explosion in Crude Oil Tanks – Daqing Wang, Peng Zhang and Liqiong Chen, Journal of Loss Prevention in the Process Industries

7.4.4.3 Consequence Analysis – Tankages

The main hazards associated with the storage and handlings of crude oil are pool fires resulting from the ignition of released material as well as explosions and Flash fires resulting from the ignition of a

flammable cloud formed in the event of tank overfilling. The hazards may be realised following tank overfilling and leaks/failures in the storage tank and ancillary equipment such as transfer pumps, metering equipment, etc. all of which can release significant quantities of flammable material on failure.

Bulk Storage Tank Scenarios

In addition to overfill, the scenarios considered for the crude oil storage tanks were partial/local failures and cold catastrophic failures. Factors that have been identified as having an effect on the integrity of tanks are related to design, inspection, maintenance, and corrosion[1]. The following representative scenarios for the tanks were considered (Refer **Table 7.19**).

Table 7.19 OCS Storage Tank – Risk Modelling Scenarios

Scenario	Tank	Tank Diameter (m)	Tank Height (m)	Tank Volume (KL)	Accident Scenario
1	OCS Storage Tank	10.0	10.0	795	50mm leak
2		10.0	10.0	795	100mm leak
3		10.0	10.0	795	300mm leak (worst case)

The OCS storage tank failure risk scenarios have been modeled using ALOHA for n-decane which best represent the properties of crude oil and interpreted in terms of Thermal Radiation Level of Concern (LOC) encompassing the following threshold values (measured in kilowatts per square meter) to create the default threat zones:

Red: 10 kW/ (sq. m) -- potentially lethal within 60 sec;

Orange: 5 kW/ (sq. m) -- second-degree burns within 60 sec; and

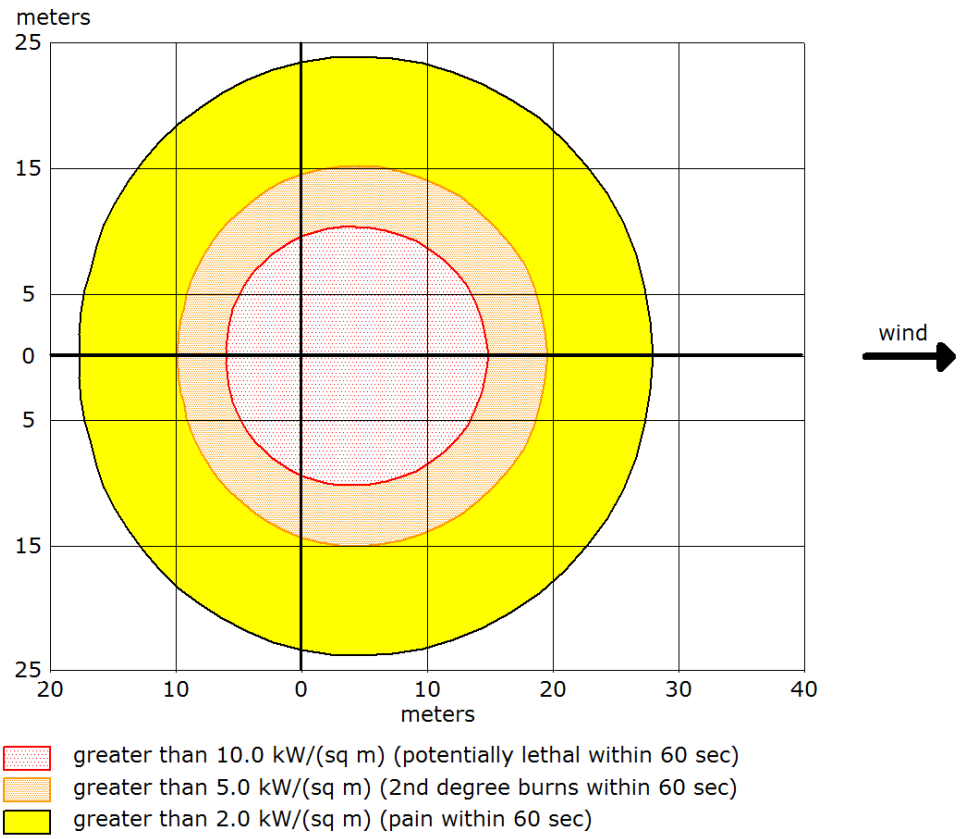
Yellow: 2 kW/ (sq. m) -- pain within 60 sec

[1] AEA Technology, HSE Guidance Document

Scenario 1: OCS Storage Tank Leak (50mm dia.)

The pool fire threat zone plot for release and ignition of crude oil from a storage tank leak of 50mm dia is represented in **Figure 7.19** below.

Figure 7.19 Threat Zone Plot – OCS Storage Tank Leak (50mm dia)



Source: ALOHA

THREAT ZONE:

Threat Modeled: Thermal radiation from pool fire

Red : 15 meters --- (10.0 kW/ (sq. m) = potentially lethal within 60 sec)

Orange: 20 meters --- (5.0 kW/ (sq. m) = 2nd degree burns within 60 sec)

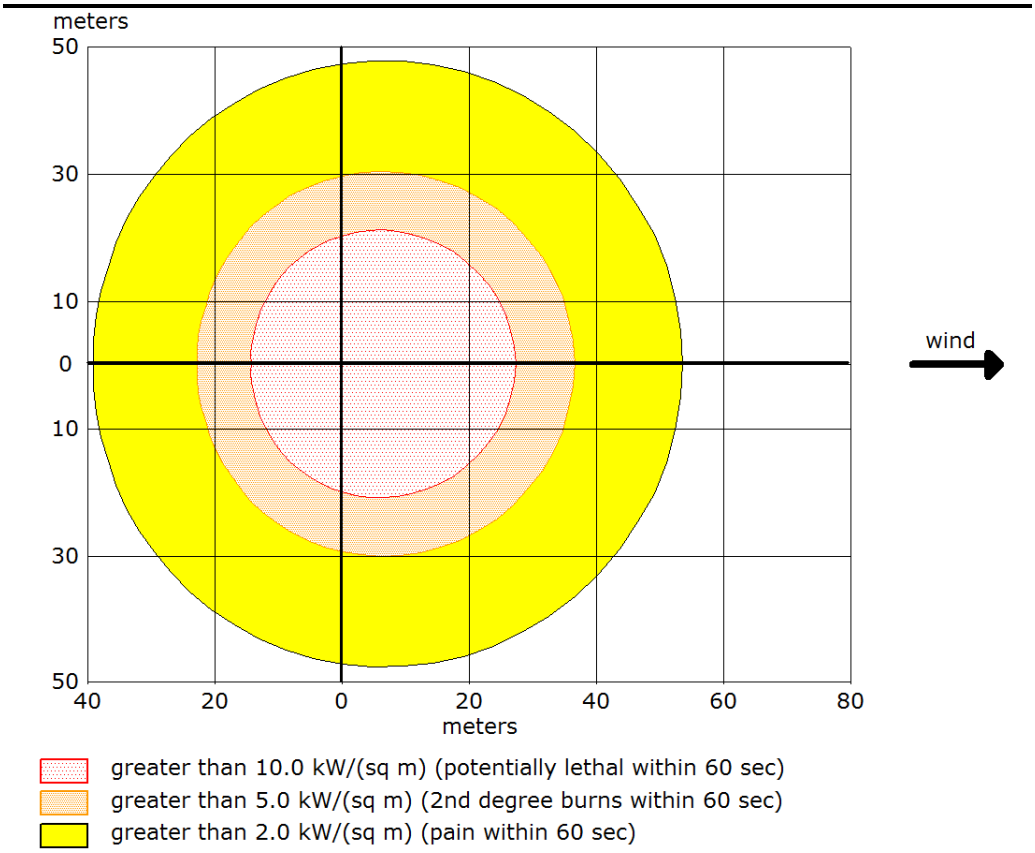
Yellow: 28 meters --- (2.0 kW/ (sq. m) = pain within 60 sec)

The worst hazard for release and ignition of crude oil from storage tank leak (50mm) will be experienced to a maximum radial distance of 15m from the source with potential lethal effects within 1 minute.

Scenario 2: OCS Storage Tank Leak (100mm dia)

The pool fire threat zone plot for release and ignition of crude oil from a storage tank leak of 100mm dia is represented in **Figure 7.20** below.

Figure 7.20 Threat Zone Plot – Diesel Storage Tank Leak (100mm dia)



Source: ALOHA

THREAT ZONE:

Threat Modeled: Thermal radiation from pool fire

Red : 26 meters --- (10.0 kW/ (sq. m) = potentially lethal within 60 sec)

Orange: 38 meters --- (5.0 kW/ (sq. m) = 2nd degree burns within 60 sec)

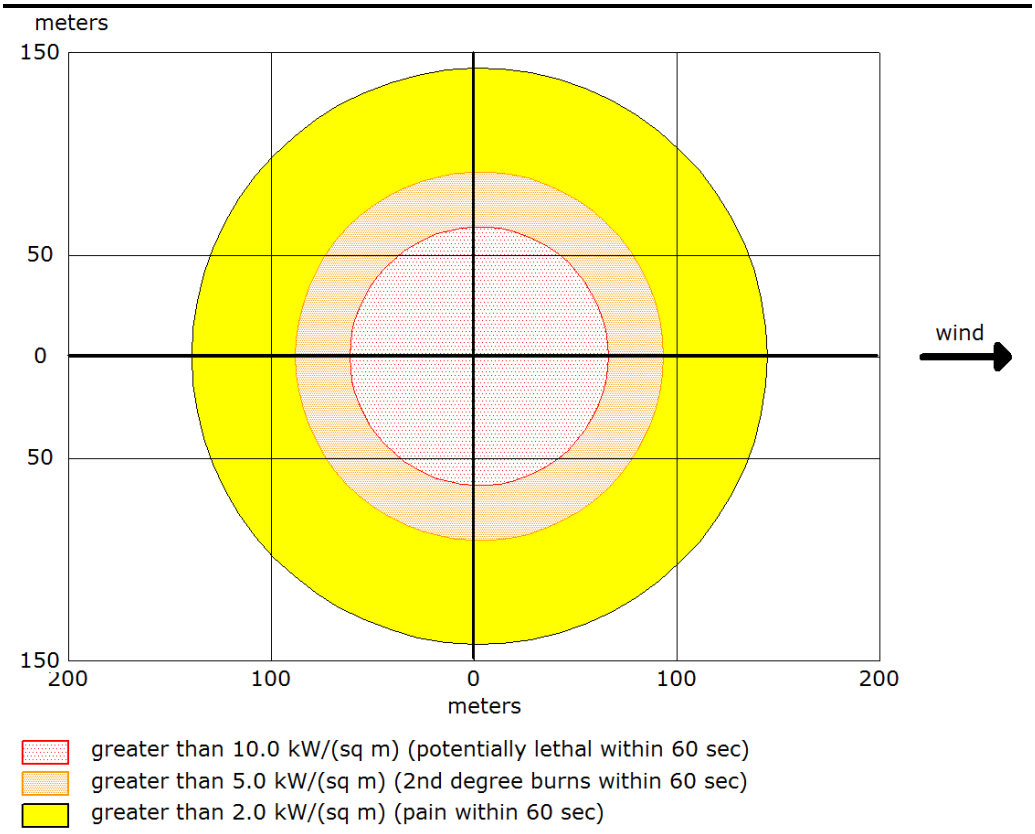
Yellow: 54 meters --- (2.0 kW/ (sq. m) = pain within 60 sec)

The worst hazard for release and ignition of crude oil from OCS storage tank leak (100mm) will be experienced to a maximum radial distance of 26m from the source with potential lethal effects within 1 minute.

Scenario 3: OCS Storage Tank Leak (300mm dia)

The pool fire threat zone plot for release and ignition of crude oil from a storage tank leak of 300mm dia (worst case) is represented in **Figure 7.21** below.

Figure 7.21 Threat Zone Plot – OCS Storage Tank Leak (300mm dia)



Source: ALOHA

THREAT ZONE:

Threat Modeled: Thermal radiation from pool fire

Red : 67 meters --- (10.0 kW/ (sq. m) = potentially lethal within 60 sec)

Orange: 93 meters --- (5.0 kW/ (sq. m) = 2nd degree burns within 60 sec)

Yellow: 145 meters --- (2.0 kW/ (sq. m) = pain within 60 sec)

The worst hazard for release and ignition of crude oil from storage tank leak (300mm) will be experienced to a maximum radial distance of 67m from the source with potential lethal effects within 1 minute.

For calculating the risk significance of crude oil storage failure, the likelihood ranking is considered to be “2” as the failure probability for such failure is computed to be ~5 x10^{-6} per year. With respect to consequence ranking, for the aforesaid incident it has been identified to be as “4” given for a worst case scenario lethal effects is likely to be experienced within a maximum radial zone ~67 meters. However, considering that isolated crude oil storages will be equipped appropriate state of the art process and fire safety controls in consistent with OISD-117 requirements, the risk is likely to be less significant.

Risk Ranking – OCS Tank Failure (Worst Case Scenario)

Likelihood ranking	**2**	**Consequence ranking**	**4**
Risk Ranking & Significance =8 i.e. “Low” i.e. Risk is Acceptable and can be managed through use of existing controls with the option for installation of additional controls, if necessary.			

7.4.5 Hazardous Material Releases or Mishaps

Release of following materials are not considered as major accidents and therefore are not quantified in terms of frequency, consequence and the resulting risk.

- Diesel fuel;
- Lubricants;
- Mud Chemicals;
- Explosives.

Exposure to such hazards would be **occupational** rather than **major** hazards.

7.4.6 External Hazards

External hazards which may impair the safety of the rig include the following:

- Severe weather conditions;
- Earthquake or ground movement; and
- Security breaches.

Extreme weather conditions are primarily lightening, cyclones and high winds and heavy rains. They may result in injury (through slips trips of personnel) or equipment damage. Cyclones and high winds may damage the rig structure. There are potential hazards to workers from direct impact of the structure i.e. falling equipment and any subsequent hydrocarbon releases caused by equipment damage. However, no fatalities are expected from such conditions i.e. the risk to workers is low, providing:

- Reliable weather forecasts are available;
- Work or rig move is suspended if conditions become too severe;
- Design and operational limits of the rig structure are known and not exceeded.

Other natural hazards, such as earthquake are predominant in the region.
The risk of external hazards causing blowouts has been considered in the frequency estimation of oil and gas blowouts in the earlier sections.

7.5 Disaster Management Plan

Disaster Management is a process or strategy that is implemented when any type of catastrophic event takes place. The Disaster Management Plan envisages the need for providing appropriate action so as to minimize loss of life/property and for restoration of normalcy within the minimum time in event of any emergency. Adequate manpower, training and infrastructure are required to achieve this.

The objectives of Disaster Management Plan are as follows:

- Rapid control and containment of the hazardous situation;
- Minimising the risk and impact of occurrence and its catastrophic effects;
- Effective rehabilitation of affected persons and prevention of damage to Property and environment;
- To render assistance to outside the factory.

The following important elements in the disaster management plan (DMP) are suggested to effectively achieve the objectives of emergency planning:

- Reliable and early detection of an emergency and careful response;
- The command, co-ordination, and response organization structure along with efficient trained personnel;
- The availability of resources for handling emergencies;
- Appropriate emergency response actions;
- Effective notification and communication facilities;
- Regular review and updating of the DMP;
- Proper training of the concerned personnel.

7.5.1 Emergency Identified

Emergencies that may arise:

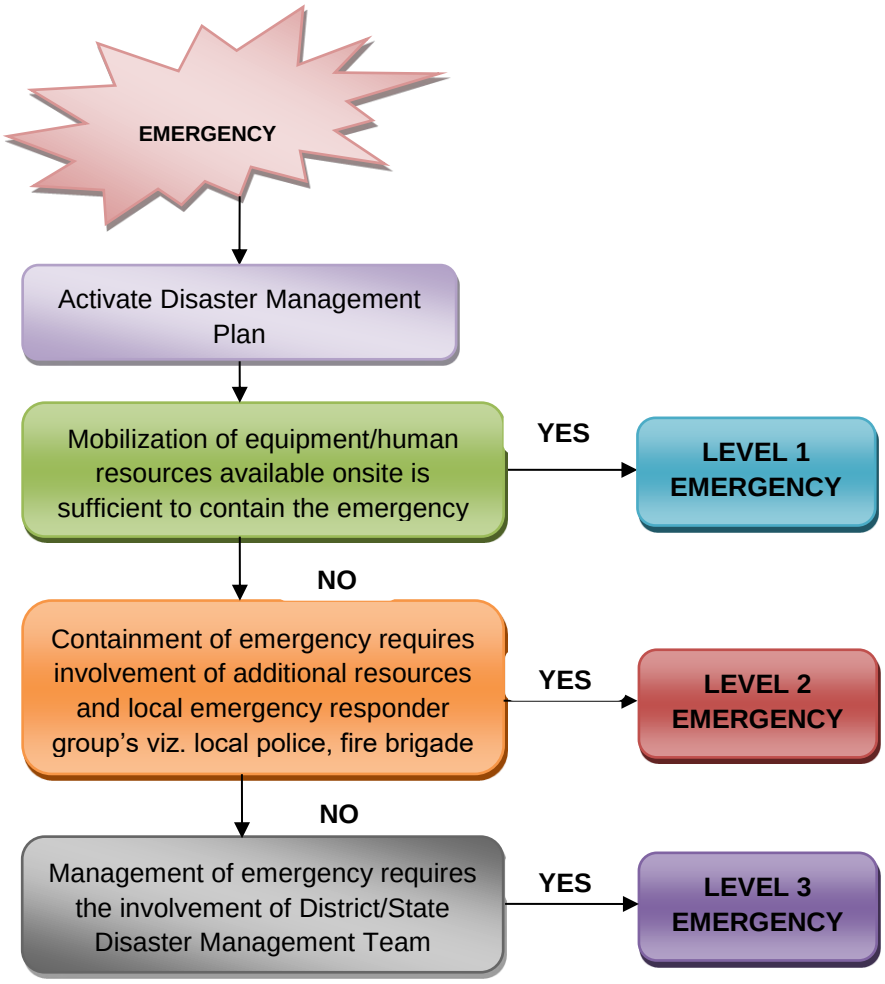
- Such an occurrence may result in on-site implications like :
  - Fire or explosion;
  - Leakage of natural gas; and
  - Oil spillage and subsequent fire.
- Incidents having off-site implications can be:
  - Natural calamities like earthquake, cyclone, lightening, etc.
- Other incidents, which can also result in a disaster, are :
  - Agitation / forced entry by external group of people;
  - Sabotage.

7.5.2 Emergency Classification

Due consideration is given to the severity of potential emergency situation that may arise as a result of accident events as discussed in the **Risk Analysis (RA**) study. Not all emergency situations call for

mobilization of same resources or emergency actions and therefore, the emergencies are classified into three levels depending on their severity and potential impact, so that appropriate emergency response procedures can be effectively implemented by the Emergency Response Team. The emergency levels/tiers defined with respect to this project based on their severity have been discussed in the subsequent sections with 'decision tree' for emergency classification being depicted in **Figure 7.22.**

Figure 7.22 Emergency Classification "Decision Tree"



The emergency situations have been classified in three categories depending upon their magnitude and consequences. Different types of emergencies that may arise at the project site can be broadly classified as:

7.5.2.1 Level 1 Emergency

The emergency situation arising in any section of one particular plant / area which is minor in nature, can be controlled within the affected section itself, with the help of in-house resources available at any given point of time. The emergency control actions are limited to level 1 emergency organization only. But such emergency does not have the potential to cause serious injury or damage to property / environment and the domino effect to other section of the affected plant or nearby plants/ areas.

7.5.2.2 Level 2 Emergency

The emergency situation arising in one or more plants / areas which has the potential to cause serious injury or damage to property / environment within the affected plant or to the nearby plants / areas. This level of emergency situation will not affect surrounding community beyond the facility. But such emergency situation always warrants mobilizing the necessary resources available in-house and/or outsources to mitigate the emergency. The situation requires declaration of On – Site emergency.

7.5.2.3 Level 3 Emergency

The emergency is perceived to be a kind of situation arising out of an incident having potential threat to human lives and property not only within the facility but also in surrounding areas and environment. It may not be possible to control such situations with the resources available within OIL facility. The situation may demand prompt response of multiple emergency response groups as have been recognized under the off-site district disaster management plan of the concerned district(s).

7.5.3 Preventive and Mitigation Measures for Blow Outs

In case of a blowout Fire service team from OIL and other Mutual Aid partners will report at site and will start spraying water continuously from all directions to disperse the formation of any explosive mixture in and around the well head area and keep the well head area cool to avoid any fire incident. The Disaster Control Room will be activated and information will be sent to all Disaster Management Coordinators of Mutual Aid partners. The Oil and Natural Gas Corporation Ltd. (ONGCL), Crisis Management Team (CMT) will be contacted for their expertise and support to control the situation. International Blowout control agencies will also be engaged for blowout control as necessary.

Proposed action plan control blowout of hydrocarbon prior to fire incident

- Creation of facilities for pumping water to the blowing well.
- Infrastructure arrangement for capping the well.
- Pumping of sufficient water through the well annulus to make the flowing gas wet, thereby reducing gas condensate spread to the nearby areas.
- Adequate water spraying through Fire Service pumps and nozzles/ monitors.
- Taking all adequate HSE measures.
- Continuous gas testing for LEL level around the well plinth area.
- To clear all equipment’s and debris from site.
- Arrange adequate drilling mud and pumping infrastructure
- To complete the fabrication of hydraulically operated mechanized structure (for moving/ placing Blow out Preventer (BOP)) at OIL’s workshop, incorporating all the points identified in the mock drill.
- Place fabricated mechanized structure 20-25 m from the wellhead
- Move BOP to well mouth hydraulically. Splash water continuously
- Cap the well by placing BOP on the wellhead
- Subdue the well by pumping drilling mud immediately.

Proposed action plan to extinguish the fire in case of blowout

- Heat shielding of the working areas by suitable means.

- To clear all debris and damaged rig package & equipment from site.
- Arrange water and pumping infrastructure.
- Arrange adequate drilling mud and pumping infrastructure.
- Special tools and equipment's used for controlling well under fire to be mobilized from various sources nationally and internationally.
- Arranging to cap the well by placing BOP with the help of special tools (Athey wagon) after creating a continuous water umbrella.
- Subdue the well by pumping drilling mud & kill the well immediately.
- Bring the well under control.

7.5.4 Preventive Measures for Handling of Natural Gas

- Leak detection sensors to be located at areas prone to fire risk/ leakages;
- All safety and firefighting requirements as per OISD norms to be put in place;
- High temperature and high pressure alarm with auto-activation of water sprinklers as well as safety relief valve to be provided;
- Flame proof electrical fittings to be provided for the installation;
- Periodical training/awareness to be given to work force at the project site to handle any emergency situation;
- Periodic mock drills to be conducted so as to check the alertness and efficiency and corresponding records to be maintained;
- Signboards including emergency phone numbers and 'no smoking' signs should be installed at all appropriate locations;
- Plant shall have adequate communication system;
- Pipeline route/equipment should be provided with smoke / fire detection and alarm system. Fire alarm and firefighting facility commensurate with the storage should be provided at the unloading point;
- 'No smoking zone' to be declared at all fire prone areas. Non sparking tools should be used for any maintenance; and
- Wind socks to be installed to check the wind direction at the time of accident and accordingly persons may be diverted towards opposite direction of wind.

7.5.5 Preventing Fire and Explosion Hazards

- Proper marking to be made for identification of locations of flammable storages;
- Provision of secondary containment system for all fuel and lubricating oil storages;
- Provision of fire and smoke detectors at potential sources of fire and smoke;
- Storing flammables away from ignition sources and oxidizing materials;
- Providing specific worker training in handling of flammable materials, and in fire prevention or suppression;
- Equipping facilities with fire detectors, alarm systems, and fire-fighting equipment;
- Fire and emergency alarm systems that are both audible and visible;

- For safety of people the building, regulations concerning fire safety to be followed. Some of the requirements include:
- Installation of fire extinguishers all over the building;
- Provision of water hydrants in operative condition;
- Emergency exit;
- Proper labelling of exit and place of fire protective system installation;
- Conducting mock drills;
- Trained personnel to use fire control systems.

7.5.6 Preventive Measures for Interconnecting Pipeline Risk Management

- Design all pipes and vessels to cope with maximum expected pressure;
- Install pressure transmitters that remotely monitor high- and low-pressure alarms;
- Design equipment to withstand considerable heat load;
- Conduct regular patrols and inspections of pipeline easements;
- Fit pumps with automatic pump shutdown or other safety devices;
- Minimise enclosed spaces where flammable gas may accumulate;
- Where necessary, automate emergency shutdown systems at production facilities;
- Consider installing flow and pressure instrumentation to transmit upset conditions and plant shutdown valves status;
- Install fire and gas detection systems;
- Implement security controls;
- Install emergency shutdown buttons on each production facility;
- Bury gathering lines at a minimum depth of 600 mm and where above ground, maintain a clear area;
- Implement management of change processes; and
- Conduct pressure testing and inspection of equipment and pipelines.

7.5.7 Preventing Fire and Explosion Hazards

- Proper marking to be made for identification of locations of flammable storages;
- Provision of secondary containment system for all fuel and lubricating oil storages;
- Provision of fire and smoke detectors at potential sources of fire and smoke;
- Storing flammables away from ignition sources and oxidizing materials;
- Providing specific worker training in handling of flammable materials, and in fire prevention or suppression;
- Equipping facilities with fire detectors, alarm systems, and fire-fighting equipment;

- Fire and emergency alarm systems that are both audible and visible;
- For safety of people the building, regulations concerning fire safety to be followed. Some of the requirements include:
- Installation of fire extinguishers;
- Provision of water hydrants in operative condition;
- Emergency exit;
- Proper labelling of exit and place of fire protective system installation;
- Conducting mock drills;
- Trained personnel to use fire control systems.

7.5.8 General Health and Safety

- The facility will adopt a total safety control system, which aims to prevent the probable accidents such as fire accidents or chemical spills.
- Firefighting system, such as sprinklers system, portable extinguishers (such as CO_2) and automated fire extinguishers shall be provided at strategic locations with a clear labelling of the extinguisher so the type of the extinguisher is easily identifiable. Also a main hydrant around the buildings will be available. On all floors an automated fire detection system will be in place.
- The site operations manager will take steps to train all emergency team members and shall draw up an action plan and identify members. The appointed emergency controller shall act as the in-charge at the site of the incident to control the entire operation.
- The staff shall be trained for first-aid and firefighting procedures. The rescue team shall support the first-aid and firefighting team.
- A first-aid medical centre will be onsite to stabilise the accident victim. The emergency team will make contact with a nearby hospital for further care, if required.
- A training and rehearsal of the emergency response by emergency team members and personnel on site will be done regularly.
- A safe assembly area will be identified and evacuation of the premises will be practised regularly through mock drills.
- In case an emergency is being declared, the situation shall be reported to the authorities such as local police, the chief inspector of factories and the state pollution control board as per rules and regulation of law of the land.
- Safety manual for storage and handling of Hazardous chemicals shall be prepared.
- All the personnel at the site shall be made aware about the hazardous substance stored and risk associated with them.
- Personnel engaged in handling of hazardous chemicals shall be trained to respond in an unlikely event of emergencies.
- A written process safety information document shall be compiled for general use and summary of it shall be circulated to concerned personnel.
- MSDS shall be made available and displayed at prominent places in the facility. The document compilation shall include an assessment of the hazards presented including (i) toxicity information

(ii) permissible exposure limits. (iii) Physical data (iv) thermal and chemical stability data (v) reactivity data (vi) corrosivity data (vii) safe procedures in process.

- Safe work practices shall be developed to provide for the control of hazards during operation and maintenance
- In the material storage area, hazardous materials shall be stored based on their compatibility characteristics.
- Near miss and accident reporting system shall be followed and corrective measures shall be taken to avoid / minimize near miss incidents.
- Safety measures in the form of DO and Don't Do shall be displayed at strategic locations.
- Safety audits shall be conducted regularly.
- Firefighting system shall be tested periodically for proper functioning.
- All hydrants, monitors and valves shall be visually inspected every month.
- Disaster Management Plan shall be prepared and available with concerned personnel department.

7.5.9 Personal Protective Equipment

In certain circumstances, personal protection of the individual maybe required as a supplement to other preventive action. It should not be regarded as a substitute for other control measures and must only be used in conjunction with substitution and elimination measures. PPEs must be appropriately selected individually fitted and workers trained in their correct use and maintenance. PPEs must be regularly checked and maintained to ensure that the worker is being protected.

7.5.10 First Aid

First aid procedures and facilities relevant to the needs of the particular workforce should be laid down and provided in consultation with an occupational physician or other health professional.

Health assessment should form a part of a comprehensive occupational health and safety strategy. Where employees have to undergo health assessment, there should be adequate consultation prior to the introduction of such program. Medical records should be kept confidential. Site should be able to relate employee health and illness data to exposure levels in the workplace.

7.6 Public Hearing

Public Hearing (PH) for the project was conducted by Pollution Control Board of Assam (PCBA) at Tinsukia district of Assam. Details of the Public Hearing is presented in **Table 7.20**.

Table 7.20 Public Hearing for the Dumduma Pengeri Area

Sl No	Date	Venue	Chaired By	No of people attended	District
1	13.03.20	Sambawana Khetra, Digboi under Digboi Forest Division (JFMC) Assam	Additional Deputy Commissioner, Tinsukia district	117	Tinsukia

The local stakeholders were informed about the public hearings through advertisements in national and local newspapers. Details provided in **Table 7.21**.

Table 7.21 Public Hearings Notice in Newspapers

Sl No	Date	Name of the Newspaper	Language
1	10.02.2020	Assam Tribune	English

People from nearby villages and representative from Civil Society attended the PH meetings at Tinsukia district.

Issues discussed during the Public Hearing by the locals and clarifications provided by the project proponent and action plans have been presented in **Table 7.22** for the public hearing held at Tinsukia district.

The minutes of both the public hearings issued by PCBA has been provided in **Annexure 7.2**.

Figure 7.23 Picture of Public Hearing in Balijan



Table 7.22 Public Hearing Action Plan and budgetary allocation

S. No	Raised by Public	Comments/Suggestion by Public	Response /Commitment of OIL as Project Proponent	Action Items	Respon-sibility	Tentative Budget (INR)	Reference Plan	Draft Timeline for Completion
1.	**Mr. Rajen Das, a resident of Balijan**	Complained about the publicity of M/S OIL regarding this public hearing as he expected more people to gather in this hearing.		All the advertisements are published in Dainik Janmabhumi in Assamese and in Assam Tribune in English one month prior to the public hearing by PCBA.	-	-	-	-
2.		Expressed concern about the safety of the existing gas gathering centre in the Balijan.	OIL has conducted risk assessment study to take all the safety required. OIL also follows all the guidelines of PCBA and MoEF&CC.	OIL has dedicated team for management of pipeline operations. Regular patrols and inspections of pipelines conducted. Pressure testing and inspection of equipment and pipelines conducted regularly.	CGM-Safety& Environment	Only management time required	-	7 years (2021-22 to 2027-28)
3.		Complained the land mining done by M/S OIL in forest areas for various purpose.	OIL also follows all the guidelines of	-	-	-	-	-

S. No	Raised by Public	Comments/Suggestion by Public	Response /Commitment of OIL as Project Proponent	Action Items	Respon-sibility	Tentative Budget (INR)	Reference Plan	Draft Timeline for Completion
			PCBA and MoEF&CC.					
4.		Hoped for the proper implementation of M/S OIL's CSR activities, like developmental works in Health Services and Schools of the local area.	Mr. Gaganath Cheti, an official of M/S OIL, said that M/S OIL is not only a co-operation / Ltd. but also a responsible PSU. OIL is always ready for developments in areas where projects are laid. OIL is responsible for the cultural, economic and social development of the people. Certain CSR activities sanctioned M/s OIL does take some time but it finally takes place. He hoped for people's co-operation to point out certain specific areas where M/S OIL could contribute.	M/s OIL has developed a 7 years developmental plan for the area.	GM-CSR	As per PH action plan following activities are planned in the area **Health Initiatives** Mobile health services= Rs. 2 lakhs per year for 7 years= Total 14 lakhs **Educational Initiatives** Providing scholarships to economically backward students for pursuing higher education Rs. 0.1 lakh per student x 20 students per year x 7 years= Total Rs. 14 lakhs Infrastructure improvement work across schools in 20 schools Rs. 1 lakh per school x 20 schools= Total Rs. 20 lakhs **Livelihood initiatives** Training support for skill development	PH Action Plan	7 years (2021-22 to 2027-28)

S. No	Raised by Public	Comments/Suggestion by Public	Response /Commitment of OIL as Project Proponent	Action Items	Respon-sibility	Tentative Budget (INR)	Reference Plan	Draft Timeline for Completion
						among women Rs.1 lakh per training program x 1 training program in a year x 7 years= Total Rs. 7 lakhs Industrial training for students Rs. 0.5 lakh per student x 5 selected students per year x 7 years= Rs. 17.5 lakhs **Social Initiatives** Sponsoring for local sports and cultural events Rs. 1 lakh per year for 7 years= Total Rs. 7 lakhs Drinking water facilities Rs. 0.2 lakh per hand pump x 80 pumps= Total Rs. 16 lakhs **Plantation Initiatives** Plantation at Tea Gardens Rs. 2 lakh per year for 7 years= Total Rs. 14 lakhs **Other Initiatives** Repair of local roads=Rs. 20 lakhs		

S. No	Raised by Public	Comments/Suggestion by Public	Response /Commitment of OIL as Project Proponent	Action Items	Respon-sibility	Tentative Budget (INR)	Reference Plan	Draft Timeline for Completion
						Provision for Street light in the area Rs. 2 lakhs per year for 7 years= Total 14 lakhs		
5.		Praised M/S OIL for its service rendered to the country and the people and also hoped for its longevity.	-	-	-	-	-	-
6.		Asked M/S OIL to take adequate measures to balance the ecology and environment of the locality.	OIL will prepare an action plan and will try to implement as far as possible to protect the environment.	OIL is committed to preserve the natural resource and environment. OIL has dedicated team for management environment. OIL has prepared a detailed EMP to protect the environment. OIL also follows all the necessary guidelines from PCBA and MoEF&CC. OIL will also implement conservation plan	CGM-S&E	Budget for environmental control measures presented in Table 10.6 of EIA report Budget for Wildlife Conservation plan presented in Table 10.2 of EIA report Budget for greenbelt plantation in production installations presented in Section 10.2.10-Greenbelt Plan	Environmental Management Plan Wildlife Conservation Plan Greenbelt Plan	7 years (2021-22 to 2027-28)

S. No	Raised by Public	Comments/Suggestion by Public	Response /Commitment of OIL as Project Proponent	Action Items	Respon-sibility	Tentative Budget (INR)	Reference Plan	Draft Timeline for Completion
				for protection of wildlife in the area. Greenbelt plantation will also be undertaken in the production installations.				
7.	**Mrs. Trisna Phukan Boiragi, President of Gaon panchayat, Balijan**	Requested M/S OIL to contribute for Swachcha Bharat Abhiyan in this locality.	OIL will prepare an action plan and will try to implement as far as possible for development of societies. OIL will provide funds in the CER budget for Swachcha Bharat Abhiyan in the area.	OIL will provide funds for toilet development	GM-CSR	Renovation of toilets in schools-Rs. 1 lakh per school x 20 schools= Total Rs. 20 lakhs Providing fund to locals villagers for construction of household latrines Rs. 0.1 lakh per unit X 20 units per year for 7 years= Rs. 14 lakhs	PH Action Plan	
8.		Asked for development in local area through CSR activities like roadways, school development and unskilled employment of the locals.	Refer Sl. No. 4 of this table.	Refer Sl. No. 4 of this table	Refer Sl. No. 4 of this table	Refer Sl. No. 4 of this table	Refer Sl. No. 4 of this table	Refer Sl. No. 4 of this table

S. No	Raised by Public	Comments/Suggestion by Public	Response /Commitment of OIL as Project Proponent	Action Items	Respon-sibility	Tentative Budget (INR)	Reference Plan	Draft Timeline for Completion
9.	**ADC, Tinsukia District**	ADC told the public about the public hearing held in public/community hall, Baghjan TE, Baghjan on 12.03.2020, there were large public gathering. He expected the same even in today's hearing but is unhappy as only a few public gathering today. He informed that public hearing is necessary as per EIA Notification, 2006 for acquiring Environmental clearance from MoEF&CC. He stressed in his speech the degradation of Environment and Ecosystem in recent years. He wanted each citizen to be responsible to preserve and maintain tranquillity with nature.		OIL is committed to preserve the natural resource and environment. OIL has dedicated team for management environment. OIL has prepared a detailed EMP to protect the environment. OIL also follows all the necessary guidelines from PCBA and MoEF&CC. OIL will also implement conservation plan for protection of wildlife in the area. Greenbelt plantation will also be undertaken in the production installations.	CGM-S&E	Budget for environmental control measures presented in Table 10.6 of EIA report Budget for Wildlife Conservation plan presented in Table 10.2 of EIA report Budget for greenbelt plantation in production installations presented in Section 10.2.10-Greenbelt Plan	Environmental Management Plan Wildlife Conservation Plan Greenbelt Plan	7 years (2021-22 to 2027-28)

S. No	Raised by Public	Comments/Suggestion by Public	Response /Commitment of OIL as Project Proponent	Action Items	Respon-sibility	Tentative Budget (INR)	Reference Plan	Draft Timeline for Completion
10.		He urged Mrs. Trishna Phukan Boiragi, president Gaon Panchayat of Balijan to create awareness to plant trees and seeks any help necessary from M/S OIL.	OIL is always ready for developments in areas where projects are laid.	-	-	-	-	-
11.		He also requested Mrs. Trishna Phukar Boiragi also to create an awareness camp regarding Coronavirus. He urged M/S OIL Authorities to provide necessary help to such measures initiated by public.	-	-	-	-	-	-

Budget for Socioeconomic Development as part of Public Hearing Action Plan is INR 1.775 crores for 7 years. Environmental issues of the Public Hearing Action Plan and budget are presented in Section 10.3 EMP Budget.

8. PROJECT BENEFITS

Oil and Natural gas produced from the location will ultimately cater to fulfil the energy requirement of India. The dependency of India on other countries will be lessened to an extent. Additionally, the Project will benefit people living in neighbouring villages in relation to direct & indirect employment associated with various project activities, The benefits of the project are listed below;

- Provision of more royalty to Assam Government and more cess to Govt. of India
- Provision of more employment opportunity to local people
- Development of infrastructure (roads, culverts, bridges, schools etc.) in the area
- Increase in business opportunity for the local people
- Energy security for the country
- Programs related to livelihood generation, health improvement programs.

9. ENVIONMENTAL COST BENEFIT ANALYSIS

9.1 OVERVIEW

An Environmental Cost Benefit Analysis (ECBA) is primarily aimed at considering environmental and social externalities. These positive and negative impacts are converted into monetary values so that these can be accounted in the project costing. This means proposed mitigation and management costs can properly be included in the project budget. Similarly, environmental benefits can help better justify investment to the project. The main purpose of the proposed Project is to explore, develop, and produce hydrocarbon from the Block to augment National Production of oil and gas.

9.2 PROJECT COSTS

The Project cost will include the following:

(i) Capital expenditure of drilling of 26 wells and three production facilities (includes land procurement, site development, drilling and inbuilt environmental control measures) is approximately INR 1109.40 crores.
(ii) Operational and maintenance costs (fuel, maintenance material, security, office, etc.) for seven production facilities;
(iii) Personnel costs (including consultants); and
(iv) Health, Safety and Environment management costs.

9.3 ENVIRONMENTAL AND SOCIAL COSTS

The Project may result in environmental impacts such as (i) soil quality due to scraping of top soil for site development, contamination of soil due to accidental spillage of oil & lubricant and hazardous waste; (ii) air quality due to fugitive emission during site development & decommissioning and emission from DG sets and flaring; (iii) noise quality- operation machineries, equipment and vehicles (iv) surface and ground water quality due to surface run-off and accidental spillage of oil & grease and hazardous waste.

The socio-economic impacts may arise due to procurement of private land, conflict with local community related to job opportunity. The impact on community health and safety may arise due to movement of heavy vehicles and machineries through site access road passing through the settlements, discomfort due to noise generation from the drill sites.

Based on the impact assessment results, impacts during drilling phase are expected to be more significant compared to impacts during production phase. The most of these impacts are assessed to be local extent and low to medium in scale.

It is also to be noted that the land required for the well sites and production facilities will be procured from private land owners; these are mostly agricultural lands, homestead plantation areas and tea garden areas. Generally, OIL will procure the required land through private negotiation. In few cases, OIL may request district authority to acquired land under LARR act 2013, if private negotiation is not successful. Land will be procured in a way that physical displacement will not occur and the crop compensation will be included during procurement. Land from the tea garden would be taken on long-term lease from the tea garden authority. So, no social cost is expected due to land procurement for the project.

The environmental and social costs refer to costs that will be incurred to mitigate and manage of potential impacts. A detailed EMP has been prepared for the project which include all the mitigation measures required for the project. The budget for EMP is highlighted in **Section 10.4** of this EIA Report. The significance of most of the impacts is assessed to be minor with mitigation measures. Based on the perceived significance of these potential impacts, the financial resources needed to mitigate these impacts from planned activities are expected to be rather small in comparison to the investment costs.

9.4 ENVIRONMENTAL AND SOCIAL BENEFITS

Oil and Natural gas produced from the location will ultimately cater to fulfil the energy requirement of India. The dependency of India on other countries will be lessened to an extent. Additionally, the project will benefit people living in neighbouring villages in relation to direct & indirect employment and business opportunity associated with various project activities and will boost the local economy. The benefits of the project are listed below:

9.4.1 Provision of more royalty to Assam Government and more cess to Govt. of India

Petroleum (also called crude oil) is the most traded commodity in the international market and economic drive of many countries[71]. Apart from its primary use as a source of energy, crude oil is considered the mother of all commodities because it is an important raw material for wide varieties of materials[72]. The objective of the project is expected to further augment the production of crude oil from the area by around 700 Mbbl per year. The augmented production will generate more royalty to Assam Government and more cess to Govt. of India which will be utilized for the development of the country.

9.4.2 Provision of more employment opportunity to local people

The construction phase of the project is likely to generate both direct and indirect opportunities for employment. The estimated direct man-power requirement would be approximately 80 un-skilled workers, for each drill site during the peak site development stage that will primarily sourced from nearby villages. The estimated man-power requirement during drilling phase would be 40-50 persons per shift. Indirect employment would be primarily in the supply chain as vendors, which are anticipated to be set up to support the construction. The local people are expected to be having options for such indirect employment, even if they are not directly involved as construction labour.

9.4.3 Development of infrastructure in the area

OIL will earmark 177.5 lakhs for Social Development in the area in line with the comments and suggestions made by the local public during Public Hearing.

9.4.4 Increase in business opportunity for the local people

The project is likely to influence development of entrepreneurs in the area. The local enterprises, particularly involved in production and sale of civil construction materials for site development are expected to be potential benefactors of the civil works to be undertaken for the project. Similarly, local transporters of construction materials will also benefit from the project.

[71] Cao S, Chen L, Liu Z (2007) Disharmony between society and environmental carrying capacity: a historical review, with an emphasis on China. Ambio 36: 409-415.

[72] Iledare OO, Pulsipher A (1999) The State of the Global E&P Industry: is the World Running out of Oil? J Pet Technol 51: 44-48.

9.4.5 Energy security for the country

Petroleum or crude oil is a source of raw materials for the wide variety of chemicals available today. It is a major source of benzene and benzene is a source of many important chemical compounds such as toluene, phenol (used to make resins and adhesives), aniline, naphthalene, styrene (used to make polymers and plastics) and anthracene. In the 1950s, increase demand of benzene especially from the growing plastic industry necessitated the production of benzene from petroleum (a larger source than coal) and today, most benzene come from petroleum[73]. Small quantity of benzene is used to manufacture drugs, rubbers, lubricants, detergents, dyes, explosives, pesticides and napalm[74].

The drilling and production activities in Dumduma-Pengri block is expected to contribute 700 Mbbl oil and save crores of foreign currency per annum of our country towards crude oil imports.

The oil and gas sector is among the eight core industries in India and plays a major role in influencing decision making for all the other important sections of the economy. Oil imports rose sharply to US$ 87.37 billion in 2017-18 from US$ 70.72 billion in 2016-17. India retained its spot as the third largest consumer of oil in the world in 2017. India was the fourth-largest Liquefied Natural Gas (LNG) importer in 2017 after Japan, South Korea and China. LNG imports increased to 26.11 bcm in 2017-18 from 24.48 bcm in 2016-17[75]. The importing cost of crude oil, natural gas and other petroleum product for 2017-18 and 2016-17 in India is given in **Table 9.1**.

Table 9.1 Crude Oil, LNG and Petroleum Product Import Cost in India

	2016-17		2017-18		Increase	
	Quantity (MMT)	Value (in Crore)	Quantity (MMT)	Value (in Crore)	Quantity	Value
Crude Oil	213.93	470159	220.43	565951	3.04%	20.37%
LNG	18.63	40804	19.87	49938	6.65%	22.39%
Petroleum Product	36.29	71566	35.89	86946	1.09%	21.49%
Total		583129		702835		20.52%

Source: Ministry of Petroleum and Natural Gas (2018-19)

Towards reducing India's energy imports by 10 percent by 2022, the Indian government, in the recent years, has taken multiple steps in the upstream oil and gas sector to promote exploration and production activities in the country. The proposed project will augment the oil and gas production of India thus the project will reduce the importing cost for oil and gas in the country.

9.5 Overall Assessment

The Project may result in environmental and social impacts, most of which are assessed to be of minor significance with mitigation measures. The implementation of the project will involve financial resources, including actual investment cost, operational cost, environmental and the socio-economic costs.

On the other hand, the benefits of the project will be more evident in a longer term and could provide significant positive external cost, including the contribution for economic growth through the augmentation oil and gas production in the area, local employment. Overall, in the longer run, the benefits of the project would outweigh environmental and social costs for the proposed project.

[73] Al-Jarri AS, Startzman RA (1997) Worldwide Petroleum-Liquid Supply and Demand. J Pet Technol 1329-1338.

[74] Medifacts (2011) Uses of Benzene.

[75] https://www.ibef.org/industry/oil-gas-india.aspx

10. ENVIRONMENTAL MANAGEMENT PLAN

10.1 Introduction

This Environmental Management Plan and Monitoring Framework is a site-specific document for the drilling activity that has been developed to ensure that OIL can implement the project in an environmentally conscious manner and where all contractors, understand the potential environmental risks arising out of the proposed project and take appropriate actions to properly manage such risk.

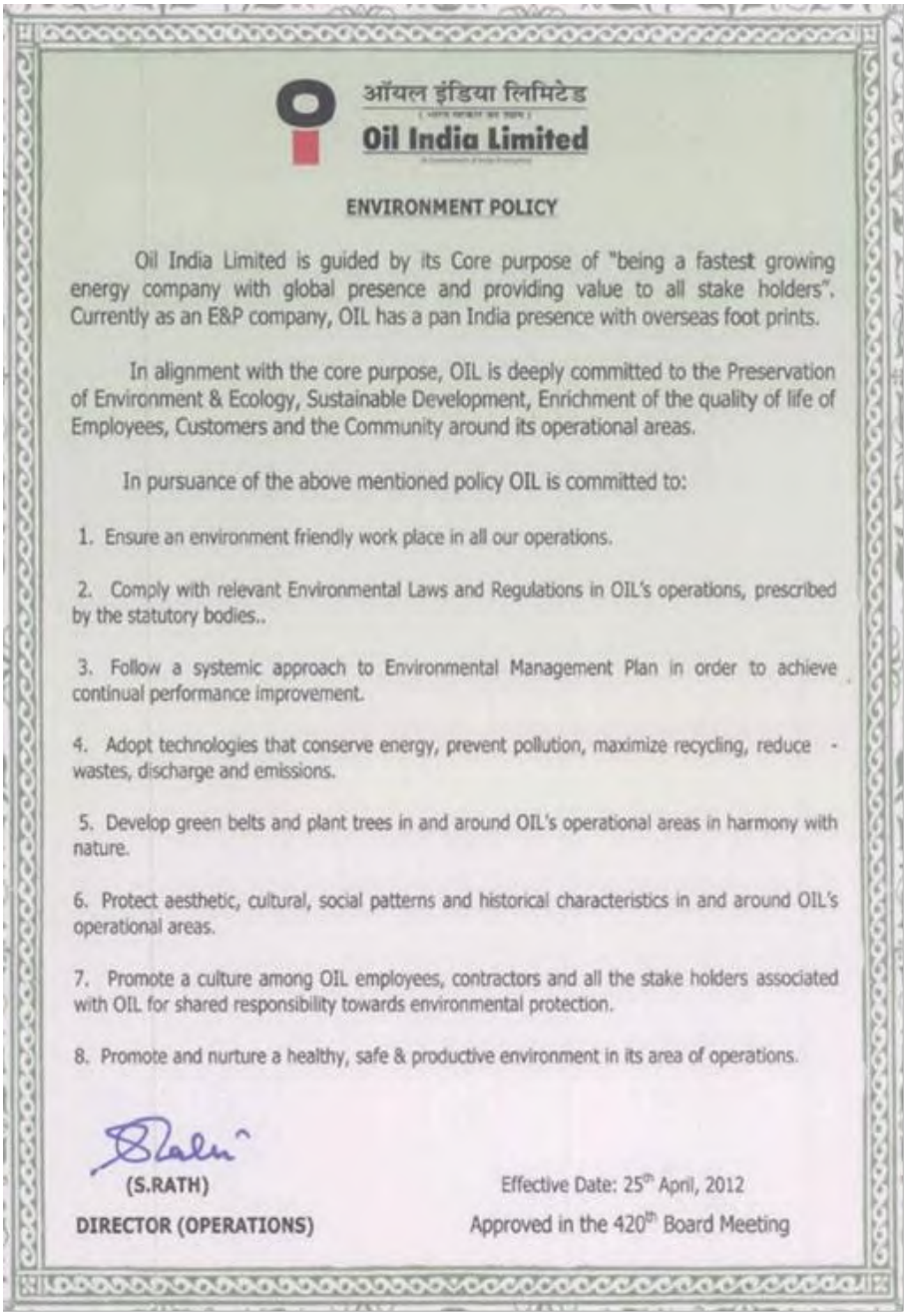
This EMP will be an overview document that will guide environmental management of all aspects of OIL's activities i.e. construction and operation of drilling wells, productions facilities and pipeline in Dumduma-Pengeri Area. This EMP will be backed up by more specific Environmental Action Plans, Procedures and Bridging Documents with the progress of the site preparation, developmental drilling, well testing, construction of production facilities, construction of pipeline, operation of production facilities and pipeline and site decommissioning activities.

The EMP describes the actions to be adopted in terms of:

- National Policies and Regulations;
- Best Practices and guides; and
- Local Environmental and Social Sensitivities.

The Environment Policy of OIL is presented at **Box 10.1.**

Box 10.1 OIL Corporate Environment Policy



ऑयल इंडिया लिमिटेड
Oil India Limited

ENVIRONMENT POLICY

Oil India Limited is guided by its Core purpose of "being a fastest growing energy company with global presence and providing value to all stake holders". Currently as an E&P company, OIL has a pan India presence with overseas foot prints.

In alignment with the core purpose, OIL is deeply committed to the Preservation of Environment & Ecology, Sustainable Development, Enrichment of the quality of life of Employees, Customers and the Community around its operational areas.

In pursuance of the above mentioned policy OIL is committed to:

1. Ensure an environment friendly work place in all our operations.
2. Comply with relevant Environmental Laws and Regulations in OIL's operations, prescribed by the statutory bodies..
3. Follow a systemic approach to Environmental Management Plan in order to achieve continual performance improvement.
4. Adopt technologies that conserve energy, prevent pollution, maximize recycling, reduce wastes, discharge and emissions.
5. Develop green belts and plant trees in and around OIL's operational areas in harmony with nature.
6. Protect aesthetic, cultural, social patterns and historical characteristics in and around OIL's operational areas.
7. Promote a culture among OIL employees, contractors and all the stake holders associated with OIL for shared responsibility towards environmental protection.
8. Promote and nurture a healthy, safe & productive environment in its area of operations.

(S.RATH)
DIRECTOR (OPERATIONS)

Effective Date: 25th April, 2012
Approved in the 420th Board Meeting

The environmental mitigation measures and plans are presented in form of a matrix according to the sequential flow of activities in the project life cycle. The matrix focuses on strategies to be adopted for safe guard of the environment from possible impacts resulting out of the project activities. The strategies have further been detailed out as management procedures and programmes in subsequent sections. These measures would be further updated by OIL during the implementation of the EMP.

The EMP helps establish the linkage between the activities environmental impacts and mitigation measures and presents the monitoring framework i.e. the Environmental Performance Indicator (EPI) No. as well as the Environmental Quality Indicator (EQI).

10.2 Specific Management Plans

The specific management plans to address the impacts have been described in the sections below:

10.2.1 Air Quality Management Plan

Scope

The Air Quality Management Plan (AQMP) is applicable for and encompasses both construction and operational phase activities for the proposed project that has the potential to adversely affect ambient air quality due to the proposed project.

Purpose

The AQMP establishes specific measures and guidelines aimed at effectively addressing and mitigating the air quality impacts that may arise as result of construction of well sites, production facilities and pipelines, drilling operations, operation of production facilities and decommissioning/site closure of well sites. The plan also details out roles and responsibilities of OIL and the contractors to ensure effective implementation of the plan.

General

Mitigation Measures –Construction

Designing, Planning & Procurement

- Vehicles delivering raw materials like fine aggregates will be covered to prevent fugitive emissions;
- Storage and handling of construction material and debris to be carefully managed to prevent generation of fugitive dust;
- All vehicles utilized in transportation of raw material and personnel will have valid Pollution under Control Certificate (PUC). Vehicular exhaust will be complying with the CPCB specified emission norms for heavy diesel vehicles;
- The top soil generated from site clearance activities will be stored in designated area and stabilized to prevent fugitive dust emissions;
- Adequate stack height to be provided to DG sets in accordance CPCB standards.
- Earlier explorations show the absence of H_2S in these Study areas. However, H_2S detector and self-containing breathing apparatus is available with OIL.

Dust Suppression

- Sprinkling of water on earthworks, material haulage and transportation routes on a regular basis.

Monitoring

- Periodic ambient air quality monitoring will be conducted in accordance with the Environment Monitoring Program.

Mitigation Measures- Drilling, Operation of Production Facilities

Operation of Machineries, Vehicle & Drilling Rig

- Exhausts of diesel generators will be positioned at a sufficient height to ensure dispersal of exhaust emissions; engines will not be left running unnecessarily;
- Vehicles involved in the transportation of project personnel will have valid PUC Certificate and will be subjected to periodic preventive maintenance;
- An efficient test flare burner head equipped with an appropriate combustion enhancement system will be selected to minimize incomplete combustion, black smoke and hydrocarbon fallout;
- OIL never encountered H_2S and no such evidence exists in the field of operation of OIL in Dumduma-Pengeri Area. However, action is being initiated to develop a contingency plan for H_2S release. H_2S detector and self containing breathing apparatus will be made available to drill sites and production facilities.

Regular Maintenance of Machineries and Vehicles

- Preventive maintenance of DG sets will be undertaken as per manufacturers schedule to ensure compliance with CPCB specified generator exhaust;
- Flaring will be undertaken in accordance with the CPCB Guidelines for Discharge of Gaseous Emissions for Oil & Gas Extraction Industry;
- Maintenance of diesel engines which are to be used as prime movers for mainline & fire water pumps, instrument air compressors and emergency generators will be carried out in accordance with OISD Standard “OISD-STD-121- Inspection of Turbines & Diesel Engines”;
- Periodic monitoring of DG set stack emission will be carried out in accordance with the Environmental Monitoring Plan to assess compliance with CPCB DG set exhaust standards.

Monitoring

- Periodic monitoring of ambient air quality and equipment emission will be conducted in accordance with the Environment Monitoring Program.

Mitigation Measures- Decommissioning/Site Closure

Mitigation measures to address the air quality impacts resulting from vehicular movement, operation of heavy construction machinery and material handling are similar to those discussed above.

10.2.2 Noise Management Plan

Scope

The noise control plan is applicable for construction of well sites, production facilities and pipelines, drilling operations, operation of production facilities and decommissioning/site closure of well sites.

Purpose

The noise control plan to ensure specific measures to minimize noise level in the project site 75 dB(A) as per CPCB Noise rules. The plan also outlines roles and responsibilities of both OIL and the contractors involved in the implementation of the plan.

Mitigation Measures –Construction

Planning, Designing & Procurement

- Selection and use of low noise generating equipment equipped with engineering controls *viz*. mufflers, silencers etc.;
- All vehicles utilized in transportation of raw material and personnel will have valid PUC Certificate;
- All high noise generating equipment will be identified and subjected to periodic preventive maintenance;
- Night time operation of vehicles and construction activities will be restricted;
- Site personnel will be trained in the proper use and maintenance of tools and equipment, including the positioning of machinery on site to reduce noise related to neighbouring communities.

Maintenance of Machineries & Equipment

- Periodic preventive maintenance of DG sets and vehicles will be carried out as per manufacturer's schedule to ensure compliance with noise limits specified by CPCB for vehicles and DG sets.

Monitoring

- Periodic monitoring of ambient noise quality will be conducted in accordance with the Environment Monitoring Program.

Mitigation Measures- Drilling, Operation of Production Facilities

Operation and maintenance of machineries

- Installing acoustic enclosures and muffler on engine exhaust of DG sets to ensure compliance with generator noise limits specified by CPCB;
- Undertaking preventive maintenance of the mainline and booster pumping units in accordance with guidelines and schedule referred in the OISD Standard- "OISD-STD-119 –Inspection of Pumps";
- Relevant guidelines/standards viz. API 615--Sound Control of mechanical equipment etc. will be followed in controlling noise generated from mechanical equipment and machineries.
- Provide portable metal noise barriers (screens) at fence line facing nearby receptors and areas surrounding drilling equipment generating high noise levels
- Restriction of unnecessary use of horns by trucks and vehicles near settlement areas; and
- Provide noise barrier in sensitive locations.

Monitoring

- Periodic monitoring of ambient noise quality will be conducted in accordance with the Environment Monitoring Program.

Mitigation Measures- Decommissioning/Site Closure

Management measures to address noise impacts with respect to operation of heavy equipment/machinery and movement of vehicles during decommissioning/site closure phase are similar to those discussed in the “Construction Phase” of this section.

10.2.3 Soil Quality Management Plan

Scope

Topsoil is generally defined as the top, fertile layer of material on the land surface that is capable of supporting plant growth. It contains the seed bank and is therefore an essential component of the re-vegetation programme. Maintenance of topsoil quality, particularly its structure and the integrity of its seed bank, is vital to both bio-restoration work and erosion control.

The Soil Quality Management Plan is applicable for construction of well sites, production facilities and pipelines, drilling operations, operation of production facilities and decommissioning/site closure of well sites that has the potential to adversely impact the soil quality.

Mitigation Measures-Construction Phase

Stripping of top soil

At the commencement of site preparation activities, the topsoil of the new land acquired for the project will be carefully stripped to its full depth and stored separately. Topsoil will not be stripped from areas that will only be used for storing topsoil and reclamation of drill sites. Topsoil will be stored where it will not be compacted by vehicles or contaminated and will be stored in a manner that will minimise its loss and/or degradation. Topsoil will not be mixed with subsoil or any other inert material during the entire drilling activity.

Subsequently, the topsoil will be stored in a stockpile within the site premises in a heap not more than 2m high with side slopes < 45°, drained with open ditches. The surface of the stockpile will be lightly compacted to reduce rainfall penetration but not enough to promote anaerobic conditions. The stockpiles will be selected away from natural drainage channel. Vegetation will be grown on the topsoil stacks in the form of grass and herbs to prevent erosion during monsoon. The stockpiles will have peripheral drains and same will be connected with sedimentation tank.

Prevention of soil contamination

- Drip trays to be used during vehicular/equipment maintenance and during re-fuelling operations;
- Fuel and lubricant storage areas will be paved and properly bunded. Bunded areas will be designed to accommodate 110% of the volume of spilled material;
- Spill kits will be made available at all fuel and lubricant storage areas. All spills/leaks contained, reported and cleaned up immediately;

Monitoring

- Periodic monitoring of soil quality monitoring will be conducted in accordance with the Environment Monitoring Program.

Mitigation Measures- Drilling, Operation of Production Facilities

Prevention of soil contamination

- In case of a spill, the spilled soil is to be removed and stored in hazardous waste storage area in each facility;
- Management of drill cuttings, waste drilling mud, waste oil and domestic waste will be made in accordance with “Waste Management Plan”.

Mitigation Measures- Decommissioning/Site Closure.

During decommissioning/site closure phase, the management measures will be similar to those discussed in the “Construction Phase” of this section.

Monitoring

The soil would be tested for fertility as per the standard procedure of ICAR and compared to the fertility values done during the Pre Project Baseline Environment Assessment in accordance with the Environment Monitoring Program.

10.2.4 Site Closure Plan

The site closure plan for will identify all the activities which would be performed during the restoration of a particular site after the drilling activity. Along with the well site, the approach road connecting the wells will be restored accordingly.

Chronological inventory of activities which would be performed during the closure of the site are detailed in this section.

Well sites

The following activities have been considered in the closure plan for well sites:
Plugging & Abandonment of well: Close the wellhead properly to prevent any further leakage:

- Decommissioning Phase : Removal of the materials form the site;
- Waste/mud pit closure and reclamation;

Plugging & Abandonment of well

As and when the well will be declared as non-productive, plugging of the well will be performed to close and abandon the well to prevent any leakage of oil or gas.

Decommissioning

The decommissioning phase includes activities dismantling and removal of surface facilities from the well site and storage in the Material Dumping Area. The activities which are envisaged during this phase are:

- Waste Management: clean up the site and remove all waste materials e.g. HDPE liners, any waste material etc. The waste will be dumped in the designated area as per the guidelines of local pollution control board;

Waste and mud pit closure and reclamation

Following decommissioning and abandonment of the well site the waste and mud pits will be subject to closure through onsite burial of solids in accordance with local, state and national regulations.

10.2.5 Surface Water Quality Management Plan

Scope

The Surface Water Quality Management Plan is applicable during construction of well sites, production facilities and pipelines, drilling operations, operation of production facilities and decommissioning/site closure of well sites that has the potential to adversely affect the surface water quality.

Purpose

The surface water is the important resources for the local community, as surface water has been utilized for domestic purposes and also for catching fish. The Surface Water Quality Management Plan establishes specific measures and guidelines aimed at effectively addressing and mitigating the surface water quality impacts that may arise at different phases of the project. The effective surface water quality management plan will mitigate the potential impact on surface water quality from the proposed activity.

Mitigation Measures- Construction Phase

Planning, designing & procurement

- Levelling and grading operations will be undertaken with minimal disturbance to the existing contour thereby maintaining the general slope of site;
- Minimize clearing and construction activities during monsoon season (as far as practicable);
- Construction work close to the streams will be avoided during monsoon;
- During site preparation and construction, surface water run-off will be channelized through integrated drainage system to an ETP for treatment and will be reused;
- Sediment filters and oil-water separators will be installed to intercept run-off and remove sediment before it enters water courses;
- Fuel and lubricant drums will be stored in bunded and lined area equipped with proper spill control equipment;
- The water will be subjected to adequate treatment (if required) to ensure compliance with CPCB “General Standards for Discharge of Environmental Pollutants – Inland Surface Water” and will be reused;
- Wastewater generated during hydrotesting of pipelines to be treated in ETP and will be reused.

Monitoring

- Periodic monitoring of treated runoff will be conducted in accordance with the Environment Monitoring Program;

- Regular monitoring of surface water quality will be conducted in accordance with the Environment Monitoring Program.

Mitigation Measures- Drilling, Operation of Production facilities

Site runoff control, produced water and domestic water

- Construction activities viz. stripping, excavation etc., during monsoon season will be restricted to the extent possible;
- Channelize all surface runoff from the construction site through storm water drainage system and provide adequate size (of minimum one hour retention time) double chambered sedimentation tank;
- An oil-water separator will be provided at the storm water drainage outlet, to prevent discharge of contaminated run-off;
- Spill kits to be used for removal of any oil or chemical spillage on site;
- Drip trays will be used during preventive maintenance of vehicles and machinery;
- All chemical and fuel storage areas, process areas will have proper bunds so that contaminated run-off cannot escape into the storm-water drainage system;
- Hazardous chemicals and fuel drum will be stored in bunded and lined area equipped with proper spill control equipment;
- Waste water generated from the drilling activity will be treated through ETP and will be reused at the drilling site;
- Domestic wastewater generated from camp area will be treated through septic tank and soak pit;
- Produced water generated at the production facilities will be treated in an ETP and will be reused.
- Additional storage area to be provided to store formation water within the drill site.

Monitoring

- Periodic monitoring of treated runoff, treated wastewater will be conducted in accordance with the Environment Monitoring Program;
- Periodic monitoring of surface water quality of local streams will be conducted in accordance with the Environment Monitoring Program.

Mitigation Measures- Decommissioning/Site Closure

No significant impacts to surface water quality can be associated with activities during decommissioning/site closure phase. Any possible impacts that may arise due to surface run-off will be mitigated in manner similar to that discussed during construction phase activities.

10.2.6 Ground Water Quality Management Plan

Scope

The Ground Water Quality Management Plan is applicable for construction of well sites and production facilities, drilling operations, operation of production facilities and decommissioning/site closure of well sites that has the potential to adversely affect the ground water quality.

Mitigation Measures- Construction Phase

No significant impact on the ground water/potable water quality can be associated with the construction phase activities.

Mitigation Measures- Drilling

Planning, designing & procurement

- Water based mud will only be used as discussed in Section 2.7. However, eco-friendly polymer mud system may also be used if required for deeper sections after providing intimation to the Pollution Control Board.
- Selection of low toxicity chemicals/additives in the preparation of water based/ eco-friendly polymer mud system.

Prevention of Contamination

- Proper casing and cementing of well will be done to prevent contamination of sub-surface aquifers;
- Drip trays will be used during preventive maintenance of vehicles and machinery;
- Hazardous chemicals and fuel drum will be stored in bunded and lined area equipped with proper spill control equipment;
- Storage and disposal of drill cutting and waste mud to be made in accordance with “Solid & Hazardous Waste Management Plan”;

Monitoring

- Periodic monitoring of ground water quality will be conducted in accordance with the Environment Monitoring Program

10.2.7 Waste Management Plan

Scope

The Waste Management Plan (WMP) is applicable for all process and non-process waste streams that are generated during various phases of OIL’s proposed drilling and production activities at the Dumduma-Pengeri Area. The major waste streams covered under this plan includes drill cuttings, waste drilling mud, wash water, kitchen waste and sewage. In addition, waste oil and lead acid batteries generated from the proposed project operations have also been dealt in this plan.

Purpose

The WMP establishes specific measures to ensure proper collection, storage, treatment and disposal of the identified process and non-process waste streams in accordance with the applicable national regulations and guidelines and also to ensure compliance with OIL’s corporate HSE Policy. The plan also outlines roles and responsibilities of both OIL and the contractors involved in the implementation of the plan.

Mitigation Measures- Drilling Waste (cuttings, spent mud and wash water), used oil and spent oil

As discussed in Chapter 2 earlier, the drilling project is likely to generate a considerable amount (350-400 m^3) of drill cuttings that may be non-hazardous in nature. However, OIL has planned to management the drilling waste to minimize the contamination of soil, surface water and ground water.

Planning, designing & procurement

- Use of water based mud primarily for drilling of wells; eco-friendly polymer mud system may also be used if required for deeper sections after providing intimation to the Pollution Control Board.;
- Use of low toxicity chemicals for the preparation of drilling fluid
- Barite used in the preparation of drilling fluid shall not contain Hg>1mg/kg and Cd>3 mg/kg;
- Protection of the surrounding environment of a drilling waste (cutting & spent mud) storage and disposal site can be effectively achieved by using an impermeable liner on the base and sides to prevent contamination soil and groundwater;
- The liner system for the proposed waste pit has been designed based on recommendation of the MoEF&CC for construction of a non-permeable lining system at the base and wall of waste disposal site area. The liner will have, at a minimum, a composite barrier having HDPE geo-membrane.
- Design aspects of the impervious waste disposal pit will be communicated/ shared by OIL with Assam State Pollution Control Board.
- The drilling cuttings pit will be bunded and kept covered using tarpaulin sheets during monsoon.

Prevention of Contamination during Drilling Period

- Drill cuttings separated from drilling fluid will be adequately washed and temporarily stored and disposed in an impervious pit lined by HDPE
- Drilling wastewater will be stored in HDPE lined pit and will be treated and reused
- Recycling of drilling mud will be ensured to the maximum extent possible
- Temporary storage of drilling fluid and wash waste water will be done in an impervious pit lined with HDPE
- Drilling wash water will be reused after treatment through onsite ETP/ mobile ETP and will be reused
- The waste pit after it is filled up will be covered with impervious liner over which a thick layer of native top soil with proper top slope will be provided.

Monitoring

- Periodic monitoring and analysis of drill cuttings will be undertaken to establish its nature and characteristics.

Storage and Disposal of Used oil & Spent Oil

- The hazardous waste (waste and used oil) will be managed in accordance with Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016;

- The hazardous waste will be stored in properly labelled and covered bins located in paved and bunded area;
- Necessary spill prevention measures *viz.* spill kit will be made available at the hazardous material storage area;
- Storage details of onsite hazardous waste generated will be maintained and periodically updated;
- Adequate care will be taken during storage and handling of such waste *viz*. use of proper PPEs by personnel;
- The hazardous waste so stored to be accounted and to be periodically sent to Assam PCB registered used and/or waste oil recyclers/ facilities;
- Proper manifest as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 to be maintained during storage, transportation and disposal of hazardous waste.

Storage and Disposal of Lead Acid Batteries

- Will be recycled through the vendors supplying lead acid batteries as required under the Batteries (Management & Handling) Rules, 2001 and Batteries (Management & Handling) Amendment Rules 2010;
- Proper manifest will be maintained as per Batteries (Management & Handling) Rules, 2001.

Mitigation Measures- Domestic Waste (Kitchen Waste, Sewage)

Storage & Disposal of Kitchen Waste

- The waste will be segregated and stored in designated waste bins;
- All such waste bins will be properly labelled and covered;
- The kitchen waste will be disposed in nearest dumping site available; on a daily basis. Discussion with the local panchayat/municipality authorities in this aspect would be conducted.

Treatment of Domestic Waste Water

- The sewage generated will be treated in a combination of septic tank and soak pit;
- Regular supervision will be undertaken for the domestic waste treatment system to report any overflows, leakage, foul odour etc.

In addition to the management measures specified for the major waste stream, OIL will prepare and update periodically a waste management inventory of all waste streams identified for the proposed project. Necessary measure will also be taken by OIL to incorporate appropriate waste management and handling procedures in the contractor work document and conduct periodic training of personnel involved in waste handling onsite to ensure proper implementation of the WMP. In this regard, necessary inspection, record keeping, training program and monitoring procedures will be established by OIL and made operational to achieve proper management of all wastes generated on site.

10.2.8 Spill Management Plan

A number of chemicals and fuel (high-speed diesel) will be stored on site, improper handling or accidents are likely to result in spills that have a potential for contaminating the environment. OIL would develop and educate the Contractors/personnel working to prevent such spills and develop a proper spill response and management plan.

Planning, Designing and Procurement

As best practices to avoid/contain any spill, OIL would ensure:

- All chemicals will be stored in designated area and to an extent possible all such areas would away from drainage channels;
- The flooring of the area would be impervious (paved or HDPE lining) and bunding to be provide on all sides of the chemical storage areas;
- The chemical storage area to be covered to ensure it has the minimum runoff;
- All transfers of chemicals to be done with proper care and under the supervision of the Store Supervisor;

Preventive and Mitigative Measures

OIL's spill management plan would aim to control the spill to a limited area and take necessary mitigative actions. The following additional measures will be implemented for spill management:

- Once a spill incident has occurred, identify the chemical involved and check hazardous property of the chemical from the Material Safety Datasheet (MSDS);
- Person wearing required PPE will apply necessary absorbent like saw dust for a liquid spill to ensure that the spill does not spread over a wide area or reach any surface water body or drainage channels;
- Thereafter, the substance will be properly collected and stored in a separate labelled container marked "hazardous waste – do not burn"; and dispose in accordance with Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

10.2.9 Blowout Management Plan

10.2.9.1 Blow out Preventive Measures

In view of the recent blowout OIL have taken the following measures, which will help in preventing recurrence of such incidents.

1. **Standard Operating Procedures**: Oil India has been following Good Petroleum Industry Practices and has Standard Operating Procedures for its activities with respect to all operations directly or indirectly related to Drilling, Workover, Production of oil & gas including maintenance, Logging or any other related services. The Blowout incident at well Baghjan-5 has necessitated a review of the existing SOPs and also add relevant ones for further improvement and operational excellence. The Standard Operating Procedures (SOPs) for various activities in the oil & gas installations as well as for other service departments in Oil India Limited have been reviewed (over 1000 activities). All SOPs will be reviewed after every 2 years. However, in case of change or upgradation in equipment/ system or adoption of any new system, the relevant SOP will be reviewed/ added as and when required.

A programme will also be implemented for periodic visits of various levels of senior officials to different work centres with proper checklists so that these points are checked during each visit and proper records of such visits are maintained for periodic review by the HoDs, Group Heads, RCE and concerned Directors.

2. **Structural change**: OIL had earlier shifted to an asset based structure for the Main Producing Area under Fields Headquarter with an objective of increasing production through focussed attention to the matured acreages covered by the Mining Leases in Assam and Arunachal Pradesh. The Asset based structure has proved to be effective and the G&R teams have now been reorganised in alignment with the Assets to provide focused support. However, it is perceived that there is scope for improvement in the structure especially in areas of drilling and workover operations. The present processes seem to lead to a blurred state of responsibilities and a lack of single point control. Thus the current system requires a complete overhaul and the systems, processes and reporting hierarchy require an immediate change.

With the above in view certain structural changes are being brought in in the following areas:

a. Work flow for custody transfer of well in different phases of its lifecycle.
b. Restructuring of Organogram for Workover activities in Main Producing Area (MPA)

Under the above initiative, WO Section, which is currently a part of Drilling Services and reports to Director (E&D) will be brought under Director (Operations) along with the rig resources, allied services and personnel on 'as is where is basis'. This will ensure more job focus and single point responsibility in work-over operations.

3. **Mines Structure**: The above will also necessitate restructuring of the Mines Structure. Accordingly actions will be taken to reassign Mines Owner, Mines Agent, Deemed Agent, Mines Manager etc., in line with the new operational structure at Fields Headquarter.

4. **Crisis Management Team (CMT)**: Oil India currently has a CMT. However, in effect this department has not been empowered in its true sense. The department will now be strengthened with adequate numbers of engineers and staff. All CMT persons will be trained up in relevant areas (International Well Control Forum-IWCF /International Association of Drilling Contractors- IADC etc.) and will also be engaged in routine maintenance activities of heavy duty equipment. Frequency of mock drills will be increased to keep the members in full readiness at all times.

5. **Safety Audits**: Presently OIL has a robust system of safety audits with following audits carried out in every Drilling/ Workover location:

i. Pre- Spud in audits in Drilling Rigs before starting the operation.
ii. Pre-Workover audits in Workover Rigs before starting the operation.
iii. Surprise Safety audit during Drilling & Workover operations
iv. Multidisciplinary Audit in all operating drilling rigs and workover rigs annually during Internal Safety Week observance.

10.2.9.2 Environment Management in case of blowout

Efforts will be undertaken by OIL by engaging its own resources and hired services from organizations of national repute to minimize impacts on the environment in case of a blowout. The following organizations will be involved for the purpose mentioned above, apart from the District Administration.

i. Accredited Environment Management Consultants for Impact Assessment study
ii. National Level Govt. Institutes for Bioremediation
iii. National Agricultural University
iv. CSIR Institute for subsidence study

An oil spill due to Well Blow out is possible during Drilling activities when wells are drilled to meet exploration, development or production requirement. Well Blow out is also possible during any subsequent “Well Intervention” of existing wells for Work - Over activities. In the event of an unfortunate well blow out, the situation will call for the immediate services of Well Control specialists. But, adherence to established drilling procedures which includes proper use of BOPs of rated pressures will adequately control the oil spill risk due to well blow outs.

The actions planned for execution by OIL to mitigate the impacts on the environment is briefed below.

(A) Environmental Assessment: A National Level Accredited environmental management consultant will be engaged to assess the site surroundings and affected area around the well location based on site observations, environmental and ecological monitoring and stakeholder consultations.

(B) Spillage cleaning and Bio-remediation: Bio-remediation is a process of recuperating the original properties of oil contaminated soil and water by treating with oil consuming bacteria. A reputed National Level Institute will be engaged with the objective to recuperate the original properties of whatever soil and water are contaminated with oil spillage incident.

(C) Picking up of spilled oil manually and by turbo pump: After the incident of blowout, several bunds will be constructed around the area of blowout to arrest the spilled oil flowing to the nearby water bodies. The oil arrested inside the bundhs will be picked up by manual efforts in drums and transferred to nearest production facility of OIL. Turbo pumps driven by water jet will also be used for lifting spilled oil.

Following Steps will be taken to collect the oil:

1. Using Oil Booms: The use of oil booms is a very simple and popular method of controlling oil spills. Equipment called containment booms acts like a fence to prevent the oil from further spreading or floating away. Booms float on the water surface and have three parts –

- A ‘freeboard’ is the part that rises above the water surface, containing the oil and preventing it from splashing over the top
- A ‘skirt’ is placed below the surface and keeps the oil from being squeezed under the booms and escaping
- A kind of cable or chain that connects the parts to strengthen and stabilize the boom. Connected sections of the boom are placed around the area of the oil spill until it is totally surrounded and contained.

2. Using Sorbents: Sorbents are materials that soak up liquids by either absorption (pulling in through pores) or adsorption (forming a layer on the surface). Both these properties make the process of clean-up much easier. Materials commonly used as oil sorbents are hay, peat moss, straw or vermiculite.

3. Using Dispersants: When the spilled oil cannot be contained by using booms, the only option left is to accelerate the disintegration of oil. Dispersal agents, such as Corexit 9500, are chemicals that are sprayed upon the spill with the help of boats, which aid the natural breakdown of oil components. They allow the oil to chemically bond with water by increasing the surface area of each molecule. This ensures that the slick does not travel over the surface of the water, and is easier to degrade by microbes

4. Using Manual Labour: The method requires hand-held tools and manual labour to clean up the contaminants. It involves the use of manual means like hands, rakes, shovels etc. to clean the surface oil and oily debris and place them in special containers to be removed from the spilled area.

(D) Assessment of Environmental contamination: This will involve monitoring of air, soil, groundwater, surface water, sediment to detect impacts due to hydrocarbon contamination.

(E) Assessment of impact/ damage to the biodiversity: An assessment of biodiversity including the flora & wildlife in the affected area caused due to the blowout & fire. Competent authority of experts will assess damage to the Crops/Tree/Plants (Paddy/tea/Fruit/Vegetation) in the area likely to be affected by the blow out and subsequent fire

(F) Assessment of Health Hazard to Public: An assessment of health hazard to public in the affected area caused due to the blowout & fire.

(G) Damage Assessment for Compensation: The District Administration of will constitute committees to assess the damage caused to the crops, livestock, houses, fishery etc. as per the guidelines of District Disaster Management Manual.

(H) Assessment of Vibration: CSIR- North East Institute of Science and Technology (NEIST) will be requested to assess alleged vibration of the locality.

10.2.9.3 Additional mitigation measures to be adopted by OIL

Recommendations provided by Director General of Mine Safety (DGMS) with respect to safety precautions will be undertaken in respect of any Workover Oil/Gas well in operation by OIL for to prevent the chances of accident in an OIL facility.

1. It shall be ensured that person(s) deployed in the workover area within 30m from any tank, separator, oil well, oil/gas manifold at the installation including in Zone -2 hazardous area, do not carry/possess mobile phones, any electronic device, cigar, cigarette, biri/other smoking apparatus or any match or kind which is capable of producing a light, flame or spark, excepting intrinsically safe apparatuses or such devices which are housed in a flame proof enclosure.
2. Before employing any person at the installation, it shall be ensured that such persons have undergone adequate and appropriate training under the Mines Vocational Training Rules, 1966 on safe conduct of various operations. Such persons may also be imparted requisite training on behavioural safety.
3. It shall be ensured that no person is permitted to enter into any place in the workover area which is likely to contain dangerous levels of hydrocarbon gases, without wearing suitable fire-proof whole-body vests/jackets, to protect from sudden fire.
4. Whenever any operation connected to the conduct of workover are carried out, continuous presence of an official/Installation Manager shall be ensured at site for the purpose of proper management, control, supervision and direction of all workover operations.
5. Before commencement of operation at the installation, it shall be ensured by the Manager that a thorough Job Safety Analysis is carried out and various attendant issues arising thereof are addressed in accordance with law.
6. There shall be provided a system for effective handling, conduit and/or safe disposal of hydrocarbon gases through a properly constructed and maintained flare stack, thereby preventing accumulation and discharge into atmosphere.
7. A system of continuous monitoring and detection for hydrocarbon gases at all pre-defined locations by the Manager for the purpose, shall be provided in addition to monitoring by portable spot gas detection systems on hourly basis or at shorter intervals as may be decided by the Manager. A record of such monitoring/detection by portable spot gas detection systems shall be kept in a register kept for the purpose and shall be signed and dated by the person making the measurement. In case of the continuous monitoring and detection system, the measured readings may be kept in non-editable electronic form.
8. It shall be ensured that suitable protective systems such as Automatic Fire Detection and Suppression System (AFDSS), engine coolant temperature sensors, engine oil pressure gauge,

over-heating tripping system and exhaust manifold & turbo charger guards, are provided and maintained on every internal-combustion (IC) engine. It shall also be ensured that the exhaust of every IC engine including exhaust pipe, muffler/silencer, are adequately insulated/protected to prevent contact with inflammable fluids.

9. It shall be ensured that every Draw Works is provided with a Fail-Safe braking system so as to get automatically applied in case of any pneumatic/hydraulic component failure.
10. It shall be ensured that equipment maintenance shall be carried out as per the procedure and schedule as per OEM guidelines/recommendations.
11. It shall be ensured that the entire workover area is kept under effective CCTV surveillance to monitor all operations closely.
12. Care shall be taken to ensuring that various SOPs made in connection with workover operations shall be in accordance with OMR 2017 and relevant OISD guidelines issued from time to time.

(*Source: DGMS Technical Circular No. 01 of 2019*)

Testing and maintenance of BOP in line with the OISD Guidelines (OISD-GDN-182) will be followed by OIL for safe operations at a drill site. The guidelines in this respect are provided below;

a. Function Test

i. Blowout preventer function test should be performed on each round trip (but not more than once per day) or once a week whichever is earlier.
ii. The test BOP pipe ram should be conducted when the production string is inside casing.
iii. Pipe ram preventers should be function tested and closing time should be recorded.
iv. Blind/Shear ram should be operated for function test while string is out of hole.
v. All the tests results & problems observed during testing and any actions taken to remedy the problem should be documented

b. Pressure Testing

i. All blowout prevention components that may be exposed to well pressure should be tested first to a low pressure of 200 to 300 psi and then to a high pressure i.e. at the rated working pressure of BOP or to the rated working pressure of the wellhead on which BOP is installed on, whichever is lower. When performing the low pressure test, do not apply a higher pressure and bleed down to the low test pressure. The higher pressure could initiate a seal that may continue to seal after the pressure is lowered and therefore misrepresenting a low pressure condition.
ii. The initial high pressure test on components that could be exposed to well pressure (BOP stack) should be to the rated working pressure of the ram BOPs or to the rated working pressure of the wellhead that the stack is installed on, whichever is lower. Initial pressure tests are defined as those tests that should be performed on location before the well is spudded or before the equipment is put into operational service.
iii. Each low pressure & high pressure tests must hold required pressure for 5 minutes.
iv. There may be instances when the available BOP stack and / or the wellhead have higher working pressures than are required for the specific well bore conditions due to equipment availability. Special conditions such as these should be covered in the site-specific well control pressure test program.
v. If the equipment does not hold the required pressure during a test , remedy the problem and retest the effected component
vi. Test BOP using cup tester or test plug or tubing hanger.
vii. Clear water should be used as test fluid.
viii. All pressure tests on well control equipment should be conducted at least
   - Immediately upon installation.
   - After the disconnection or repair of any pressure containment seal in BOP but limited to the affected component.
   - Not exceeding 21 days
ix. All the tests results & problems observed during testing and any actions taken to remedy the problem should be documented.

c. BOP drills

i. BOP drills should be conducted at unschedule times when operations and hole conditions permit.
ii. Drills must be conducted weekly (subject to BOP is installed on wellhead) to familiarize all personnel engaged in well completion /workover operations with appropriate safety measures.
iii. All Crew members shall be instructed in the operation of BOP system and their responsibility in the event of Blow out
iv. Total time taken to complete the drill should not be more than 2 minutes. The deficiencies/ delay in response be discussed for further improvement.

The drills should be documented in DPR.

10.2.10 Greenbelt Plan

Scope

Afforestation activities not only serve as foreground and background landscape features resulting in harmonizing and amalgamating the physical structures of production installations with the surrounding environment, but also contribute to the overall improvement in the environment. In addition to this plants have an in-built mechanism to absorb a wide variety of pollutants.

Purpose

The main purpose of the plan are:

- Enhancing the vegetation cover for increasing the biodiversity of the region;
- Providing aesthetic value to the production facilities;
- Enhancing the ecological equilibrium of the area and
- Attenuate dust emission and noise.

Demarcation of plantation area

The peripheral area of the production installations will be used for greenbelt plantation.

Selection of Plant Species

Selection of plant species is to be done on the basis of their adaptability to the existing geographical conditions and the vegetation composition of the topography of the region. The selection of tree species suitable for plantation shall be governed by guiding factors as stated below:

- Selection of the plant species to be done on the basis of their adaptability to the existing geographical conditions and the vegetation composition of the vegetation type of the region;
- During the development of the greenbelt within the project area, special attention would be given to species having nitrogen fixing capability, ornamental values, and species of very fast growth with good canopy cover.
- The tree should be tolerant to air pollutants present in the area.
- The tree should be able to grow and thrive on soil of the area, be evergreen, inhabitant, having minimum of leaf fall.
- Plants with more than 10 m height, fair amount of canopy cover shall be preferred so that these plants can effectively reduce the pollution load as well as provide maximum amount of shade.
- Since the tree trunks are normally devoid of foliage (up to 3 m), it would be appropriate to have shrubs in front of such trees to give coverage to such portions.

- The tree should be fast growing and indigenous and should maintain ecological, land and hydrological balance of the region.

Recommendation of Species for Plantation

Following is a suggestive list of the plants, which could be considered for pollution abatement:

Table 10.1 Suitable Plant Species for Greenbelt Plantation

Sl no	Species Composition	Percentage
A.	*Trees*	
1.	*Albizia procera*	5
2.	Aegle marmelos	7
3.	Ailanthus grandis	5
4.	Albizia lebbeck	5
5.	Alstonia scholaris	5
6.	Artocarpus heterophyllus	5
7.	*Dillenia indica*	10
8.	Dalbergia sissoo	5
9.	Mangifera indica	10
10.	*Mesua ferrea*	10
11.	*Polyalthia longifolia*	8
12.	Syzygium cumini	5
13.	Terminalia arjuna	5
14.	Cassia siamea	5
15.	Bischofia javanica	5
16.	Casuarina *sp.*	5
B.	*Shrubs*	
17.	Adhatoda vasica	20
18.	Nerium indicum	20
19.	Bougainvillea spectabilis	20
20.	*Vitex negundo*	20
21.	*Lawsonia inermis*	20

Spacing and Plantation density

Tree Plantation

The spacing and pit size would be varying according to the choice of species and compatibility of various species to grow together in a niche. Small spread would be planted at a distance of 2.5m x 2.5m apart, while tall varieties with spread would be planted at a spacing of 3m x 3m. The pit size would be 30cm x 30cm x 30cm for cylindrical whereas for the broadleaf species the size of 45cm x 45cm x 45cm need to be adopted. Approximately 1600 saplings will be planted per hectare of land.

Pit Preparation

Adequate quantity of soil and manure mixture @ 4:1 is necessary for each pit. The soil mixture is to be filled in each pit and watered well to form a puddle before the actual transplantation

Fencing and Closure

A minimum block plantation would be undertaken by providing barbed wire fencing including watch and ward for assuring protection from biotic interference.

The Planting Scheme

The peripheral area of the production installations will be utilized for greenbelt development. For the purpose of pollution attenuation, the green belt shall be developed in three tiers as stated below:

First Tier **–** Consists of shrub species having good levels of air pollution tolerance limits which is referred to as Tolerance zone.

- *Broken or interrupted*: Trees shall be planted in between the shrub species at regular intervals in the first tier. The branching pattern and canopy formation of these species is not uniform.
- *Drooping canopy:* Trees shall be planted in between the shrubs in the first tier. The branches and leaves of these species droop downwards e.g. *Polyalthia longifloia*.

Second Tier - consists of trees having fast growth potential with conical canopy identified as Dispersion Zone.

- *Rotund type:* The shape of the crown is more or less rounded; branches and leaves are closely arranged. These tree species are suitable for the second and third tiers.
- *Flat topped canopy:* The branches of the crown are uniformly shaped flat-topped crown and the spread of the crown is wide to cover a large area e.g. *Cassia siamea*. These tree species are suitable for the second and third tiers.

Third Tier - Trees having hairy leaves with thick and round canopy referred to as the Absorption Zone.

- *Cylindrical type:* The branches and leaves form a close network and give the longitudinal spread e.g. *Dalbergia* sp. These tree species are appropriate in between the trees in the third tier.
- *Chimney type:* The branches give the appearance of long chimney. These tree species are used for the outer rows of the third tier.
- *Conical type:* The growth of main stem and horizontal branches appear in the form of a cone. e.g. *Casuarina* sp. These tree species are suitable in the peripheral rows of the third tier.

Area Allocated

A detailed survey was conducted with respect to existing vegetation types, vegetation diversity, etc. in the project area for development of greenbelt around project components. The greenbelt plan has been formulated considering the parameters such as climate, soil types etc. and applicable norms. In the present case an area of about 25% (1.75 ha.) of the total area of the production installation (7 ha.) has been allocated within the site for development of the green belt. Approximately 1600 saplings will be planted per hectare of land. Total number of saplings to be planted is 2800 nos. per site.

Maintenance of Plantation

The desired saplings for plantation will be obtained from the nearest Forest Department Nursery. Necessary steps to be taken for better results are as follows:

- One/two years old seedlings will be planted for plantation
- Regular de-weeding, mulching of seedlings and application of oil cakes and organic manure should be carried out to boost up growth potential
- Watering of the plantation during dry season to avoid water loss

10.2.10.1 Cost of Implementation

Total implementation of greenbelt for 7 years would be INR 5.25 lakhs (@ INR 1 lakh per hectare) for three production installations.

10.2.11 Wildlife Conservation Plan

The protected species recorded in the study area, their habitat, threats and conservation measures proposed has been presented in **Table 10.2**.

Table 10.2 Conservation Plan for Schedule- I species

Sn.	Species	Habitats within Study Area	Threats	Broad Conservation Actions	Responsibilities	Actions Required
	Reptilian Fauna					
1.	Bengal Monitor (*Varanus bengalensis*)	Monitor lizards can be found in variety of habitats depending upon their food resource. In the study area the species was predominantly found in the forest habitats and homestead plantation areas	Threats within the study area is identified as hunting and road kills	• Identify basking sites of the species and enhance protection of these sites through village communities. • Awareness campaigns to be carried out among village communities, focusing on local schools for protection of the species • While laying approach road, measures will be taken to keep natural drainage unhindered, by construction of culverts, which will provide crossing points for reptiles and minimize risk of road kill. • Project proponent shall comply with all the pollution control and other conditions imposed in the environmental clearance by statutory authorities. Apart from pollution control measures, it is also important to inform the workers about the presence of the species.	OIL with assistance from Forest Department	• Awareness campaigns to be conducted for conservation of Schedule I species, their ecosystem and values. • Pollution Control measures to be implemented • Contributing to Forest Department's habitat improvement and species conservation programs
2.	Yellow monitor (*Varanus flavescens*)	Monitor lizards can be found in variety of habitats depending upon their food resource. In the study area the species was predominantly found in the forest habitats and homestead plantation areas				
3.	Asiatic Rock Python (*Python molurus*)	Primarily within the forest areas	Primary threat in the area is hunting and pollution	• Awareness campaigns to be carried out among village	OIL with assistance from	• Awareness campaigns to be

Sn.	Species	Habitats within Study Area	Threats	Broad Conservation Actions	Responsibilities	Actions Required
4.	Burmese Python (*Python bivattus*)	Primarily within the forest areas		communities, focusing on local schools • While laying approach road, measures will be taken to keep natural drainage unhindered, by construction of culverts, which will provide crossing points for reptiles and minimize risk of road kill. • OIL will comply with all the pollution control and other conditions imposed in the environmental clearance by statutory authorities. Apart from pollution control measures, it is also important to inform the workers about the presence of the species.	Forest Department	conducted for conservation of Schedule I species, their ecosystem and values. • Pollution Control measures to be implemented • Contributing to Forest Department's habitat improvement and species conservation programs
5.	Indian Flapshell Turtle (*Lissemys punctata*)	Primarily within the aquatic habitats	Primary threat in the area is hunting and pollution	• Awareness campaigns to be carried out among village communities, focusing on local schools for protection of turtle species • OIL will take onsite pollution control measures viz. use of sedimentation tanks, oil water separator, treatment of drilling washwater and reusing etc. • Spill kits will be placed at site for controlling of onsite spills	OIL with assistance from Forest Department	• Awareness campaigns to be conducted for conservation of Schedule I species, their ecosystem and values. • Pollution Control measures to be implemented • Contributing to Forest Department's habitat
6.	Indian Softshell Turtle (*Nilssonia gangeticus*)	Primarily within the aquatic habitats	Primary threat in the area is hunting and pollution			

Sn.	Species	Habitats within Study Area	Threats	Broad Conservation Actions	Responsibilities	Actions Required
						improvement and species conservation programs
	Avifauna					
7.	White backed Vulture (*Gyps bengalensis*)	Covering all terrestrial habitats within the study area	The anthropogenic threats to these species is hunting, loss of habitat. Project activities resulting in air, water and noise pollution, degradation of vegetation could potentially affect the habitat of these bird species and their population in the study area.	• The villagers, school children, industry workers working in the vicinity are to be made aware about the importance of wildlife, its habitat, importance of conservation etc. • OIL will also conduct awareness campaigns at the village level to make the locals aware about the protected species in the area; their behaviour, habitat, ecology, breeding/nesting seasons, threats to habitats and species, laws regarding protection of species. Awareness generation campaigns will include preparation of brochures in local language, film shows and display of posters, etc. • OIL would support the Forest Department for habitat improvement program. • Workshops on forestry and biodiversity to be arranged for	OIL with assistance from Forest Department	• Contributing to habitat improvement activity as planned by Forest Dept. • Awareness campaigns to be conducted for conservation of Schedule I species, their ecosystem and values. • Workshops on forestry and biodiversity to be arranged for the forest department staffs • Pollution Control measures to be implemented • Identification of vulture nesting sites, if any, in
8.	Black-winged Kite (*Elanus caereleus*)	Covering all terrestrial habitats within the study area				
9.	Common Kestrel (*Falco tinnunculus*)	Covering all terrestrial habitats within the study area				
10.	Oriental Pied Hornbill (*Anthracoceros albrostris*)	Primarily within the forest areas				
11.	Black Kite (*Milvus migrans)*	Covering all terrestrial and aquatic habitats within the study area specially in proximity to the settlement areas				
12.	Great Pied Hornbill (*Buceros bicornis*)	Primarily within the forest areas				
13.	White-winged Wood duck (*Asarcornis scutalata*)	Aquatic habitats within study area				
14.	Common Hill Myna (*Gracula religiosa*)	Covering all terrestrial habitats within the study area				

Sn.	Species	Habitats within Study Area	Threats	Broad Conservation Actions	Responsibilities	Actions Required
15.	Slender-billed Vulture (*Gyps tenuirostris*)	Covering all terrestrial habitats within the study area		the forest department staffs for capacity building. External experts to be engaged for coordinating the workshops. • Lightings of within the project area could potentially deter the species presence. Therefore, OIL will ensure that minimum illumination comes out from the project area. This can be done by adjusting the angles of the light sources and using low intensity focused bulbs inside the project area. • Special care to be taken for identification of vulture nests, if any, and maintain distance from the nests. • OIL will take utmost care in controlling air, water, noise and soil pollution in line with the requirement of Environmental Clearance.		proximity to the project area • Contributing to Forest Department's habitat improvement and species conservation programs
16.	Shikra (*Accipiter badius*)	Covering all terrestrial habitats within the study area				
17.	Indian vulture (*Gyps indicus*)	Covering all terrestrial habitats within the study area				
18.	Kaleej Pheasant (*Lophura leucomelanos*	Primarily within the forest areas				
19.	Grey Peacock Pheasant (*Polyplectron bicalcaratum*)	Primarily within the forest areas				
20.	Crested Serpent Eagle (*Spilornis cheela*)	Primarily within the forest areas				
21.	Eurasian Sparrowhawk (*Accipiter nisus*)	Covering all terrestrial habitats within the study area				
22.	Crested Goshawk (*Accipiter trivirgatus*)	Primarily within the forest areas				
23.	Pied Harrier (*Circus melanoleucos*)	Covering all terrestrial habitats within the study area				
24.	Brown Hornbill (*Anorrhinus tickelli*	Primarily within the forest areas				
25.	Wreathed Hornbill (*Aceros undulates*)	Primarily within the forest areas				
	Mammals					
26.	Common Leopard (*Panthera pardus*)	The distribution of Common Leopard is within the reserve forest	The primary threats to Leopards are habitat fragmentation through	• OIL would support the Forest Department for habitat improvement program.	OIL with assistance from	• Contributing to Forest Department's

Sn.	Species	Habitats within Study Area	Threats	Broad Conservation Actions	Responsibilities	Actions Required
		areas and tea gardens within the study area	degradation of forest habitats, reduced prey base and conflict with livestock and game farming Movement of vehicle, presence of human, direct noise, vibrations and illuminations could cause disturbance to the species and affect their movements if any in the proximity of the project site.	• Awareness campaign will be carried out in local villages, on conservation of leopards and their ecosystem services and values. • OIL will take utmost care in controlling air, water, noise and soil pollution	Forest Department	habitat improvement and species conservation programs • Awareness campaigns to be conducted for conservation of Schedule I species, their ecosystem and values. • Workshops on forestry and biodiversity to be arranged for the forest department staffs • Pollution Control measures to be implemented
27.	Western Hoolock Gibbon (*Hoolock hoolock*)	The distribution of the species is primarily confined to reserve forest areas	The primary threats are habitat fragmentation through degradation of forest habitats and Movement of vehicle, presence of human, direct noise, vibrations and illuminations could cause disturbance to the species.	• Special care to be taken for identification of roosting sites for Hoolock Gibbon and maintain distance from the roosting site • OIL would support the Forest Department for habitat improvement program. • Awareness campaign will be carried out in local villages, on conservation of the species, their ecosystem services and values.		
28.	Asian Elephant (*Elephas maximus*)	Asian Elephant movement is primarily reported within the Upper Dihing RF, Kotha RF, Buridihing RF	The primary threats are habitat fragmentation through degradation of forest habitats; blockage of movement corridors	• OIL would support the Forest Department for habitat improvement program and also in other programs for conservation of elephants		

Sn.	Species	Habitats within Study Area	Threats	Broad Conservation Actions	Responsibilities	Actions Required
				• Awareness campaign will be carried out in local villages, on conservation of the species, their ecosystem services and values. • Drilling of wells in proximity to the elephant corridors (Well 822, 835, 836) to avoid the seasonal elephant movement months September-February.		
29.	Leopard Cat (*Prionailurus bengalensis*)	The distribution of the species is primarily confined to the reserve forest areas	The primary threats to are habitat fragmentation through degradation of forest habitats, reduced prey base and conflict with livestock	• OIL would support the Forest Department for habitat improvement program. • Awareness campaign will be carried out in local villages, on conservation of leopard cats and their ecosystem services and values.		
30.	Capped langur (*Presbytis pileatus*)	The distribution of the species is primarily confined to the reserve forest areas	The primary threats are habitat fragmentation through degradation of forest habitats Movement of vehicle, presence of human, direct noise, vibrations and illuminations could cause disturbance to the species.	• Special care to be taken for identification of roosting sites. • OIL would support the Forest Department for habitat improvement program. • Awareness campaign will be carried out in local villages, on conservation of the species, their ecosystem services and values • OIL will take utmost care in controlling air, water, noise and soil pollution		

Sn.	Species	Habitats within Study Area	Threats	Broad Conservation Actions	Responsibilities	Actions Required
31.	Sloth Bear (*Melursus ursinus*)	The distribution of the species is primarily confined to the reserve forest areas	The primary threats are habitat fragmentation through degradation of forest habitats	• OIL would support the Forest Department for habitat improvement program. • OIL will take utmost care in controlling air, water, noise and soil pollution		
32.	Wild Asian Buffalo (*Babalus arnee*)	The distribution of the species is primarily confined to the reserve forest areas	Primary threats are habitat degradation and pollution	• OIL would support the Forest Department for habitat improvement program. • OIL will take utmost care in controlling air, water, noise and soil pollution		
33.	Tiger (*Panthera tigris*)	Within Upper Dihing Reserve Forest areas	The primary threats are habitat fragmentation through degradation of forest habitats	• OIL would support the Forest Department for habitat improvement program.		
34.	Chinese Pangolin (*Manis pentadactyla*)	The distribution of the species is primarily confined to the reserve forest areas	The primary threats are habitat fragmentation through degradation of forest habitats Movement of vehicle, presence of human, direct noise, vibrations and illuminations could cause disturbance to the species.	• OIL would support the Forest Department for habitat improvement program. • Awareness campaign will be carried out in local villages, on conservation of the species and their ecosystem services and values. • OIL will take utmost care in controlling air, water, noise and soil pollution		
35.	Marbled Cat (*Pardofelis marmorata*)	The distribution of the species is primarily confined to the reserve forest areas	Primary threats are habitat degradation and pollution	• OIL would support the Forest Department for habitat improvement program.		

Sn.	Species	Habitats within Study Area	Threats	Broad Conservation Actions	Responsibilities	Actions Required
				• OIL will take utmost care in controlling air, water, noise and soil pollution		
36.	Asiatic Golden Cat (*Catopuma temmincki*)	The distribution of the species is primarily confined to the reserve forest areas	Primary threats are habitat degradation and pollution	• OIL would support the Forest Department for habitat improvement program. • OIL will take utmost care in controlling air, water, noise and soil pollution		

Implementation of Conservation Measures

The budgetary provision for implementation of wildlife conservation measures for 7 years of working period for the Dumduma Pengeri area has been provided in **Table 10.3**.

Table 10.3 Budget for Wildlife Conservation Plan

S. No.	Action Item	Details	Budget (INR in Lakh)
A.	**Species Conservation Programs**		
A.1	Cost of Habitat Improvement (Contributing Forest Departments habitat improvement program)	Partial Assistance to forest department from OIL (@ INR 5 lakh per year x 7 years)	35.00
A.2	Cost of capacity building of forest department staffs (Engagement of external expert; Logistic cost for arrangement of workshop; Cost of development of IEC Material)	Assistance towards capacity building training program (@ INR 1 lakh per year x 2 years)	2.00
A.3	Awareness Generation Meetings at villages (Development of Brochure; Arrangement of Meeting; Development of Posters)	Awareness program – @ 0.50 lakh per year x 7 years	3.50
A.4	Engaging a NGO for Identification of Hoolock Gibbon Roosting sites and Vulture Roosting sites	@ INR 1 lakh per year x 7 years	7.00
A.5.	Providing fund to forest department for engaging trackers to monitor elephant movement in the area	@ INR 1 lakh per year x 7 years	7.00
B.	**Monitoring & Reporting budget**		
B.1	Monitoring & Reporting budget	Hiring of Third Party Consultant for annual monitoring & Reporting @ Rs. 0.5 lakh x 7 years	3.50
	Total Budget		**58.00**

Monitoring & Reporting

OIL will engage a third party monitoring Agency (working in the wildlife conservation) for annual monitoring and review of wildlife conservation program. This agency will review the proposed wildlife action plans, likely benefits and will provide an annual report. The annual Monitoring report will be submitted to the Forest Department.

10.2.12 Road Safety & Traffic Management Plan

Scope

The Road Safety & Traffic Management Plan is applicable to all operation pertaining to OIL and contractor vehicular movement viz. vehicle involved in the transportation of raw materials, project and contractor personnel, drilling rig and heavy equipment transportation to well sites and production facilities.

Purpose

The Road Safety & Traffic Management Plan outlines specific measures to be adopted and implemented by OIL to mitigate any potential impact on community health and safety that may arise out of movement of vehicles and transportation of drilling rig and other heavy equipment during construction, drilling, operation of production facilities and decommissioning of well sites.

Mitigation Measures

- Project vehicular movement will be restricted to defined access routes to be identified in consultation with locals and concerned authorities;
- Proper signage will be displayed at important traffic junctions along the predefined access routes to be used by construction and operational phase traffic. The signage will serve to prevent any diversion from designated routes and ensure proper speed limits are maintained near village residential areas;
- Precautions will be taken to avoid damage to the public access routes including highways during vehicular movement;
- Safe and convenient passage for vehicles, pedestrians, tea garden workers and livestock to and from side roads and property accesses connecting the project road will be provided;
- Parking of project vehicles along village access roads prohibited;
- Traffic flows will be scheduled wherever practicable during period of increased commuter movement;
- Personnel will be deployed at major traffic intersection for control of traffic;
- Clear signs, flagmen & signal will be set up at major traffic junctions and near sensitive receptors *viz.* schools in discussion with Gram Panchayat and local villagers;
- Movement of vehicles during nighttime will be restricted. Speed limits will be maintained by vehicles involved in transportation of raw material and drilling rig;
- A Journey Management Plan will be formulated and implemented to control construction and operational phase traffic;
- Routine maintenance of project vehicles will be ensured to prevent any abnormal emissions and high noise generation.
- Adequate training on traffic and road safety operations will be imparted to the drivers of project vehicles. Road safety awareness programs will be organized in coordination with concerned authorities to sensitize target groups viz. school children, commuters on traffic safety rules and signage.

10.2.13 Occupational Health & Safety Management Plan

10.2.13.1 Purpose

The Occupational Health and Safety procedure is a procedure developed to address the occupational health and safety related impacts that may arise from proposed project activities viz. construction of well sites, production facilities and pipelines, drilling and testing, operation of construction machinery/equipment, storage and handling of fuel and chemicals, operation of drilling rig and associated equipment. The implementation of this procedure is intended to promote health check-ups of Operational workers, thereby maintaining a healthy working life. The purpose of this procedure is to represent the design of a program to ensure usual medical care followed by treatment to Operational

workers. This Procedure will be monitored, reviewed and updated where a change in conditions or requirements occur.

10.2.13.2 Scope

The Occupation Health & Safety Management Procedure (OHSMP) is applicable for all project operations that have the potential to adversely affect the health and safety of contractors' workers and onsite OIL personnel.

10.2.13.3 Roles & Responsibilities

Authorized Medical Attendant (AMA) – It includes Medical Officers or Specialist who is a direct employee of OIL or Medical Officers or Specialist who is under employment of OIL (a professionally qualified registered medical practitioner working under state/ central government or nominated by OIL). AMA is responsible for conducting pre-employment and periodic medical check-ups of Operational workers, issuing fitness certificates and maintaining a health register[76].

HSE Officer – HSE officer is responsible for:

- Monitoring and reviewing the implementation of the procedure;
- Advise the manager on measures necessary to prevent dangerous situations;
- Either at site or in office to maintain stock of PPE, Stationeries, registers, Formats, Signboards, Display boards etc. required for installation; prepare requisitions/ reservations for procurement/stock-withdrawal of the same and issuance of the same as per prevailing practices of OIL or as per advice of Oil authorities;
- Imparting Training to the responsible person/workers executing the procedure; and
- Collecting and recording information on performance indicators identified as part of this procedure[77].

Medical Relief Coordinator − Medical Relief Coordinator is responsible for:

- Organizes First Aid at the site of incidence.
- Arranges Ambulance Services.
- Medical relief camp in Oil Hospital and arranges extended services under Mutual aid scheme with the Neighboring Industries and Civil Hospitals[78].

Administrative & Welfare Coordinator − Coordinates for security arrangements and Liaises with Police and District Civic authorities, HEAD (MS) & GM(ER) for Rescue, Shelter and Medical relief operations. Officer also informs the voluntary organizations to assist for rescue and relief operations.

Employee Relations & Welfare Coordinator - Responsibilities include:

- To participate in rescue and relief operations.
- To contact relatives of affected persons and provide Food/ Beverage etc. at relief camp.
- Contacts Union Officials.

[76] Oil India Limited Employees Medical Attendance Rules, 2018

[77] http://www.oil-india.com/Document/Career/Advertisement-for-engagement-of-HSE-Officer-on-contract-basis-19072014.pdf

[78] On Site Emergency Response Plan, Oil India Limited, Duliajan

Contractors - Contractor are responsible for

- Establish and maintain an occupational H&S Policy and safe system of work;
- Every person deployed by the contractor in a Factory must wear safety gadgets to be provided by the contractor;
- Prepare and Follow SOP[79].

10.2.13.4 Management Measures

Fitness for Duty

At the time of engagement, all employees including contractor workers to undergo a medical assessment to ensure they are medically fit to perform their role.

Whilst working onsite, employees and contractors must advise their supervisor of any pre-existing injury or illness which may affect their performance, or has the potential to impact on safety and health in the workplace. A medical assessment may also be required to determine associated risks or limitations with records for the same to be maintained.

No person having congenital deformity, uncontrolled disease or communicable disease should be allowed to work. A person suffering from a disease or taking medicine for such a disease that may put him or his co-workers at risk should not be declared medically fit.

Health Surveillance

OIL has its own Medical Attendance Rules (Oil India Limited Employees Medical Attendance Rules, 2018). It includes all the hospitals / dispensaries held by company and company empanelled hospitals and nursing homes. The rules clearly states the employee benefits[80]. OIL has its own hospital in Duliajan and Digboi.

Apart from that, all the employees working must undergo PME (Periodical Medical Examination) by approved medical officers / Hospital at fixed interval as per the company policy. Results of the examination are recorded. The frequency of periodic medical examinations should be every five years for the workers below 45 years of age and every three years for workers of above 45 years of age. If any worker fails to pass the annual medical tests, then he/she will be advised to take further medical treatments. After completion of the treatment, the worker may be allowed to resume work at the site after obtaining medical fitness certificate from the site physician.

Apart from the periodical medical check-ups, if any worker reports of any physical discomfort, the medical officer will ensure proper medical treatment to the worker and if necessary, he/she will be referred to nearby specialized medical or hospital facility by the Site Physician. This record will be maintained in the workers' health register.

Worksite Assessment

HSE officer inspects, as often as may be necessary, drilling site, pipeline installation and other facilities with a view to identify the dangers which may cause bodily injury or impair health of any person or environment and advise the manager on measures necessary to prevent dangerous situations.

HSE officer will enquire into the circumstances and causes of all accidents whether involving persons or not and advise the manager on measures necessary to prevent recurrence of such accidents. HSE officer will Collect, compile and analyse information in respect of accidents and dangerous occurrences with a view to promote safe practices and improvement of working environment.

Organize regular safety education programmes and safety campaigns to promote safety awareness

[79] https://www.oil-india.com/pdf/tenders/national/Doc_CGI1234P20.pdf

[80] Oil India Limited Employees Medical Attendance Rules, 2018

amongst persons employed. Ensure that all new workers and workers transferred to new jobs receive adequate safety firefighting and first aid training[81].

Ergonomics

All personnel and contractors must consider ergonomics when designing or arranging workstations, products and systems so that they fit the personnel who use them. Management shall ensure that where ergonomic hazards are identified and pose a threat to personal safety, a risk assessment is completed by a competent person. Personnel and workers shall be informed of the risks, and provided with the necessary equipment and information to reduce the risk.
Special consideration should be given to ergonomics in confined spaces, awkward or difficult to access spaces, using heavy or awkward tools and equipment, and using repetitive or high force actions.

First Aid Boxes

At all the drilling site and production installation first aid boxes are present as per the instructions of the Medical Relief Coordinator. Senior HSE Officer are responsible for first-aid training programme for all the new employees for immediate action. The first aid box should contain the followings:

- 05 small sterilised dressings
- 05 medium size sterilised dressings
- 05 large size sterilised dressings
- 05 large size sterilised burn dressings
- 10 (15 mg) packets of sterilised cotton wool
- 1 pair of scissors
- Ointment for burns (e.g. silver sulfadiasine)
- Antiseptic ointment (e.g. Neosporin, soframycin)
- A bottle of a suitable surgical antiseptic solution ((e.g. Savlon / Dettol)
- 12 roller bandages ten cms. Wide
- 12 roller bandages five cms. Wide
- 10 Adhesive band aids
- 6 triangular bandages
- packets of safety pins
- 1 supply of suitable splints
- 1 copy of the first aid leaflet
- List of first aiders
- List of nearby hospitals with contact numbers

Contractor Engagement

- Contractors engaged by OIL, are responsible to fulfil all the legal formalities with respect to the Health, Safety and Environmental aspects of the entire job (namely; the person employed by him, the equipment, the environment, etc.) under the jurisdiction of the district of that state where it is operating. Contractors have to ensure that all sub-contractors hired by him comply with the same requirement as the contractor himself and shall be liable for ensuring compliance all HSE laws by the sub or sub-sub-contractors.

[81] http://www.oil-india.com/Document/Career/Advertisement-for-engagement-of-HSE-Officer-on-contract-basis-19072014.pdf

- Every person deployed by the contractor must wear safety gadgets to be provided by the contractor. The Contractor shall provide proper Personnel Protective Equipment as per the hazard identified and risk assessed for the job and conforming to statutory requirement and company PPE schedule. Safety appliances like protective footwear, Safety Helmet and Full Body harness has to be DGMS approved. Necessary supportive document shall have to be submitted as proof. If the Contractor fails to provide the safety items as mentioned above to the working personnel, the Contractor may apply to the Company (OIL) for providing the same. OIL will provide the safety items, if available. However, it will be the Contractors sole responsibility to ensure that the persons engaged by him use the proper PPE while at work. All the safety gears mentioned above are to be provided to the working personnel before commencement of the work.
- The Contractor shall prepare written Safe Operating Procedure (SOP) for the work to be carried out, including an assessment of risk, wherever possible and safe methods to deal with it/them. The contractor shall provide a copy of the SOP to the Supervisor. The health check-up of contractor's personnel is to be done by the contractor in authorized Health Centres as per OIL's requirement & proof of such test(s) is to be submitted to OIL. The frequency of periodic medical examinations should be in every three years.
- All persons deployed by the contractor for working in a Factory must undergo Vocational Training, Initial Medical Examination, and Periodical Medical Examination. They should be issued cards stating the name of the service provider and the work and its validity period, indicating status VT, IME and PME.
- The contractor should be submitted to Factory returns indicating name of his firm, Registration number, Name and address of person heading the firm, Nature of work, type of deployment of work persons, Number of work persons deployed, how many work persons hold Vertigo Test Certificate, how many work persons undergone IME and type of medical coverage given to the work persons.
- It will be entirely the responsibility of the contractor/his supervisor/representative to ensure strict adherence to all Safety, Health and Environment measures and statutory rules during operation in OIL’s installations and safety of workers engaged by him. The crew members will not refuse to follow any instruction given by company’s installation Manager/ Safety Officer/ Engineer/Official/ Supervisor/ Junior Engineer for safe operation.
- The contractor should have to report all incidents including near miss to Installation Manager/ Departmental representative of the concerned department of OIL. The contractor has to keep a register of the persons employed by him/her. The contractor’s supervisor shall take and maintain attendance of his men every day for the work, punctually.
- If the company arranges any safety or other class/training for the working personnel at site (company employee, contractor worker, etc) the contractor should not have any objection for such training provided to his personnel.
- The health check-up of contractor’s personnel is to be done by the contractor in authorized Health Centers as per OIL’s requirement and proof of such test(s) is to be submitted to OIL. The frequency of periodic medical examinations should be every five years for the workers below 45 years of age and every three years for workers of above 45 years of age.
- Records of daily attendance, accident report etc. are to be maintained in applicable form (as per Factory Act 1948) by the contractor. Also this is entirely the contractor’s responsibility to maintain all registers as per statutory norms.
- A contractor’s worker must, while at work, take reasonable care for the health and safety of people who are at the worker, place of work and who may be affected by the worker act or omissions at work.
- A contractor’s personnel must, while at work, co-operate with his or her employer or other persons so far as is necessary to enable compliance with any requirement under the act or the

regulations that is imposed in the interest of safety, health and welfare of the personnel or any other person82.

10.2.13.5 Training

All personnel responsible for implementation of the procedure are subjected to training and records maintained. OIL also organizes refresher trainings for the employees. All the new employees must complete First-Aid training after joining.

10.2.13.6 Monitoring and Evaluation

The successful implementation of Management Plans and Policies greatly depend upon the adaptability by the employees, who are the prime movers of the progress of company. Maintaining their health is very much vital for productivity & effectiveness. To promote the health of employees, OIL has made a structured Occupational Health Monitoring system so as to have scientific basis for decisions aimed at protection of employee's health from any possible adverse consequences of exposure to occupational health hazards. Following systems are followed in OIL towards providing Occupational Health Services[83].

- An OHS (Occupational Health Service) Centre is established at Duliajan.
- Various activities coordinated are pre-employment, periodical and pre-retirement medical examination.
- Administering special tests like Lung Function Test, Audiometry Test and Vision Test etc. for identified target groups.
- Conducting First Aid Training & other awareness programme related to Occupational Health Hazards & remedial measures.
- OHS in peripheral areas are provided through dispensaries located in Oil fields at Moran, Jorhat and Sonapur etc.
- The scope of Occupational Health Services will be widened in due course to encompass all the dimensions of health services.

Apart from above, OIL review the occupational health indicators on an annual basis to assess the overall occupational health performance of the project. These performance indicators are monitored and communicated to personnel and contractors through regular meeting forums and in writing. Detailed Environmental Management Matrix is presented in **Annexure 10.1**.

Monitoring and Evaluation

Like the other project components, OIL shall ensure that the stakeholders should have no issues with the project and in case there are any concerns, they should be adequately addressed as per the mandate. In order to keep track on the effectiveness of CER Plan, it is the responsibility of the OIL's CSR team to compile and maintain database on grievances for periodic review. The mechanism shall be based on two components, (i) internal monitoring and reporting and (ii) external monitoring and reporting which shall run simultaneously. Mostly this shall be aligned with simultaneous process monitoring rather than doing it separately all the time.

The CSR team shall track and report the following aspects in its annual report submitted to the senior management;

[82] https://www.oil-india.com/pdf/tenders/national/Doc_CGI1234P20.pdf

[83] https://oilweb.oilindia.in/sne/downloads/sop/SOP_Vol2.pdf

- Adherence to the agreed mechanism of grievance resolution – grievance categorisation, time for grievance resolution and communication of the status of the grievance to the aggrieved;
- Status of resolution of the registered grievances within the defined timeline;
- Status on expenditure of the annual budgetary allocation for CER;
- Achievements made vis-à-vis the targets set for each CER intervention;
- List of beneficiaries under each CER intervention and the criteria used for selecting the beneficiaries;
- Mechanism adopted for and current status of engagement with institutional stakeholders for implementing CER interventions; and
- Feedback of beneficiaries/ local communities concerning the CER programme of OIL. Excerpts of interviews and FGDs (focus group discussion) undertaken as part of the feedback process may also be included in the Report.

The report should be used by the OIL's senior management to evaluate the overall effectiveness of the CER programme of OIL on an annual basis. Deficiencies in the CER programme should be identified and recommendations to overcome them should be proposed at the end of the report.

10.3 OIL Environment Management Policy and System

10.3.1 Environmental Management Organisation

OIL is committed to providing resources essential to the implementation and control of the EMP. Resources includes the appropriate human resources and specialised skills. The structure for the organisation responsible for environmental and social management and implementation of the EMP is depicted in **Table 10.4**.

Table 10.4 Environmental Management Organisation Roles and Responsibilities

Position	Responsibility
Basin Manager	Oversee and coordinate all activities pertaining to the Project; ultimately responsible for environmental and social issues. Ensure delivery by the asset of its environmental, social and operational targets. Ensure effective communication with all stakeholders.
Chief General Manager (Drilling)	Ensuring that the Project and subcontractors operate in accordance with applicable regulatory environmental and social requirements and plans. Monitor implementation of environmental and social protection measures, and assist with technical input into oil spill response requirements.
CSR Manager	Liaise with local communities, farmer and government regulators on the project's behalf. Implement environmental and social awareness and education programmes with communities.

10.3.2 Training and Awareness

OIL will identify, plan, monitor, and record training needs for personnel whose work may have a significant adverse impact upon the environment or social conditions. The Project recognises that it is important that employees at each relevant function and level are aware of the Project's environmental and social policy; potential effects of their activities; and roles and responsibilities in achieving

conformance with the policy and procedures. This will be achieved through a formal training process. Employee training will include awareness and competency with respect to:

- Environmental and social impacts that could potentially arise from their activities;
- Necessity of conforming to the requirements of the EIA and EMP, in order to avoid or reduce those impacts; and
- Roles and responsibilities to achieve that conformity, including with regard to change management and emergency response.

The Chief General Manager (Drilling) is responsible for coordinating training, maintaining employee-training records, and ensuring that these are monitored and reviewed on a regular basis. The Chief General Manager (S&E) will also periodically verify that staff is performing competently through discussion and observation. Employees responsible for performing site inspections will receive training by drawing on external resources as necessary. Training will be coordinated by the General Manager (Learning and Development) prior to Project's implementation.

Similarly, the Project will require that each of the contractors institute training programmes for its personnel. Each contractor is responsible for site HSE awareness training for personnel working on the job sites. The contractors are also responsible for identification of any additional training requirements to maintain required competency levels.

The contractor-training program will be subject to approval by the Project and it will be audited to ensure that:

- Training programs are adequate;
- All personnel requiring training have been trained; and
- Competency is being verified.

10.3.3 Inspection & Monitoring

HSE inspections will be conducted by subcontractors on a daily basis. The results of the inspection and monitoring activities will be reported to OIL on a weekly basis or more frequently if requested by the Chief General Manager (Drilling).

Monitoring will be conducted to ensure compliance with regulatory requirements as well as to evaluate the effectiveness of operational controls and other measures intended to mitigate potential impacts.

10.3.4 Compliance Auditing

Beyond the routine inspection and monitoring activities conducted, compliance audits will be carried out internally by OIL to ensure compliance with regulatory requirements as well as their own HSE standards and policies. Audits to be conducted will also cover the subcontractor self-reported monitoring and inspection activities. The audit shall be performed by qualified staff and the results shall be communicated to the Basin Manager and management board.

The audit will include a review of compliance with the requirements of the EIA and of this EMP and include, at minimum, the following:

- Completeness of EHS documentation, including planning documents and inspection records;
- Conformance with monitoring requirements;

- Efficacy of activities to address any non-conformance with monitoring requirements; and
- Training activities and record keeping.

There will be a cycle of audits into specific areas of the Project such as waste management, and effectiveness of local content plans and discharge controls.
The frequency of audits will be risk based and will vary with the stage of the project (more frequent during construction and in the early stages of the project) and will depend on the results of previous audits.

10.3.5 Corrective Action

Impacts will be identified and associated risks addressed before an incident occurs. Investigating a 'near miss' or actual incident after it occurs can be used to obtain valuable lessons and information that can be used to prevent similar or more serious occurrences in the future.

OIL will implement a formal non-compliance and corrective action tracking procedure for investigating cause and identifying corrective actions in response to accidents or environmental or social non-compliances. The Chief General Manager (Drilling) will be responsible for keeping records of corrective actions and for overseeing the modification of environmental or social protection procedures and/or training programs to avoid repetition of non-conformances and non-compliances.

10.4 EMP BUDGET

EMP Budget includes budget for Public Hearing Action Plan, Wildlife Conservation Plan, Greenbelt Budget and Budget for Environmental Conservation Measures. Budget for Public Hearing Action Plan for socioeconomic development is planned to be INR 177.5 lakhs for 7 years (refer **Table 7.22**). PH action plan budget related to environmental issues have been included in the budget for environmental conservation measures (in **Table 10.5** and **Table 10.6**). Budget for Greenbelt Plan will be INR 5.25 lakhs. Budget for Wildlife Conservation Plan for Schedule-I species for 7 year will be INR 58 lakhs (refer **Table 10.3**). Environmental Control measures for each well would be 14.645 lakhs and for each production installation per year would be INR 6.43 lakhs. Detail of cost breakup of EMP Budget is provided at the **Table 10.5** and **Table 10.6**. Capital cost of EMP would be INR 104 lakhs and recurring cost for EMP would be approximately INR 93.41 lakhs per annum.

Table 10.5 Tentative Budget for EMP Implementation for Well Drilling

Sl. No.	Particulars of Work	Budget for 1 well (in lakh Rs.)	Cumulative Budget for 26 wells
1	**Air Quality Management Plan**		
a.	Dust suppression through water sprinkling in the internal unpaved roads Cost of water sprinkling - One truck hiring charge (Rs. 1,00,000 per month X 9 months=Rs. 9,00,000); - Diesel charge (50 km travel per day @ Rs. 35/km X 270 days = Rs. 4,72,500); - Total cost for one year Rs.13,72,500 Total cost for 7 years= Rs. 96,07,500	4.575	96.08
b.	Maintenance of paved internal road and transport route (budgetary provision is included in operational cost of drilling)	0.00	0.00

Sl. No.	Particulars of Work	Budget for 1 well (in lakh Rs.)	Cumulative Budget for 26 wells
c.	Ambient Air Quality Monitoring -3 monitoring locations x 2 weeks per location x Once during site development, twice during drilling and once during decommissioning (@ Rs.7500 x 24 samples)	1.8	46.8
d.	Stack emission monitoring (@ Rs. 5000 per sample x 3 DG sets x twice during drilling)	0.3	7.8
2	**Noise Management Plan**		
a.	Ambient Noise Monitoring – 3 locations, once during site development, twice during drilling and once during decommissioning (@Rs. 2500 X 12 samples)	0.3	7.8
b.	Workplace noise monitoring -5 locations per well, twice during drilling (@Rs.2500 per location x 5 locations x 2 times)	0.25	6.5
c.	All DG sets would be provided with acoustic enclosures (All DG sets will be procured with in-built acoustic enclosures budget included in drilling budget)	0.00	0.00
d.	Erection of noise barrier at drill sites (Budget for erection of noise barrier included in drilling budget)	0.00	0.00
3	**Water Quality Management Plan**		
a.	Construction and maintenance of double chambered sedimentation tank and oily-water separator ETP (Budget included in drilling budget)	0.00	0.00
b.	Surface Water Quality Monitoring (@ Rs. 8000 x 4 samples from natural drainages once during site construction, once during drilling, once after decommissioning)	0.96	24.96
c..	Ground Water Quality Monitoring (@ Rs. 8000 x 3 sites, once during site construction, once during drilling, once after decommissioning)	0.72	18.72
d.	ETP Treated water quality (@ Rs. 8000 x 2 samples of ETP treated water per month for 3 months)	0.48	12.48
e.	Sample from Oily water separator(@Rs. 5000 per sample X 1 sample after drilling)	0.05	1.3
4	**Soil Quality Management Plan**		
a.	Soil quality monitoring(@ Rs. 8000 x 2 samples x once before site preparation; once after decommissioning/restoration)	0.32	8.32
b.	Procurement of spill kits at drill sites (Rs 20,000 per kit X 3 spill kits per site)	0.6	15.6
5	**Road Safety & Traffic Management**		
a.	Signage in the transport route & its maintenance (@Rs. 100,000 + Rs. 10,000)	1.1	28.6
b.	Deployment of traffic personnel in sensitive area – 5 persons (@ Rs. 6000 per month x 6 months)	1.8	46.8
6	**Surface Runoff & Soil Erosion Control**		
a.	Two chamber sedimentation tank at each drill site (Budgetary provision is already included in the infrastructure development cost)	0.00	0.00
7	**Municipal Solid Waste**		0
a.	Provision of two chambered covered collection bins at well site – 2 nos	0.2	5.2

Sl. No.	Particulars of Work	Budget for 1 well (in lakh Rs.)	Cumulative Budget for 26 wells
b.	Transport arrangement of waste from well sites to dumping area	0.25	6.5
8	**Hazardous waste management**		
a.	Construction of dedicated hazardous storage area and record maintenance (construction included under project cost; only maintenance included in this budget)	0.1	2.6
b.	Drill Cutting, waste mud and wash water pits; HDPE lined (budgetary provision in operation cost of drilling)	0.00	0.00
c.	Analysis of drill cutting and waste drilling mud (Drill cutting @Rs. 5000 per sample x 1 sample per month x 3 months drilling time; Waste drilling mud @Rs. 5000 per sample x 1 sample per month x 3 months drilling time)	0.3	7.8
9	**Surface and Ground Water Protection and Management**		
a.	Surface runoff control measures for chemical storage area, fuel storage area (budgetary provision is already taken care in earlier section)	0.00	0.00
b.	Paved /impervious storage area for chemical storage area, fuel & lubricant storage area (Budgetary provision is already included in the infrastructure development cost)	0.00	0.00
c.	Domestic waste water treatment facility through septic tank & soak pits at the drill sites (budgetary provision in operation cost of drilling)	0.00	0.00
10	**Occupational Health & Safety Management**		
a.	Provision of appropriate PPE to all workers and its maintenance (budgetary provision is included in operational cost of drilling)	0.00	0.00
b.	Provision of drinking water, sanitation facility for all workers (budgetary provision is included in operational cost of drilling)	0.00	0.00
c	Provision First aid facility (budgetary provision is included in operational cost of drilling)	0.00	0.00
d	Provision of Ambulance facility OIL has its own ambulance facility)	0.00	0.00
e	Regular health checkup facility provided by OIL for workers)	0.00	0.00
f	Regular occupational health & safety training (@ 1 lakh per year for 7 years)	0.27**	7
g.	Safety related training for OIL drivers (@ 1 lakh per year for 7 years)	0.27**	7
	Total Cost of Implementation of EMP	**14.645**	**380.73**

*** Budget is for overall drilling programme for 26 wells in the Block. Budget for 1 well has been calculated from the cumulative budget for 26 wells*

Table 10.6 Tentative Budget for EMP Implementation for Production Installations

Sl. No.	Particulars of Work	Budget (in lakh Rs.) per installation per year	Budget (in lakh Rs.) for 3 production installation for 7 years
1	**Air Quality Management Plan**		
a.	Dust suppression through water sprinkling in the internal unpaved roads (Budget at the drilling budget)	0.00	0.00
b.	Maintenance of paved internal road and transport route (budgetary provision is included in operational cost of production installations)	0.00	0.00
c.	Ambient Air Quality Monitoring -3 monitoring locations x twice per week x 2 weeks per location x 2 times per year (@ Rs.7500 x 24 samples)	1.8	37.8
d.	Stack emission monitoring (@ 5000 per sample x 2 GG sets x twice a year) @5000 X 4 samples	0.2	4.2
2	**Noise Management Plan**		
a.	Ambient Noise Monitoring – 3 locations, 2 times a year (@Rs. 2500 X 6 samples)	0.15	3.15
b.	Workplace noise monitoring -5 locations per facility, twice a year (@Rs.2500 per location x 5 locations x 2 times)	0.25	5.25
c.	All GG sets would be provided with acoustic enclosures (budget included in production budget)	0.00	0.00
3	**Water Quality Management Plan**		
a.	Surface Water Quality Monitoring (@ Rs. 8000 x 3 samples from natural drainages twice a year)	0.48	10.08
b.	Ground Water Quality Monitoring (@ Rs. 8000 x 3 samples from local villages twice a year)	0.48	10.08
c.	Treated water quality (@ Rs. 8000 x 2 samples of ETP treated water ; @ Rs. 5000 one sample from oily water separator; twice a year)	0.42	8.82
4	**Soil Quality Management**		
a.	Soil Quality Monitoring (@Rs. 8000 x 3 samples x twice a year)	0.48	10.08
b.	Procurement of spill kits (@Rs. 20000 per kit x 3 spill kit per year)	0.6	12.6
6	**Surface Runoff & Soil Erosion Control**		0
a.	Two chamber sedimentation tank at each facility (Budgetary provision is already included in the infrastructure development cost)	0.00	0.00
7	**Municipal Solid Waste**		
a.	Provision of two chambered covered collection bins at each site – 2 nos.	0.2	4.2
b.	Transport arrangement of waste from production installation to dumping area	1.0	21
8	**Hazardous waste management**		
a.	Construction of dedicated hazardous storage area and record maintenance (construction included under project cost; only maintenance included in this budget)	0.1	2.1

Sl. No.	Particulars of Work	Budget (in lakh Rs.) per installation per year	Budget (in lakh Rs.) for 3 production installation for 7 years
9	**Surface and Ground Water Protection and Management**		
a.	Surface runoff control measures for chemical storage area, fuel storage area (budgetary provision is already taken care in earlier section)	0.00	0.00
b.	Paved /impervious storage area for chemical storage area, fuel & lubricant storage area (Budgetary provision is already included in the infrastructure development cost)	0.00	0.00
c.	Domestic waste water treatment facility through septic tank & soak pits at the production sites (budgetary provision in operation cost of operations)	0.00	0.00
10	**Occupational Health & Safety Management**		
a.	Provision of appropriate PPE to all workers and its maintenance (budgetary provision is included in operational cost of operation)	0.00	0.00
b.	Provision of drinking water, sanitation facility for all workers (budgetary provision is included in operational cost of operation)	0.00	0.00
c	Provision First aid facility (budgetary provision is included in operational cost of operation)	0.00	0.00
d	Provision of Ambulance facility OIL has its own ambulance facility)	0.00	0.00
e	Regular health checkup facility provided by OIL for workers)	0.00	0.00
f	Regular occupational health & safety training (@ 1 lakhs per year for 7 years)	0.27**	7
	Total cost of implementation of EMP	**6.43**	**136.36**

*** Budget is for overall programme for 7 years for 3 production installations. Budget for 1 production installation has been calculated from the cumulative budget.*

Additionally, OIL will allocate budget for CSR activities as per Govt. norms.

11. SUMMARY AND CONCLUSION

11.1 Project Description

Oil India Ltd. (OIL) is currently planning for drilling of 26 onshore exploratory & developmental wells, 3 nos. of production installations and laying of interconnecting pipeline at Dumduma-Pengeri Area of Tinsukia District of Assam.

Land Procurement

The land required for the well sites and production facilities will be procured from agricultural lands, homestead plantation areas and tea garden areas. Generally, OIL will procure the required land through private negotiation. In few cases, OIL may request district authority to acquired land under LARR act 2013, if private negotiation is not successful. Land will be procured in a way that physical displacement will not occur and the crop compensation will be included during procurement. Land from the tea garden would be taken on long-term lease from the tea garden authority.

Project Activities

Construction of Access road

Majority of the proposed wells are located adjacent to the existing road; the distance of the proposed well pad will be of 100- 200 m (maximum) from existing road. Construction of site access road will not involve displacement of any household. As far as possible, existing roads will be used. Cutting of trees will be avoided. If necessary, existing road will be developed by widening, etc. Culverts and drainage channel will be maintained during site preparation.

Site Preparation & Construction Drill site

Site preparation will involve levelling, filling and consolidation of the site for staging equipment and machinery. The proposed well sites and production facilities will be duly fenced to a height of about 2 m.

Preparation and construction of drill sites and production facilities will involve top soil scraping and storage for future use, elevating the drill platform by excavated material from the site and material brought from authorized quarry area. Reinforced Cement Concrete (RCC) will be used for the construction of foundation system at drill sites. For making foundations of the main rig structure, cast in-situ bored under- reamed piles of specified lengths will also be used.

Drilling & Testing

The exploration wells will be drilled 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 3900 metres as planned for the project.

Drill cuttings generated will be collected and separated using a solid control system and temporarily stored on-site in HDPE lined pits. Drilling and wash wastewater generated will also be stored at an onsite HDPE lined pit. 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 and will be reused.

Well Site decommissioning

On completion of activities, the wells will be either plugged and connected with flow lines or suspended. In the event of a decision to suspend the well, it will be filled with a brine solution containing very small quantities of inhibitors to protect the well and well will be sealed with cement plugs.

Project Utilities and Resource Requirements

Power: It is anticipated that two DG sets with a power rating of 1000 KW/1250 KVA each will be required for drilling purposes of and another one will be kept standby. Lighting and other power requirements at drill sites will be met through 200 KW/250 KVA DG sets. Power requirement for the production facilities will be met through GG Sets (216 KW).

Fuel: It is estimated that 3.5 KLD of diesel will be required during drilling phase and about 1 KLD diesel will be required during site preparation phase. Oil will store a contingency of 3 days in a tank at the drill site. Natural Gas consumption would be 1500 SCUM per day for GG sets.

Water: Approximately, 5 m^3 per day water will be required for construction and 3 m^3 per day for workers during construction phase. During the drilling operations, Average drilling water consumption per day is 50 m^3 per day of which freshwater requirement would be 39 m^3 per day and recycled water would be 11 m^3 per day. A provision for storage of about 250 m^3 per day of water will be made at the drilling site. Potable water requirement at site will be met through packaged drinking water. Approximately 20 m^3 per day water is required for the operation of production installations.

Manpower: The estimated employment would be approximately 80 un-skilled temporary workers during the peak construction phase that will be primarily sourced from nearby villages. Additionally, 20 permanent OIL employees will supervise the construction phase. The drilling rig will be operated by approximately 40-50 persons on the rig at any particular time. Approximately 10 persons per shift will be hired during operation phase of production facility.

Pollution Sources

- *Air emissions*: Point source air emissions will be generated from DG sets. Fugitive emissions will occur from vehicles involved in the drilling operations and from windblown dust from storage and staging areas within the drill sites and production facilities.
- *Noise & Vibrations*: Noise and vibration will be generated due to operation of drilling rig, DG/GG sets and vehicles.
- *Liquid wastes*: During the drilling phase, wastewater will be generated as a result of rig wash and dewatering of spent mud and washing of drill cuttings. During construction and operation of GCS, waste water will be generated. The wastewater will be treated in an ETP at site. The treated water would be reused. Domestic wastewater will be generated from the drill sites would be treated in septic tanks and soak pits. In production facilities, produced formation water will be disposed to the shallow wells after necessary treatment; surface Runoff after treatment through OWS and sedimentation tank will be recycled.
- *Drill cuttings & spent mud*: Approximately 350-400 m^3 of drill cuttings and 900-1200 $m^3$of spent mud will be generated per site. Drill cuttings and spent mud will be disposed off in a well-designed pit lined with impervious liner located on site.

Project Cost

Based on OILs previous experience of drilling in the area, cost for drilling of 26 wells (including drilling rates, consumables and well accessories etc.) and three production facilities is approximately INR 1109.40 crores.

EMP Budget includes budget for Public Hearing Action Plan, Wildlife Conservation Plan, Greenbelt Budget and Budget for Environmental Conservation Measures. Budget for Public Hearing Action Plan for socioeconomic development is planned to be INR 177.5 lakhs for 7 years. Budget for Greenbelt Plan will be INR 5.25 lakhs. Budget for Wildlife Conservation Plan for Schedule-I species for 7 year will be INR 58 lakhs. Environmental Control measures for each well would be 14.645 lakhs and for each production installation per year would be INR 6.43 lakhs. Capital cost of EMP would be INR 104 lakhs and recurring cost for EMP would be approximately INR 93.41 lakhs per annum.

11.2 Baseline Environmental Status

Land use and land cover: Settlement with homestead plantation covers 29.22% of the total area of Dumduma-Pengeri followed by reserve forest (28.93%), agricultural land (19.51%) and tea gardens (15.57%). Unclassified forest areas cover 2.68% of the total area. River, streams and waterbodies approximately 2% of the total area.

Soil Quality: Soil samples were collected from five locations spread across different types of land cover such as agricultural field, homestead plantation, tea garden and forest land. The soil samples were found to be clay loam, sandy clay loam and clayish in nature with acidic pH. The macronutrient contents *viz*. phosphorous and potassium values of the soil samples were found to be low. Metal contamination has not been observed in soil samples.

Climate and Meteorology: The study area experiences a sub-tropical to temperate climate. The maximum and minimum temperature reported during the study period was 30.3°C and 10.1°C. The average relative humidity was 70.2% during the study period. Relative humidity ranged between 30.9% and 97.8% during the study period. Rainfall occurred on few days of the study period. Hourly micro-meteorological data collected during the post monsoon season reveal that the pre-dominant wind direction is from the north-east with an average speed of 1.3 m/s.

Air Quality: Average values of all the monitored parameters like particulate matter, SO_2, NOx, CO were observed to be within the levels specified in the NAAQS.

Noise Quality: The ambient noise was monitored at 8 locations within the Block. The equivalent noise level as measured at the residential areas range between 40.1-53.2 dB(A) at day time and between 37.5-46.9 dB(A) at night time. The equivalent day time noise values in all the locations were in compliance to the day time standard of 55 dB(A) for residential areas.

Groundwater Quality: The concentration of all the parameters analysed were within the acceptable limit of IS: 10500, 2012 standard. Absence of coliform indicates that, the water is safe to consume for drinking purpose.

Surface Water Quality: Surface water samples were analyzed from Dibru River, Burhi Dihing River, Dibru River Near Sandang T.E.and Nala Within Upper Dihing R.F. The analyzed values reveal that all the samples were in compliance to the CPCB Class B i.e. *Propagation of Wild life and Fisheries*.

Biological Environment: A significant part of the study area falls within the Upper Dihing Reserved forest. Also part of Dehing Patkai National Park is located within the Block. Three Elephant Corridors between Upper Dihing R. F. East and West Blocks at Bogapani and Golai-Powai and Kotha-Buridihing are located within the Dumduma Pengeri Area. Apart from the protected areas tea garden plantation covers huge tracts of land within the study Area as well as in the surrounding region. 253 numbers of plant species was reported from the area. Secondary information and primary surveys revealed presence of thirty six of Schedule I animals which includes 6 species of reptiles, 19 species of birds and 11 species of mammals.

Socioeconomic Environment: Twenty one villages lie within 1 km of proposed well locations and production facilities. Major population in the study area villages either are cultivators or tea garden workers. Water requirement is catered through household bore well/tube well facility in the village areas whereas tap water supply present in 13 of the study area villages. Almost every village has a primary school; however, percentage of students pursuing higher education is comparatively less. Four primary health centres and 10 Community Health centers are present in the influenced area villages.

11.3 Anticipated Environmental Impacts and Mitigation Measures

The potential impacts arising due to the construction and operation of the drilling activities are given below:

Air Quality**:** The operation of DG/GG sets, movement of vehicles and machineries during construction and drilling at drill sites and production operations will result in the generation of air pollutants *viz*. PM, NOx and SOx that may affect the ambient air quality temporarily.

Noise Quality**:** Operation of heavy machinery/equipment and vehicular movement during site preparatory and road strengthening/construction activities may result in the generation of increased noise levels. Operational phase noise impacts are anticipated from the running of drilling rig and ancillary equipment *viz*. shale shakers, mud pumps and diesel generators, gas generators etc.

Soil Quality**:** Stripping of top soil will affect the soil fertility of the well sites temporarily. Potential adverse impacts on soil quality may also result from improper storage and handling of fuel, lubricants, drilling mud and drill cuttings.

Water Quality and Hydrogeology**:** All wastewater discharged from the drilling and production operations will be treated in the ETP and reused in drilling operations. All the treated water from ETP will be recycled. As no water will be discharged is small, it will not increase the pollution load of different surface waterbodies. Uncontrolled surface runoff from the drill sites and production facilities may compose of waste fluids or storm water mixed with oil and grease and may pollute the surface water quality. However, the surface runoff will be treated with sedimentation tank and oil water separator at site and will be reused.

Biological Environment**:** The existing vegetation at the proposed drill sites, production installations, approach roads and RoU of the pipeline will be felled for site development. Noise generated from drilling operations and vehicular movement within the drill sites, production facilities and approach roads may affect the reptiles, birds and mammals adversely and may result in their moving away from the project area for a temporary period. Surface runoff from the drill sites and production facilities contaminated with sediment, may reach surface water channels and increase the suspended solids load of the channel water. Increase of suspended solid will increase the turbidity of river water that ultimately will adversely affect the DO level in the water. The turbid water and lower DO may affect the primary productivity of the impacted areas of the streams and rivers. The process effluent will be adequately treated in the ETP to meet the industrial effluent discharge standards and will be reused.

***Socio-Economic Environment*:** OIL/its contractors would endeavour to provide maximum employment to the local people, however, certain percentage of semi-skilled and highly skilled migrant labour would be used by contractors for manning technical activities. It is anticipated that occasional conflicts would arise with the local community over the recruitment of migrant workers. Discomfort due to dust and noise to adjoining communities, influx of people are likely to occur.

***Impact on Community Health & Safety*:** Community health and safety of inhabitants residing close to the proposed well sites and production facilities will be affected from frequent heavy vehicular movements along village access roads and due to noise from drilling rig operations, movement of heavy vehicles during construction etc.

11.4 Environment Monitoring Program

Environmental monitoring Program for each well will include the following

- Ambient Air Quality Monitoring – at 3 monitoring location; once during construction, twice during drilling and once during site decommissioning phase
- Stack emission monitoring at 3DG sets during drilling
- Ambient Noise Monitoring – 3 locations, once during construction, twice during drilling and once during site decommissioning phase
- Workplace noise monitoring -5 locations, twice during drilling
- Surface Water Quality Monitoring- 2 locations, once during construction, once during drilling and once during site decommissioning phase
- Treated water -2 from ETP and 1 from oil/water separator- once each during drilling phase
- Ground Water Quality Monitoring, three location, once during drilling phase
- Soil Quality Monitoring - three locations, once each during pre-construction, drilling and post drilling phase

At the production facilities ambient air, stack emission monitoring from GG sets, ambient and workplace noise monitoring, surface and groundwater quality monitoring, treated wastewater monitoring and soil quality monitoring would be conducted twice a year.

11.5 Additional Studies

11.5.1 Risk Assessment and Mitigation

Risk Assessment (RA) aims to provide a systematic analysis of the major risks that may arise as a result of drilling and production activities in Dumduma-Pengeri Area. The RA process outlines rational evaluations of the identified risks based on their significance and provides the outline for appropriate preventive and risk mitigation measures.

Three major categories of hazards that can be associated with proposed Project, which includes:

- Blowouts leading to uncontrolled well flow, jet fires, pool fires;
- Hydrocarbon leaks due to loss of containment while drilling;
- Non-process fires / explosions, the release of a dangerous substance or any other event resulting from a work activity which could result in death or serious injury to people within the site; and
- Any event which may result in major damage to the structure of the rig.

Risk Reduction Measures

Blow Out Risk reducing measures include:

- Kick simulation training for personnel;
- Presence of well-trained engineers;
- Appropriate well design;
- Good well control procedures;
- Appropriate mud weight formulations;
- Installation of primary and secondary blow out preventers; and
- Trained and skilled operation staff.

Accidents related to leaks from equipment can be minimised by:

- Ensuring that equipment is designed, installed and maintained as per international standards;
- Implementing a robust preventive maintenance system of all safety critical equipment; and
- Efficient test separator;

Risk from storage areas can be minimized by;

- Proper preventive maintenance and robust safety management and security systems.
- For the storage tank, secondary containment to be provided.

Other risk management can be achieved by;

- A hydrocarbon gas detection system with suitable alarm system will be provided at the drilling sites and production facilities.
- Management of Oil Spills/Leaks and Soil contamination

11.5.2 Public Hearing

Public Hearing (PH) for the project was conducted by Pollution Control Board of Assam (PCBA) at Tinsukia district of Assam on 13.03.20. The local stakeholders were informed about the public hearings through advertisements in Assamese and English newspapers. People from nearby villages and representative from Civil Society attended the PH meetings at Dibrugarh district. Major concerns and issues discussed in the PH was related to;

- Protection of ecology and environment
- Development activities - improvement of infrastructure in schools, health initiatives, social initiatives
- Funds for construction of toilets

OIL will earmark INR 177.5 lakhs for Social Development in Tinsukia district for Dumduma Pengri Area in line with the comments and suggestions made by the local public during Public Hearing.

11.6 Project Benefits

- Provision of more royalty to Assam Government and more cess to Govt. of India;
- Provision of more employment opportunity to local people;

- Development of infrastructure (roads, culverts, bridges, schools etc.) in the area;
- Increase in business opportunity for the local people;
- Energy security for the country;
- Programs related to livelihood generation, health improvement programmes.

11.7 Environmental Management Plan

Air Quality Management Plan

- Vehicles delivering raw materials like fine aggregates will be covered to prevent fugitive emissions.
- Sprinkling of water on earthworks, material haulage and transportation routes on a regular basis during construction and decommissioning phase of the wells.
- Flare stacks of adequate height would be provided.
- DG/GG set stacks would have adequate height, as per statutory requirements, to be able to adequately disperse exhaust gases
- Periodic monitoring of DG/GG set stack emission will be carried out in accordance with the Environmental Monitoring Plan to assess compliance with CPCB DG set exhaust standards.

Noise Management Plan

- Selection and use of low noise generating equipment with in-built engineering controls viz. mufflers, silencers, etc.
- All DG/GG sets would be provided with acoustic enclosures.
- Appropriate PPEs (e.g. ear plugs) will be used for by workers while working near high noise generating equipment.
- All vehicles utilized in transportation of raw materials and personnel will have valid Pollution under Control Certificates (PUC).
- Use of noise barriers

Soil Quality Management Plan

- Drip trays to be used during vehicular/equipment maintenance and during re-fuelling operations.
- Spill kits will be made available at all fuel and lubricant storage areas. All spills/leaks contained, reported and cleaned up immediately.
- Dedicated paved storage area will be identified for the chemicals, fuel, lubricants and oils within the drill sites and production facilities.
- 1.5 mm HDPE lined pits will be considered for the disposal of unusable drilling mud cuttings.

Surface Water Quality Management Plan

- During site preparation and construction, surface water run-off will be channelized through appropriately designed drainage system.
- Sediment filters and oil-water separators will be installed to intercept run-off and remove sediment before it enters water courses.
- Domestic wastewater generated from drill sites and production facilities will be treated through septic tank and soak pit system.

- Process wastewater would be treated in Effluent Treatment Plant (ETP) at drill sites and production facilities.

Ground Water Quality Management Plan

- Water based mud would be used as a drilling fluid for the proposed project.
- Eco-friendly synthetic based mud if required for deeper sections, will be used after providing intimation to the Pollution Control Board;
- The drill cutting along with spent mud will be stored in HDPE lined pit.

Waste Management Plan

- Use of low toxicity chemicals for the preparation of drilling fluid.
- Management of drill cuttings, waste drilling mud, waste oil and domestic waste, wastewater in accordance with CPCB Standards.
- The hazardous waste (waste and used oil) will be managed in accordance with Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2016.
- The kitchen waste will be disposed in nearest municipal/village dumping site on a daily basis through approved waste handling contractors.
- The sewage generated will be treated through septic tank and soak pit system.
- Used batteries will be recycled through the vendors supplying lead acid batteries as required under the Batteries (Management & Handling) Rules, 2001.
- The drill cuttings pit will be bunded and kept covered using tarpaulin sheets during monsoon.

Greenbelt Plan

- The peripheral area of the production installations will be used for greenbelt plantation.
- Selection of plant species will be done on the basis of their adaptability to the existing geographical conditions and the vegetation composition of the topography of the region.
- In the present case an area of about 25% (1.75 ha.) of the total area of each production installation (7 ha. each) has been allocated for development of the green belt.
- Approximately 1600 saplings will be planted per hectare of land. Total number of saplings to be planted is 2800 nos. per production installation

Wildlife Conservation Plan

- Contributing funds to Forest Departments habitat improvement program
- Contributing funds to Forest Department for tracking the movement of elephant
- Capacity building of forest department staffs
- Awareness Generation Meetings at villages
- Engaging a NGO for Identification of Hoolock Gibbon Roosting sites and vulture nests

Road Safety & Traffic Management Plan

- The condition of roads and bridges identified for movement of vehicles and drilling rig will be assessed and if required strengthened by OIL to ensure their safe movement.
- Precautions will be taken by the contractor to avoid damage to the public access routes including highways during vehicular movement.

- Traffic flows will be scheduled wherever practicable during period of increased commuter movement.

Occupation Health & Safety Management Plan

- All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be kept in good working order, will be regularly inspected and properly maintained as per IS provisions and to the satisfaction of the site Engineer.
- Hazardous and risky areas, installations, materials, safety measures, emergency exits, etc. shall be appropriately marked.

Emergency Response Plan

- Drilling rig and related equipment to be used for drilling will be conformed to international standards specified for such equipment.
- Blow-out preventers and related well control equipment shall be installed, operated, maintained and tested generally in accordance with internationally recognized standards.
- Appropriate gas and leak detection system will be made available at each of the drill sites and production facility.
- Adequate fire-fighting equipment shall be provided at each site.

12. DISCLOSURE OF CONSULTANTS

Environmental Resources Management (ERM) is the world's leading provider of environmental, health, safety, risk, social consulting and sustainability related services. With a history that spans more than four decades, ERM today has a global footprint of 160 offices in 40 counties, employing more than 5000 best-in-class professionals. In the last three years, ERM has worked with more than 50% of the Global Fortune 500 Companies.

ERM India Private Limited (ERM India) was formally established in 1995 with its headquarters in Delhi and regional office in Mumbai (Maharashtra), Bangalore (Karnataka), Ahmadabad (Gujarat) and Kolkata (West Bengal). The contact address of ERM India is as follows:

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12.1 ERM's Accreditation as EIA Consultant

ERM has been accredited as EIA consultant for various sectors including Offshore and Onshore Oil and Gas Exploration Development and Production National Accreditation Board for Education and Training (NABET) of Quality Council of India (QCI) under the Accreditation Scheme for EIA Consultant Organisation as per the requirement of MoEF&CC.

12.2 EIA Team

Experts contributing to the EIA Study for Onshore Oil & Gas development drilling and production in Dumduma-Pengeri Area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML is presented in **Table 12.1**.

Table 12.1 Professionals Engaged for the EIA Study

S.N	Functional Area	Name of the Expert	Involvement
1	EIA Coordinator	Salil Das	Coordination with experts; compilation of EIA report. QA/QC of the EIA report
2	Air Pollution	Dr. Debanjan Bandyopadhyay	Selection of air quality monitoring stations, discussion with client on various air pollution control aspects, inputs for impact assessment from the proposed project and development of EMP.
3	Water Pollution	Dhritiman Ray	Selection of water monitoring stations, interpretation of analysis results, , inputs for impact assessment and development of EMP.
4.	Air Quality Modelling	Dr. Indrani Ghosh	Modelling. Model input data related to emissions and micrometeorology interpretation of modelling results and development of EMP
5.	Noise Quality	Dr. Indrani Ghosh	Undertaking Noise Quality Modelling; Selection of noise sampling locations for baseline monitoring, model input data, interpretation of modelling results and development of EMP.

S.N	Functional Area	Name of the Expert	Involvement
7.	Socio-economic environment	Tufail Khan	Support for socio economic baseline, stakeholder consultations and impact assessment.
8.	Ecology and Biodiversity	Dr. Abhishek Roy Goswami	Ecological survey and assessment of flora and fauna and related impact assessment and development of EMP.
9.	Land use	Dr. Karunakaran Nagalingam	Assessment of land use impacts
		Dibyendu Chakraborty	Preparation of all maps including LU/LC and impact assessment.
10.	Risk Assessment	Debanjan Bandyopadhyay	Conducting risk assessment including frequency analysis, consequence analysis; development of Disaster Management Plan

Name of the EIA consultant organization: ERM India Private Limited
NABET Certificate No. & Issue Date: NABET/EIA/1922/RA 0177 dated August 31, 2020 and valid upto October 30 2022 (**Figure 12.1**).

Figure 12.1 ERM's Accreditation from NABET



Quality Council of India

National Accreditation Board for Education & Training

CERTIFICATE OF ACCREDITATION

ERM India Private Limited, Gurugram

Building No. 10, Tower A, 4rth Floor, Gurugram, Haryana-122002

Accredited as Category - A organization under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations: Version 3 for preparing EIA-EMP reports in the following Sectors:

Sl. No.	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including opencast and underground	1	1 (a) (i)	A
2	Offshore and onshore oil and gas exploration, development & production	2	1 (b)	A
3	River Valley projects	3	1 (c)	A
4	Thermal power plants	4	1 (d)	A
5	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	B
6	Cements plants	9	3 (b)	A
7	Petro-chemical complexes	18	5 (c)	A
8	Synthetic organic chemicals industry	21	5 (f)	A
9	Oil & gas transportation pipeline, passing through national parks/ sanctuaries/coral reefs / ecologically sensitive areas including LNG terminal	27	6 (a)	A
10	Airports	29	7 (a)	A
11	Industrial estates/ parks/ complexes/areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes	31	7 (c)	A
12	Common hazardous waste treatment, storage and disposal facilities	32	7 (f)	B
13	Ports, harbours, break waters and dredging	33	7 (e)	B
14	Highways	34	7 (f)	A
15	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
16	Common Municipal Solid Waste Management Facility	37	7 (i)	B
17	Building and construction projects	38	8 (a)	B
18	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated June 19, 2020 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/20/1454 dated August 31, 2020. The accreditation needs to be renewed before the expiry date by ERM India Private Limited, Gurugram following due process of assessment.

Sd/-
Sr. Director, NABET
Dated: August 31, 2020

Certificate No.
NABET/EIA/1922/RA 0177

Valid till
October 30, 2022

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

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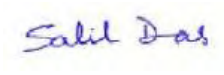
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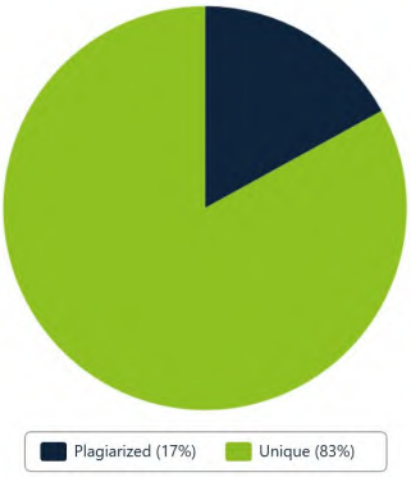
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Date and Sign of EIA Coordinator	
	21.06.2021
Name	Salil Das
Designation	Principal Consultant, ERM
Date and Sign of authorized person	
	Dr. Debanjan Bandyopadhyay, Partner 21.06.2021
Name of the EIA consultant organization	ERM India Private Limited
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Annexure -R2

GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE
(IA DIVISION-INDUSTRY-2 SECTOR)
***

Dated: 01.11.2021

MINUTES OF THE 42nd MEETING OF THE EXPERT APPRAISAL COMMITTEE

(INDUSTRY-2 SECTOR PROJECTS)

HELD ON 20th – 22nd October, 2021

Venue: Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110003 through Video Conferencing (VC)

(i) Opening Remarks by the Chairman: The Chairman made hearty welcome to the Committee members and appreciated the efforts of the Committee. After opening remarks, the Chairman opened the EAC meeting for further deliberations.

(ii) Confirmation of minutes: The EAC, having taken note that final minutes were issued after incorporating comments received from the EAC members on the minutes of its 41st Meeting of the EAC (Industry-2) held during 28th - 30th September, 2021 conducted through Video Conferencing (VC), confirmed the same.

After welcoming the Committee Members, discussion on each of the agenda items was taken up ad-seriatim.

Details of the proposals considered during the meeting **conducted through Video Conferencing (VC)**, deliberations made and the recommendations of the Committee are explained in the respective agenda items as under: -

20th October, 2021 (Wednesday)

Agenda No. 42.1

Proposed 200 KLPD Grain based Ethanol Plant at village Begrajpur Paragana Khatauli District Muzaffarnagar Uttar Pradesh by M/s CRYSTAL BALAJI INDUSTRIES PRIVATE LIMITED- Consideration of Environment Clearance.

[IA/UP/IND2/228826/2021, J-11011/365/2021-IA-II(I)]

The Project Proponent and the accredited Consultant M/s. Environmental and Technical Research Centre., made a detailed presentation on the salient features of the project and informed that:

The proposal is for environmental clearance for establishment of 200 KLPD grain-based ethanol plant with 5.0 MW co-generation of power at Begrajpur village, Khatauli Paragana, Muzaffarnagar district Uttar Pradesh by M/S Crystal Balaji Industries Private Limited.

All grain based distilleries producing ethanol, solely to be used for Ethanol Blended Petrol Programme of the Government of India are listed at S.N. 5(ga) of Schedule of Environmental Impact Assessment (EIA) Notification, 2006 amendment vide S.O 2339 dated 16th June 2021 under category 'B-2' and are appraised at Central Level by Expert Appraisal Committee (EAC).

The project proposal is exempted from obtaining ToR & conducting Public Hearing as per EIA notification, 2006 amendment vide S.O 2339 dated 16th June 2021. It was informed that no litigation is pending against the project.

The details of products and capacity are as under:

Sr. No.	Product Details	Quantity
1	Ethanol	200 KLD
2	Co-Gen Power	5 MW

Proposed land area is 5.949 hectares, which is already under the possession of M/s Crystal Balaji Industries Private Limited. Conversion of land documents has been obtained from Collectorate office, Muzaffarnagar vide letter dated 19.07.2021which has been accepted by EAC. Industry will develop greenbelt in an area of 33 % i.e., 1.97 hectares out of total area of the project.

The estimated project cost is Rs 19900 lakhs. Total capital cost earmarked towards environmental pollution control measures is Rs 1925 Lakh and the Recurring cost (operation and maintenance) will be about Rs 120 Lakh per annum. Total Employment will be 136 persons as direct & indirect. Industry proposes to allocate Rs. 290 lakhs towards Corporate Environmental Responsibility.

There is no National Parks, Reserved Forests (RF)/ Protected Forests (PF), within 10 Km radius. River/ water body Kali Nadi is flowing at a distance of 1.07 Km in the West direction.

Total water requirement for the Grain based Ethanol Plant will be 2437 KLPD out of which 1137 KLPD will be recycled in plant operations. Hence, the fresh water requirement for the project will be 1300 KLPD which will be met from ground water. Spent Wash (Slops) generation from

Distillation, will be sent through separation of suspended solids in Decanter Centrifuge, part Thin Slops are concentrated in multi-effect evaporators to form a Thick (Protein) Syrup, which is mixed with the Wet Cake DWG separated earlier from Decanters. This interim product called DWGS has 30-32% w/w Solids is subject to drying in a rotating steam tube bundle dryer to deliver a value-added by-product – DDGS – Distillers Dried Grains with soluble and which has min. 90% Solids and max 10% moisture. This DDGS sells as Cattle Feed / Poultry Feed / Fish Feed based on its Protein Content. Hence, entire spent wash is decanted, concentrated into syrup in a Multi-Effect Evaporation followed by Drying, in order to achieve Zero Effluent Discharge. Effluent of 1137 KLPD quantity will be treated through state of art CPU/Effluent Treatment Plant of 1300 KLPD capacity (Anaerobic, aerobic, Filters, & RO system). The plant will be based on Zero Liquid discharge system.

Power requirement for proposed project will be 4 MW (maximum) will be met from Co-generation power plant of 5 MW. Unit has proposed 1 no.s of boiler of capacity 50 TPH. Electro Static Precipitator (ESP) with a stack of height of 72 m will be installed for controlling the particulate emissions within the statutory limit of 50 mg/Nm^3 for the proposed boilers.

Details of process emissions generation and its management:

ESP with a stack height of 72 m will be installed for controlling the particulate emissions. Online Continuous Emission Monitoring System will be installed with the stack and data will be transmitted to CPCB/SPCB servers. CO_2 generated (120 TPD) during the fermentation process will be collected by utilizing CO_2 scrubbers and sold to authorized vendors.

Details of Solid waste/Hazardous waste generation and its management:

Waste	Quantity	Uses / Disposal
Total Ash	8 MT/Day	Due to high potash content, will be used as manure.
Yeast Sludge	18 MT/Day	Due to high potash content
Condensate polishing unit sludge	2 KLD	Due to high potash content
Cattle Feed DDGS	96 MT/Day	Will be sold as cattle feed.

As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed capacity of 200 KLPD will be for manufacturing of fuel ethanol only.

During the deliberations EAC desired the following information/commitments:

- Proposed parking area shall be increased to 15 %.
- Fuel used in the boiler shall be biomass based.
- Water balance shall be revised @4kL fresh water consumed/kL production of Ethanol.

- Industry shall conform to ZLD and no waste or treated water shall be discharged outside the premises.
- Solar power plant of 0.5 MW shall be installed within the plant and it shall be utilized in meeting power requirement of the plant.
- The proposed budget to be spent on CER shall be increased to Rs 3.00 crores and it shall be spent on installing solar power to the villages nearby. It was also suggested that the proposed activities under CER shall be completed before the commissioning of the plant.

PP has agreed to the above conditions. However, desired information/commitments sought by EAC have not been submitted.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with the EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee deliberated on the CER plan and found to be addressing the issues in the study area. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of environmental clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance, subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). As per OM dated 16th June, 2021, project falls in category B2 and the proposed additional capacity of 200 KLPD shall be only for fuel ethanol manufacturing as per self-certification in form of an affidavit by the Project Proponent. Provided that subsequently if it is found that the ethanol, produced based on the EC granted as per this dispensation, is not being used completely for EBP Programme, or if ethanol is not being produced, or if the said distillery is not fulfilling the requirements based on which the project has been appraised as category B2 project, the EC shall stand cancelled.

(ii). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(iii). The project proponent will treat and reuse the treated water within the factory and no waste or treated water shall be discharged outside the premises.

(iv). Total fresh water requirement shall not exceed 4kL fresh water consumed/kL production of Ethanol and it shall be met from ground water. Extraction of ground water shall not be done without obtaining prior permission of CGWA/concerned authority. No ground water recharge shall be permitted within the premises.

(v). Effluent will be treated through state of art CPU/Effluent Treatment Plant. The spent wash shall be concentrated and dried to form DDGS to be used as cattle feed.

(vi). CO_2 generated from the process shall be bottled/made solid ice and utilized/sold to authorized vendors.

(vii). Occupational Health Centre for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with required safety kits/mask for personal protection.

(viii). Training shall be imparted to all employees on safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.

(ix). The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.

(x). Process organic residue and spent carbon, if any, shall be sent to Cement other suitable industries for its incinerations. ETP sludge, process inorganic & evaporation salt shall be disposed of to the TSDF.

(xi). The company shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize waste; (b) Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapour recovery system. (f) Use of high pressure hoses for equipment clearing to reduce wastewater generation.

(xii). The green belt of 5-10 m width shall be developed in nearly 33% of the total project area, mainly along the plant periphery. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map. Development of greenbelt shall be completed along with commissioning of the project.

(xiii). PP proposed to allocate Rs. 3.00 Crores for CER and it shall be spent on installing solar power to the villages nearby. All the proposed activities under CER shall be completed before the commissioning of the plant.

(xiv). There shall be 15% space inside the plant premises earmarked for parking of vehicles for raw materials and finished products as per CPCB norms and no parking to be allowed outside on public places.

(xv). Storage of raw materials shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.

(xvi). Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.

(xvii). A separate Environmental Management Cell (having qualified person with Environmental Science/Environmental Engineering/specialization in the project area) equipped with full-fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.

Agenda No. 41.2

Establishment of new Sugar Syrup/ Molasses (C or B Heavy Molasses) / Grain Based Distillery Having Capacity – 350 KLD along with 15 MW Co Gen Power at village: Maizapur, PO: Haldharmau, Tehsil: Colonelganj, Distt – Gonda (UP) – 271126 (UP) of M/s Balrampur Chini Mills Ltd, Unit Maizapur.

[IA/UP/IND2/209541/2021, J-11011/178/2021-IA-II(I)]

The Project Proponent and the accredited consultant M/s. Environmental and Technical Research Centre made a detailed presentation on the salient features of the project and informed that:

The proposal is for environmental clearance to the project establishment of new Sugar Syrup/ Molasses (C or B Heavy Molasses) / Grain Based Distillery Having Capacity – 350 KLD along with 15 MW Co Gen Power at village: Maizapur, PO: Haldharmau, Tehsil: Colonelganj, Distt – Gonda (UP) – 271126 (UP) of M/s Balrampur Chini Mills Ltd, Unit Maizapur.

All Molasses based distilleries>100 KLPD & Non-Molasses based distilleries >200 KLD are listed at S.N. 5(g) of Schedule of Environment Impact Assessment (EIA) Notification dated 14.9.2006 and as amended on 13.6.2019 under category 'A' and are appraised at Central Level by Expert Appraisal Committee (EAC). It was informed that no litigation is pending against the proposal.

Standard ToR has been issued by Ministry of Environment, Forests & Climate Change vide letter IA-J-11011/178/2021-IA-II(I) dated 30th April 2021. Public Hearing for the proposed project has been conducted by the State Pollution Control Board on 12.08.2021 at the project site presided by Additional District Magistrate, Gonda district. The main issues raised during the public hearing are related to about air Pollution, water pollution, noise pollution and their mitigation measures in the proposed project.

The details of products and capacity are as under:

Sr. No	Product Details	Existing Quantity	Proposed Quantity	Total Quantity
1	RS /Ethanol / ENA	-	350 KLD	350 KLD
2	Co-Gen Power	-	15 MW	15 MW

Proposed land area is 26.559 hectare, which is already under the ownership of M/s Balrampur Chini Mills limited (Unit: Maizapur). Industry will develop greenbelt in an area of 33 % i.e., 8.83 hectare out of total area of the project. Proposed land is already industrial in land use and proposed establishment is proposed adjacent to existing sugar premises.

The estimated project cost is Rs 45584.94 Lakhs. Total capital cost earmarked towards environmental pollution control measures is Rs 6000 Lakh and the Recurring cost (operation and maintenance) will be about Rs 350 Lakh per annum. Total Employment will be 300 persons as direct & indirect after expansion. Industry proposes to allocate Rs 350 Lakhs towards Corporate Environmental Responsibility.

There are no National Parks, Reserved Forests (RF)/ Protected Forests (PF), within 10 Km radius. River/ water body Terhi River is flowing at a distance of 4.45 Km in the East direction. Sarju River is flowing at distance of 13.35 km in south west.

Ambient air quality monitoring was carried out at 8 locations during winter season 01st December, 2020 to 28th February, 2021 and the baseline data indicates the ranges of concentrations as: PM_{10} (58.2 to 85.5 µg/m^3), $PM_{2.5}$ (35.7 to 48.9 µg/m^3), SO_2 (9.5 to 14.5 µg/m^3) and NO_2 (11.6 to 22.9 µg/m^3). AAQ modelling study for point source emissions indicates that the maximum incremental GLCs after the proposed project would be 0.91 µg/m^3, 0.58 µg/m^3, 1.62 µg/m^3 and 1.07 µg/m^3 with respect to PM_{10}, $PM_{2.5}$, SO_2 and NO_2. The resultant concentrations are within the National Ambient Air Quality Standards (NAAQS).

Source of fresh water requirement will be met through Ground water. Fresh Water requirement for Sugar Syrup based operation 1400 KLD (@ 4.0 KL / KL of Product), for Molasses (B heavy Molasses or C Heavy Molasses) based operation 2000 KLD (@ 5.7 KL / KL of product) and for Grain based operation 1920 KLD (@ 5.5 KL/KL of Product). Maximum fresh water requirement will be 2000 KLD (@ 5.7 KL / KL of product). Spent wash generation from the distillation which is a variable in different mode operations. Spent wash generation in Mode-I, 350 KLD (100 % Sugar Syrup based distillery) operation will be 2030 KLD, in Mode-II, 350 KLD (100 Molasses based distillery) operation will be 2436 KLD and in Mode-III, 350 KLD grain based (100% Grain based Operation) operation it will be 2248 KLD. Spent wash generated will be concentrated in MEE then concentrate from MEE will be used as fuel in Slop fired Boiler of Capacity 75 TPH & 50 TPH during Mode I & Mode II. During mode III, Spent Wash (Slops) generation from Distillation, will be sent through separation of suspended solids in Decanter Centrifuge, part Thin Slops are concentrated in Multi-effect evaporators to form a Thick (Protein) Syrup, which is mixed with the Wet Cake DWG separated earlier from Decanters. This interim product called DWGS has 30-32% w/w Solids is subject to drying in a rotating steam tube bundle dryer to deliver a value-added by-product – DDGS – Distillers Dried Grains with soluble and which has min. 90% Solids and max 10% moisture. This DDGS sells as Cattle Feed / Poultry Feed / Fish Feed based on its Protein Content. Hence, entire spent wash is decanted, concentrated into syrup in a Multi-Effect Evaporation followed by Drying, in order to achieve Zero Effluent Discharge. Other effluent generated from cooling tower blow down, boiler blow down, vacuum pump, process condensate will be treated in CPU and recycled in the process after treatment. The plant will be based on Zero Liquid discharge system.

Power requirement for proposed project will be 9135 KW (maximum) will be met from Co-generation power plant of 15 MW. The total power requirement for the proposed project will be 7400 KW (Mode-I), 9135 KW (Mode-II) and 8900 KW (Mode-III), which will be sourced from Co

generation power plant; 15 MW. D.G Set (1 x 1500 KVA) State power Distribution Corporation Limited (SPDCL). Adequate Stack (7.7 meters above roof top) will be provided as per CPCB norms to the proposed DG sets. Unit proposed 2 nos of Slop fired boiler of capacity 75 TPH & 50 TPH. Electro Static Precipitator (ESP) with a stack of height of 85 m will be installed for controlling the particulate emissions within the statutory limit of 50 mg/Nm^3 for the proposed boilers.

Details of process emissions generation and its management:

CO2 (273 TPD) generated during the fermentation process will be recovered by CO2 Scrubbers and sold to authorized vendors.

Details of Solid waste/Hazardous waste generation and its management:

Waste	Mode -1	Mode – 2	Mode – 3	Uses / Disposal
Total Ash	40.62 MT/Day	146 MT/Day	10.68 MT/Day	Due to high potash content, will be used as manure. Fly ash generated during mode – III will be provided to brick manufacturer.
Yeast Sludge	22 MT/Day	28 MT/Day	30 MT/Day	Will be mixed with press mud of Sugar mill and sold to the farmer.
Condensate polishing unit sludge	2.0 KLD	2.2 KLD	1.8 KLD	Will be mixed with press mud of Sugar mill and sold to the farmer.
Cattle Feed DDGS	Nil	Nil	175.0 MT/Day	Will be sold as cattle feed.

During deliberations EAC suggested that:

- The integrated project sugar factory and proposed distillery shall conform to Zero Liquid Discharge.

- Industry shall construct rain water storage facility of capacity from which it can meet at least 60 days fresh water requirement.
- Proposed CER funds shall be increased to Rs. 4.55 Crores and it shall be spent on installing solar power and providing drinking water facilities to the nearby villages. The proposed activities under CER shall be completed before the commencement of operations of the plant.
- Ash generated shall be transported outside the plant only after proper packing.

Further, EAC directed that proposed parking area of 10 % shall be increased to 15 %. PP has agreed for the same and submitted an undertaking in compliance of the above.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with the EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee noted that the EMP report is in compliance of the PFR. The Committee deliberated on the CER plan and found to be addressing the issues in the study area. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of environmental clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance, subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(ii). The project proponent will treat and reuse the treated water within the integrated industry and no waste or treated water shall be discharged outside the premises. The integrated project sugar factory and proposed distillery shall conform to Zero Liquid Discharge.

(iii). Total freshwater requirement will be 2000 KLPD which will be sourced from groundwater. Prior permission shall be obtained from the concerned regulatory authority/CGWA in this regard, and renewed from time to time. No ground water recharge shall be permitted within the premises. Industry shall construct rain water storage facility of capacity from which it can meet at least 60 days fresh water requirement.

(xviii). Effluent will be treated through state of art CPU/Effluent Treatment Plant. The spent wash shall be concentrated and dried to form DDGS to be used as cattle feed.

(iv). CO_2 generated from the process shall be bottled/made solid ice and utilized/sold to authorized vendors.

(v). Occupational Health Centre for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with required safety kits/mask for personal protection.

(vi). Training shall be imparted to all employees on safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.

(vii). The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.

(viii). Process organic residue and spent carbon, if any, shall be sent to Cement other suitable industries for its incinerations. ETP sludge, process inorganic & evaporation salt shall be disposed of to the TSDF.

(ix). The company shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize waste; (b) Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch

reactors. (e) Venting equipment through vapour recovery system. (f) Use of high pressure hoses for equipment clearing to reduce wastewater generation.

(x). The green belt of at least 5-10 m width shall be developed in nearly 33% of the total project area, mainly along the plant periphery. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map.

(xi). PP proposed to allocate Rs. 4.55 Crores for CER and it shall be spent on installing solar power and providing drinking water facilities within nearby villages. All the proposed activities under CER shall be completed before the commencement of operations of the plant.

(xii). There shall be adequate space inside the plant premises earmarked for parking of vehicles for raw materials and finished products as per CPCB norms and no parking to be allowed outside on public places.

(xiii). Storage of raw materials shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.

(xiv). Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.

(xv). A separate Environmental Management Cell (having qualified person with Environmental Science/Environmental Engineering/specialization in the project area) equipped with full-fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.

Agenda No. 42.3

Proposed 360 KL/Day Grain Based Distillery Project along with 9 MW CoGen Power Plant and ZLD Unit at Village Panimura Jungle, Tehsil Tarbha, District- Subranpur, Odisha by M/s. Mash Bio-Fuels Pvt. Ltd - Consideration of Environment Clearance.

[IA/OR/IND2/229184/2021, J-11011/368/2021-IA-II(I)]

The PP/consultant were absent for the appraisal of proposal. It has been informed that PP desires to withdraw the proposal. Therefore, EAC has decided to return the proposal in present form.

Accordingly, proposal was *returned* in present form.

Agenda No. 42.4

Establishment of 230 KLPD Grain based Distillery along with Electricity generation 5 MW at plot no. B3/1, Mul Growth Center, Tal.: Mul, Dist.:Chandrapur, by M/s Carnival Industries Pvt Ltd - Consideration of Environment Clearance.

[IA/MH/IND2/229515/2021, J-11011/380/2021-IA-II(I)]

The Project Proponent and the accredited Consultant M/s. Equinox Environments (I) Pvt. Ltd., made a detailed presentation on the salient features of the project and informed that:

The proposal is for environmental clearance for establishment of 230 KLPD Grain based Distillery along with Electricity generation 5 MW at plot no. B3/1, Mul Growth Center, Mul taluk, Chandrapur district, by M/s Carnival Industries Pvt Ltd.

All grain based distilleries producing ethanol, solely to be used for Ethanol Blended Petrol Programme of the Government of India are listed at S.N. 5(ga) of Schedule of Environmental Impact Assessment (EIA) Notification, 2006 amendment vide S.O 2339 dated 16th June 2021 under category 'B-2' and are appraised at Central Level by Expert Appraisal Committee (EAC).

The project proposal is exempted from obtaining ToR & conducting Public Hearing as per EIA notification, 2006 amendment vide S.O 2339 dated 16th June 2021. It was informed that no litigation is pending against the project.

The details of products and capacity are as under:

Industrial Unit	Description	Quantity
Distillery (Proposed 230 KLPD)	**Product**	
	Ethanol	230 KL/D
	By-product	
	DDGS (10% Moisture)	150 MT/D
	CO_2	190 MT/D

Total plot land area is 1,89,650 m^2. Proposed Distillery Built- up is 39,718.65 m^2. Land has been allotted by Maharashtra Industrial Development Corporation vide letter No. MIDC/RO(NGP)/MUL/LMS-70/1633/2021 dated 29th June, 2021. Industry will develop greenbelt in an area of 34% i.e, 63,365.17 m^2 out of total plot area.

The estimated project cost is Rs. 207.91 Crores. Total capital cost earmarked towards environmental pollution control measures under

proposed project will be Rs.16.20 Crores and the Recurring cost (operation and maintenance) will be about Rs.1.90 Crores per annum. Total Employment will be 425 persons as direct & indirect after proposed project. Industry proposes to allocate Rs.315 Lakh @ of 1.5% towards Corporate Environment Responsibility.

The ESZ of Tadoba Andhari Tiger Reserve WLS is at 5.4 Km from the Project Site and boundary of sanctuary is at 17.31 Km from project site and do not come in the ESZ of Todabha Andhari Tiger reserve. Mul River is flowing at a distance 3 Km from North to South.

Total water requirement is 2,519 CMD. Out of which 854 CMD will be fresh water taken from MIDC Water Supply Scheme (Wainganga River). For proposed Distillery; Wet Cake from decantation operation and Thin Slop from MEE will be mixed together and this mixture known as DDGS will used as Cattle Feed. Other effluents generated from the grain distillery plant comprise of FOC lees, PRC lees, Thick Slope, RC less and condensate which are treated in CPU& the treated effluent is reused for watering of Green Belt. Lees generated from grain base distillery operations along with other effluent @ 1,380 M^3/Day will be treated in proposed CPU having capacity 1500 M^3/Day. Treated effluent from CPU will be reused for industrial operations, thereby achieving Zero Liquid Discharge (ZLD) for process effluent. same CPU will be used for grain-based operations. This wet cake further dried in dryers will result in to loss of moisture thereby forming Distillers Dry Grains with Soluble (DDGS- 10% moisture) @150 MT/D. This DDGS has more shelf life & sold as cattle feed.

Power requirement for proposed project will be 3.5 MW which will be met from own Cogeneration Plant. One DG set of 750 KVA which will be operated only during failure. Stack 5 M ARL will be provided as per CPCB norms to the proposed DG sets. New boiler of 45 TPH will be installed under proposed distillery unit. ESP with a stack of height of 70 M will be installed for controlling the particulate emissions within the statutory limit of 115 mg/Nm^3 for the boiler.

Details of process emissions generation and its management:

The CO_2 generation shall take place in fermenters of the distillery. CO_2 to the tune of 190 MT/Day shall be released from 230 KLPD distillery plant. CO_2 shall be bottled and supplied to manufacturers of beverages.

Details of Solid waste/Hazardous waste generation and its management:

No.	Unit	Waste Type	Quantity (MT/D)	Disposal
1.	Distillery	Yeast Sludge	33	To Dryer / To be used as Manure
		CPU Sludge	1.3	To be used as Manure
		Boiler Ash	21	To be sold to Bricks

No.	Unit	Waste Type	Quantity (MT/D)	Disposal
				Manufacturer

No any Hazardous waste is generated from Distillery.

As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed capacity of 230 KLPD will be for manufacturing of fuel ethanol only.

During the deliberations EAC directed PP to submit an undertaking for the following commitments:

- Brick manufacturing unit will be installed within the plant premises for utilization of fly ash.
- Solar power plant of 0.5 MW shall be installed within the plant and it shall be utilized in meeting power requirement of the plant.
- The budget to be spent on CER shall be Rs 3.15 crores and it shall be spent on providing solar power to the nearby villages. It was also suggested that the proposed activities under CER shall be completed before the commissioning of the plant.

PP has submitted the desired information as sought above and EAC found it to be in order.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with the EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee deliberated on the CER plan and found to be addressing the issues in the study area. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of environmental clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as

mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance, subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). As per OM dated 16th June, 2021, project falls in category B2 and the proposed additional capacity of 230 KLPD shall be only for fuel ethanol manufacturing as per self-certification in form of an affidavit by the Project Proponent. Provided that subsequently if it is found that the ethanol, produced based on the EC granted as per this dispensation, is not being used completely for EBP Programme, or if ethanol is not being produced, or if the said distillery is not fulfilling the requirements based on which the project has been appraised as category B2 project, the EC shall stand cancelled.

(ii). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(iii). The project proponent will treat and reuse the treated water within the factory and no waste or treated water shall be discharged outside the premises.

(iv). Total fresh water requirement shall be 854 CMD which will be met from MIDC Water Supply Scheme (Wainganga River). No ground water recharge shall be permitted within the premises.

(v). The spent wash shall be concentrated and dried to form DDGS to be used as cattle feed. PP shall install brick manufacturing plant within factory for utilization of fly ash.

(vi). CO_2 generated from the process shall be bottled/made solid ice and utilized/sold to authorized vendors.

(vii). Occupational Health Centre for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with required safety kits/mask for personal protection.

(viii). Training shall be imparted to all employees on safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.

(ix). The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.

(x). Process organic residue and spent carbon, if any, shall be sent to Cement other suitable industries for its incinerations. ETP sludge, process inorganic & evaporation salt shall be disposed of to the TSDF.

(xi). The company shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize waste; (b) Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapour recovery system. (f) Use of high pressure hoses for equipment clearing to reduce wastewater generation.

(xii). The green belt of 5-10 m width shall be developed in nearly 33% of the total project area, mainly along the plant periphery. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map. Development of greenbelt shall be completed along with commissioning of the project.

(xiii). PP proposed to allocate Rs 3.15 crores and it shall be spent on providing solar power to the nearby villages. All the proposed activities under CER shall be completed before the commissioning of the plant.

(xiv). There shall be adequate space inside the plant premises earmarked for parking of vehicles for raw materials and finished products as per CPCB norms and no parking to be allowed outside on public places.

(xv). Storage of raw materials shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.

(xvi). Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.

(xvii). A separate Environmental Management Cell (having qualified person with Environmental Science/Environmental Engineering/specialization in the project area) equipped with full-fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.

Agenda No. 42.5

Expansion of Molasses / Sugarcane Juice/Syrup based Distillery from 65 KLPD to 110 KLPD by using Molasses/ Cane Syrup/Grain) by M/s Davangere Sugar Company Ltd. (DSCL) - Consideration of Environment Clearance.

[IA/KA/IND2/229479/2021, J-11011/386/2021-IA-II(I)]

The Project Proponent and the accredited Consultant M/s. Equinox Environments (I) Pvt Ltd made a detailed presentation on the salient features of the project and informed that:

The proposal is for environmental clearance to the project proposed expansion of Molasses / Sugarcane Juice/Syrup based Distillery from 65 KLPD to 110 KLPD by using Molasses/ Cane Syrup/Grain) by M/s Davangere Sugar Company Ltd. (DSCL).

The project/activities are covered under category A of item 5 (g) 'Distilleries' of the Schedule to the EIA, 2006 and requires appraisal at central level by the sectoral Expert Appraisal Committee (EAC). The proposal has been submitted under the Ministry's EIA Notification, 2006 amendments vide Notification no. S.O. 345(E) dated 17th January 2019 & extension of notification S.O. 750(E) dated 17th February 2020, S.O 980(E) dated 2nd March, 2021. Accordingly, the proposal has been appraised as category 'B2' project.

The project proposal is exempted from obtaining ToR & conducting Public Hearing as per EIA notification, 2006 amendment vide S.O 980(E) dated 2nd March, 2021. It was informed that no litigation is pending against the project.

SEIAA, Karnataka State has issued EC earlier vide letter No. SEIAA/02/IND/2020 dated 26th August, 2020 to the existing 65 KLPD Molasses/ Sugarcane Juice based Distillery in favor of M/s Davangere Sugar Company Ltd. (DSCL).

The details of products and capacity are as under:

Industrial Unit	Product	Units	Quantity		
			Existing	Expansion	Total
Distillery (65-110 KLPD)	Rectified Spirit (RS)/ ENA	KLPD	65	-	65
	Ethanol (Molasses/ Sugarcane Syrup Based)	KLPD	65	45	110
	Ethanol (Grain Based)	KLPD	-	110	110
	Fusel Oil	MT/M	3	2.1	5.1
	By- Products				

Industrial Unit	Product	Units	Quantity		
			Existing	Expansion	Total
	CO_2	MT/M	1620	1110	2730
	DDGS (110 KLPD)	MT/M	-	5160	5160

Total plot land area is 6,67,731.30 m^2. Existing built-up area 49,147.53 m^2; additional built-up for proposed project will be 52,609.1 m^2. Industry has already developed Green Belt in an area of 1,17,359 m^2 (18% out of total plot area). Moreover, additional Green Belt area of 1,00,000 m^2 (15% out of total plot area) will be developed. After expansion of Distillery, the total Green Belt area would be 2,17,359 m^2 which accounts for 33% of total plot area.

The estimated project cost is Rs. 208 Crores including existing investment of Rs.98 Crores. The distillery will be operated for 330 days. Total capital cost earmarked towards environmental pollution control measures under proposed expansion project will be Rs.8.6 Crores and the Recurring cost (operation and maintenance) will be about Rs.0.70 Crores per annum. Total Employment will be 552 persons as direct & indirect after proposed project. Industry proposes to allocate Rs. 83 Lakh @ of 0.75 % towards Corporate Environment Responsibility.

There are no national parks, Biosphere Reserves, Tiger/Elephant Reserves, Wildlife Corridors etc. within 10 Km Study Area. Shyagale Halla River is flowing at a distance 0.5 Km from South East to North west.

Total water requirement after Distillery expansion project will be 1,927 CMD. Out of which 919 CMD will be fresh water taken from Shyagale Halla River. After expansion of Distillery from 65 KLPD to 110 KLPD, process effluent generated from Molasses based operations in the form of raw spent wash to the tune of 880 M^3/D which would be concentrated in Multiple Effect Evaporator (MEE) and the conc. Spent wash @ 176 MT/D (1.6 KL/KL of alcohol) would be blended with bagasse or coal and burnt in existing 30 TPH incineration boiler. Other effluents viz. spent lees @ 257 M^3/D, MEE condensate @ 704 M^3/D and Other effluents @ 153 M^3/D will be treated in existing CPU which will be duly upgraded under of Distillery. Treated effluent from CPU will be reused in process and boiler makeup, thereby achieving Zero Liquid Discharge (ZLD) for Distillery. After expansion of Distillery from 65 KLPD to 110 KLPD, process effluent generated from Grain based operations in the form of FOC , PRC RC Lees – 360 M^3/D, Condensate – 260 M^3/D & Other effluent to the tune of 773 M^3/D which will be treated in existing CPU to be upgraded under expansion activity & recycled in process. Same CPU will be used for Molasses Based, Sugarcane Syrup Based & Grain Based Operations.

Power requirement for proposed project will be 2.5 MW which will be met from own Turbine Generation. Existing unit has 250 KVA DG Set. No additional DG set will be installed under expansion activity. DG sets to be used as standby during power failure. Stack (height 5 M) is provided as per CPCB norms to the existing DG Set. Existing Distillery has one 30 TPH Incineration Boiler which is already installed. ESP with a stack of height of 74 M is installed for controlling the particulate emissions within the statutory limit of 115 mg/Nm^3 for the boiler.

Details of process emissions generation and its management:

The CO_2 generation shall take place in fermenters of the distillery. CO_2 to the tune of 91 MT/Day shall be released from 110 KLPD distillery plant. CO_2 shall be compressed, bottled and supplied to manufacturers of beverages.

Details of Solid waste/Hazardous waste generation and its management:

No.	Description	Quantity (MT/D)		Disposal Facility
		Existing	After Expansion	
1	Yeast Sludge	14	23	Used as Manure.
2	Boiler Ash	30	57	Sold to Farmer (As fertilizer) / Brick Making
3	CPU Sludge	0.6	1.1	Burnt in Incineration Boiler

No any Hazardous waste is generated from Distillery.

Certified Compliance report has been issued by IRO, Bangalore vide letter No. EP/12.1/2o20-21/02/SEIAA/KAR/602 dated 14th September, 2021. It mentioned that the construction work of 65 KLPD distillery was started in May 2021 but due to COVID - 19 pandemic, the construction activities were slowed down and the distillery plant erection is expected to be completed in another 7- 8 months. Further, IRO report mentioned that Since the project is in initial stage of construction and PA has obtained all necessary clearance/NOC from various departments and complied initial stage of EC conditions, detailed compliance has not been prepared and the compliance is rated as Satisfactory.

As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed expansion of 45 KLPD will be for manufacturing of fuel ethanol only.

During the deliberations EAC directed PP to submit an undertaking for the following commitments:

- Solar power plant of 0.5 MW shall be installed within the plant and it shall be utilized in meeting power requirement of the plant.
- The proposed budget to be spent on CER shall be increased to Rs 3.00 crores and it shall be spent on installing solar power in the nearby villages. It was also suggested that the proposed activities under CER shall be completed before the commissioning of the plant.
- Ash management plan.

PP has submitted desired information except for increase in the CER funds to Rs. 3.00 Crs.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with the EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee deliberated on the CER plan and found to be addressing the issues in the study area. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of environmental clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance, subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). As per OM dated 16th June, 2021, project falls in category B2 and the proposed additional capacity of 45 KLPD shall be only for fuel ethanol manufacturing as per self-certification in form of an affidavit by the Project Proponent. Provided that subsequently if it is found that the ethanol, produced based on the EC granted as per this dispensation, is not being used completely for EBP Programme, or if ethanol is not being produced, or if the said distillery is not fulfilling the requirements based on which the project has been appraised as category B2 project, the EC shall stand cancelled.

(ii). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(iii). The project proponent will treat and reuse the treated water within the factory and no waste or treated water shall be discharged outside the premises.

(iv). Total fresh water requirement shall be 919 KLPD which will be met from Shyagale Halla River. Extraction of ground water shall not be done without obtaining prior permission of CGWA/concerned authority. No ground water recharge shall be permitted within the premises.

(v). The spent wash shall be concentrated and dried to form DDGS to be used as cattle feed.

(vi). CO_2 generated from the process shall be bottled/made solid ice and utilized/sold to authorized vendors.

(vii). Occupational Health Centre for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with required safety kits/mask for personal protection.

(viii). Training shall be imparted to all employees on safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.

(ix). The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.

(x). Process organic residue and spent carbon, if any, shall be sent to Cement other suitable industries for its incinerations. ETP sludge, process inorganic & evaporation salt shall be disposed of to the TSDF.

(xi). The company shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize waste; (b) Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapour recovery system. (f) Use of high pressure hoses for equipment clearing to reduce wastewater generation.

(xii). The green belt of 5-10 m width shall be developed in nearly 33% of the total project area, mainly along the plant periphery. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map. Development of greenbelt shall be completed along with commissioning of the project.

(xiii). PP proposed to allocate Rs. 3.00 Crores for CER and it shall be spent on installing solar power in the nearby villages. All the proposed activities under CER shall be completed before the commissioning of the plant.

(xiv). There shall be 15% space inside the plant premises earmarked for parking of vehicles for raw materials and finished products as per CPCB norms and no parking to be allowed outside on public places.

(xv). Storage of raw materials shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.

(xvi). Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.

(xvii). A separate Environmental Management Cell (having qualified person with Environmental Science/Environmental Engineering/specialization in the project area) equipped with full-fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.

Agenda No. 42.6

Expansion of Molasses based Distillery from 75 to 110 KLPD for Ethanol production by using C / B Heavy Molasses/ Cane Syrup with 3 MW Captive Power Plant (CPP) including expansion of cane crushing from 10,000 to 12,000 TCD along with Co-

generation Plant from 20 to 30 MW At: Bidri (Mouninagar), Tal.: Kagal, Dist.: Kolhapur, Maharashtra by M/S Shri Dudhganga Vedganga Sahakari Sakhar Karkhana Ltd (SDVSSKL)- Consideration of Environment Clearance.

[IA/MH/IND2/231257/2021, J-11011/403/2021-IA-II(I)]

The Project Proponent and the accredited Consultant M/s. Equinox Environments (I) Pvt Ltd made a detailed presentation on the salient features of the project and informed that:

The proposal is for environmental clearance to the project proposed expansion of Molasses based Distillery from 75 to 110 KLPD for Ethanol production by using C / B Heavy Molasses/ Cane Syrup with 3 MW Captive Power Plant (CPP) including expansion of cane crushing from 10,000 to 12,000 TCD along with Co-generation Plant from 20 to 30 MW at Bidri (Mouninagar), Kagal taluk, Kolhapur district, Maharashtra by M/S Shri Dudhganga Vedganga Sahakari Sakhar Karkhana Ltd (SDVSSKL).

The project/activities are covered under category A of item 5 (g) 'Distilleries' of the Schedule to the EIA, 2006 and requires appraisal at central level by the sectoral Expert Appraisal Committee (EAC). The proposal has been submitted under the Ministry's EIA Notification, 2006 amendments vide Notification no. S.O. 345(E) dated 17th January 2019 & extension of notification S.O. 750(E) dated 17th February 2020, S.O 980(E) dated 2nd March, 2021. Accordingly, the proposal has been appraised as category 'B2' project.

The project proposal is exempted from obtaining ToR & conducting Public Hearing as per EIA notification, 2006 amendment vide S.O 980(E) dated 2nd March, 2021. It was informed that no litigation is pending against the project.

SEIAA Maharashtra has granted EC for 20 MW Co-gen plant vide letter No. 2009/348/CR.72/TC.1 dated 05th August, 2009 in favor of Shri Dudhganga Vedganga Sahakari Sakhar Karkhana Ltd. Further**,** SEIAA Maharashtra has granted EC vide letter No. SIA/MH/IND2/57733/2020 dated 13th September, 2021 to the existing 75 KLPD Molasses Based Distillery, Sugar Factory expansion from 5000 TCD to 10,000 TCD & 20 MW Co-gen plant in favor of M/s Dudhganga Vedganga Sahakari Sakhar Karkhana Ltd.

The details of products and capacity are as under:

Industrial Unit	Product & By-products	Unit	Quantity		
			Existing	Proposed	Total
Distillery (Expansion from 75 to	Rectified Spirit / Extra Neural Alcohol (ENA) (B & C Heavy Molasses)	KLPD	75	0	75

110 KLPD)	Ethanol (B & C Heavy Molasses)	KLPD	75	35	110
	Ethanol (Sugarcane Syrup)	KLPD	0	110	110
	CO_2 Gas	MT/M	1,680	1,050	2,730
	Electric Power from Incineration Boiler	MW	0	3	3
Sugar Factory (Expansion from 10,000 to 12,000 TCD)	Sugar (12%)*	MT/M	36,000	7,200	43,200
	Molasses (4%)*	MT/M	12,000	2,400	14,400
	Bagasse (30%)*	MT/M	90,000	18,000	1,08,000
	Pressmud (4%)*	MT/M	12,000	2,400	14,400
Co-gen (Expansion from 20 to 30 MW)	Electricity	MW	20	10	30

Total plot land area is 7,26,219 m^2. Existing built-up area 61,367 m^2; additional built-up for proposed project will be 2,625 m^2. Industry has already developed 94,408.50 m^2 (13% out of total plot area) of green belt. Under Expansion of Distillery, Sugar Factory, & Co-generation Plant, 1, 45,243.80 m^2 (20% out of total plot area) of additional Green Belt will be developed. After proposed activity, the total Green Belt area would be 2,39,652 m^2 which accounts for 33% of total plot area.

The estimated project cost is Rs.475.97 Crores including existing investment of Rs.425.97 Crores. The distillery will be operated for 330 days. Total capital cost earmarked towards environmental pollution control measures under proposed project will be Rs. 4.55 Crores and the Recurring cost (operation and maintenance) will be about Rs.0.44 Crores per annum.
Total Employment will be 603 persons as direct & indirect after proposed project. Industry proposes to allocate Rs.50.5 Lakh @ of 1% towards Corporate Environment Responsibility.

There is a Radhanagari Wildlife Sanctuary at a distance of 12.2 Km from SDVSSKL Site. Radhanagari Wildlife Sanctuary ESZ got finalized vide MoEFCC Notification No. SO-3630 E on 15.10.2020. SDVSSKL site is located at 9.9 Km from ESZ & do not come in the ESZ. Protected Forest is about 1.15 Km from SDVSSKL Site. Dudhganga River is flowing at a distance of 0.7 Km from West to North direction and Vedganga River is flowing at a distance of 5.8 Km from South to East direction.

Total water requirement after Expansion of Sugar Factory, Co-generation Plant & Distillery project will be 7,760 CMD. Out of which 334 CMD will be fresh water taken from Dudhganga River. Total trade effluent generated from expansion activity of Sugar Factory & Co-gen Plant @ 713 m^3/Day will be treated through existing Effluent Treatment Plant (ETP) comprising of Primary, Secondary & Tertiary Treatment units.

Treated effluent will be reused for green belt development in own factory premises. The process effluent generated after expansion of Molasses based Distillery from 75 KLPD to 110 KLPD would be in the form of raw spent wash to the tune of 880 m^3/Day which would be concentrated in Multiple Effect Evaporator (MEE) and the conc. spent wash @ 176 MT/D (1.6 KL/KL of alcohol) would be burnt in existing 30 TPH incineration boiler. Other effluents viz. spent lees @ 147 m^3/D, MEE condensate @ 704 m^3/D and other effluents @ 51 M^3/D will be treated in CPU under Distillery. Treated effluent from CPU will be reused in process and boiler makeup, thereby achieving Zero Liquid Discharge (ZLD) for Distillery.

Power requirement after Expansion of Sugar Factory, Co-generation Plant & Distillery project will be 13 MW which will be procured from own Cogeneration Plant. Existing Unit has 2 DG sets having capacity 250 KVA & 1500 KVA. No additional DG set will be installed under expansion of project. Existing units has 120 TPH bagasse fired boiler under Sugar Factory & Cogeneration Plant & 30 TPH Incineration boiler under existing Distillery. There will not be any new boiler under expansion of Distillery. After expansion, existing 30 TPH boiler will be operated with full efficiency and additional fuel will be required for same. After Expansion, 60 TPH Bagasse fired Boiler will be installed under Sugar factory & Cogeneration Plant. ESP with a stack of height of 80 M will be installed for controlling the particulate emissions within the statutory limit of 115 mg/Nm^3 for the boiler.

Details of process emissions generation and its management:

The CO_2 generation shall take place in fermenters of the distillery. CO_2 to the tune of 91 MT/Day shall be released from 110 KLPD distillery plant. CO_2 shall be compressed, bottled and supplied to manufacturers of beverages.

Details of Solid waste/Hazardous waste generation and its management:

Details of Solid waste generated & its management

No.	Industrial Unit	Type	Quantity (MT/M)		Disposal
			Existing	After Expansion	
1	Sugar Factory & Co-gen Plant	Boiler Ash (Bagasse)	960	1,500	Used as manure
		ETP Sludge	18	21	
2	Distillery	Boiler Ash (Coal + Sp. Wash)	840	1,710	To be forwarded for Brick making

		Yeast Sludge	360	690	Burnt in Incineration Boiler
		CPU Sludge	18.9	28	

Details of Hazardous Waste generation & its management

No.	Category	Quantity (KL/Year)		Disposal
		Existing	After Expansion	
1	5.1 – Used Oil	6.5	7.8	Burnt in Boiler

No other Hazardous waste is generated from Distillery.

It was informed that as SEIAA Maharashtra has issued EC for expansion of sugar factory from 5000 TCD to 10000 TCD and establishment of 75 KLPD distillery on 13th September, 2021. As no progress has been made in that EC, CCR has been submitted for earlier EC granted for 20 MW Co-gen plant vide letter No. 2009/348/CR.72/TC.1 dated 05th August, 2009. IRO, Nagpur has issued CCR for the same vide letter No. EC-1247/RON/2020-NGP/7596 dated 21.12.2020 in which few non-compliances were observed. ATR for the non- complied conditions observed has been submitted to IRO on 20.07.2021. EAC found compliance status of CCR to be satisfactory.

As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed expansion of 35 KLPD will be for manufacturing of fuel ethanol only.

During the deliberation it has been informed to EAC that Ministry is in receipt of complaint that there is a pending court case against the Industry for violation of EIA, 2006 in NGT, Pune Bench. In this regard PP informed that there is no court case at the time of submission of proposal and shall submit an undertaking for the same which has been accepted by EAC. After the deliberations EAC directed PP to submit an undertaking for the following commitments:

- Solar power plant of 0.5 MW shall be installed within the plant and it shall be utilized in meeting power requirement of the plant.
- The proposed budget to be spent on CER shall be increased to Rs 4.10 crores and it shall be spent on providing solar power in nearby villages. It was also suggested that the proposed activities under CER shall be completed before the commissioning of the plant.
- Undertaking that there is no court case pending against the Industry.
- Installation of CO2 bottling plant.
- Plan for boiler ash management.
- Brick manufacturing unit will be installed within the plant premises for utilization of fly ash.

PP has submitted the desired information as sought above and EAC found it to be in order.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with the EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee deliberated on the CER plan and found to be addressing the issues in the study area. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of environmental clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance, subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). As per OM dated 16th June, 2021, project falls in category B2 and the proposed additional capacity of 35 KLPD shall be only for fuel ethanol manufacturing as per self-certification in form of an affidavit by the Project Proponent. Provided that subsequently if it is found that the ethanol, produced based on the EC granted as per this dispensation, is not being used completely for EBP Programme, or if ethanol is not being produced, or if the said distillery is not fulfilling the requirements based on which the project has been appraised as category B2 project, the EC shall stand cancelled.

(ii). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(iii). The project proponent will treat and reuse the treated water within the factory and no waste or treated water shall be discharged outside the premises.

(iv). Total fresh water requirement shall be 334 CMD which will be met from Dudhganga River. Extraction of ground water shall not be done without obtaining prior permission of CGWA/concerned authority. No ground water recharge shall be permitted within the premises.

(v). The spent wash shall be concentrated in MEE followed by incineration. Other effluents shall be treated through the CPU/ETP.

(vi). CO_2 generated from the process shall be bottled/made solid ice and utilized/sold to authorized vendors.

(vii). Occupational Health Centre for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with required safety kits/mask for personal protection.

(viii). Training shall be imparted to all employees on safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.

(ix). The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.

(x). Process organic residue and spent carbon, if any, shall be sent to Cement or any other suitable industries for its incinerations. ETP sludge, process inorganic & evaporation salt shall be disposed of to the TSDF.

(xi). The company shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize waste; (b) Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapour recovery system. (f) Use of high pressure hoses for equipment clearing to reduce wastewater generation.

(xii). The green belt of 5 m width shall be developed in nearly 33% of the total project area, mainly along the plant periphery. Selection of plant

species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map. Development of greenbelt shall be completed along with commissioning of the project.

(xiii). PP proposed to allocate Rs. 4.10 Crores for CER and it shall be spent on providing solar power in nearby villages. All the proposed activities under CER shall be completed before the commissioning of the plant.

(xiv). There shall be adequate space inside the plant premises earmarked for parking of vehicles for raw materials and finished products as per CPCB norms and no parking to be allowed outside on public places.

(xv). Storage of raw materials shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.

(xvi). Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.

(xvii). A separate Environmental Management Cell (having qualified person with Environmental Science/Environmental Engineering/specialization in the project area) equipped with full-fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.

Agenda No. 42.7

Expansion of Distillery from 80 KLD to 200 KLD & Co-Generation Power Plant from 3.0 MW to 13.0 MW by installation of new 120 KLD Multi-feedbased Ethanol Plant along with10.0 MW Co-Generation Power Plant at Village; Kothwal Kalan, Tehsil Kaisarganj, District- Bahraich, Uttar Pradesh, by M/s Parle Biscuits Pvt. Ltd. Distillery Division - Consideration of Environment Clearance.

[IA/UP/IND2/230689/2021, J-11011/398/2021-IA-II(I)]

The Project Proponent and the accredited Consultant M/s. Environmental and Technical Research Centre made a detailed presentation on the salient features of the project and informed that:

The proposal is for environmental clearance to the project proposed expansion of Distillery from 80 KLD to 200 KLD & Co-Generation Power Plant from 3.0 MW to 13.0 MW by installation of new 120 KLD Multi-feedbased Ethanol Plant along with10.0 MW Co-Generation Power Plant

at Village; Kothwal Kalan, Tehsil Kaisarganj, District- Bahraich, Uttar Pradesh, by M/s Parle Biscuits Pvt. Ltd. Distillery Division.

The project/activities are covered under category A of item 5 (g) 'Distilleries' of the Schedule to the EIA, 2006 and requires appraisal at central level by the sectoral Expert Appraisal Committee (EAC). The proposal has been submitted under the Ministry's EIA Notification, 2006 amendments vide Notification no. S.O. 345(E) dated 17th January 2019 & extension of notification S.O. 750(E) dated 17th February 2020, S.O 980(E) dated 2nd March, 2021. Accordingly, the proposal has been appraised as category 'B2' project.

The project proposal is exempted from obtaining ToR & conducting Public Hearing as per EIA notification, 2006 amendment vide S.O 980(E) dated 2nd March, 2021. It was informed that no litigation is pending against the project.

SEIAA Maharashtra has issued EC earlier vide letter No. 313/Parya/SEAC/4982/2019 dated 22nd October 2019 to the existing molasses-based Distillery Plant (60 KLPD) along with Captive Power Plant (3 MW) in favour of M/s. Parle Biscuits Pvt. Ltd. Distillery Division. The unit applied for expansion (60 to 80 KLPD) in UPPCB under as per new notification of MoEF&CC vide S.O. 980 (E) dated 2nd March, 2021 and obtained Certificate of "No Increase in Pollution Load" from Uttar Pradesh Pollution Control Board vide letter no. H61102/C-6/N.O.C./145/FAZ/2021 dated 25.03.2021 for distillery capacity expansion due to use of alternative feedstock and raw material mix (B-Heavy Molasses/Sugar Syrup) from 60 KLD to 80 KLD. Thereafter, the company has obtained new CTO for Air & Water for expanded capacity of 80 KLPD vide Ref. No.- 134237/UPPCB/Faizabad (UPPCBRO)/CTO/air/ Bahraich/2021 & Ref. No. 134231/UPPCB/Faizabad(UPPCBRO)/CTO/water/Bahraich/2021 respectively dated 17.08.2021 valid till 31.12.2023

The details of products and capacity are as under:

Product details	**Existing quantity**	**Existing quantity**	**Total quantity**
Distillery	60 KLD RS/ENA/AA while using C-Heavy molasses as raw material and 80 KLD RS ENA AA while using B-Heavy molasses or Sugar Syrup as raw material.	120 KLD Ethanol (Cane Syrup/Grain Based)	200 KLD
Co-generation power plant	3.0 MW	10 MW	13.0 MW
Product	Absolute Alcohol-Ethanol /Extra Neutral Alcohol/Rectified Spirit	**Ethanol (Bio-fuel) Only**	**100% Ethanol**
Working Days: 365 days per annum			

Existing plant area is 3.165 ha. Additional adjacent company own land of 3.416 Ha is required for proposed expansion. Total plant area for expansion is 6.581 ha. Land is already under possession of unit. Company has already developed greenbelt in an area of 33% i.e., 1.045 hectares out of total existing area of the project and the additional 1.255 ha will be developed under greenbelt. Thus, total greenbelt area will be 2.30 ha after adding additional area.

The estimated project cost is Rs 84.15 crores. Total capital cost earmarked towards environmental pollution control measures is Rs 2121 Lakh and the Recurring cost (operation and maintenance) will be about Rs 500 Lakh per annum. Total Employment will be 44 persons as direct & indirect. Industry proposes to allocate Rs 200 lakhs towards Corporate Environmental Responsibility.

There are no National Parks, Reserved Forests (RF)/ Protected Forests (PF), within 10 Km radius. River/ water body Jhingri River is flowing at a distance of 0.96 Km in the West direction and Pingal River at a distance of 3.45 Km in the West direction.

Total fresh water requirement after expansion will be 1200 KLD (380 KLD for molasses-based operations+ 820 KLD for Grain / cane syrup-based operations) which will be met from ground water. Effluent generation after expansion will be 1395 KLD maximum (440 KLD from molasses-based operations+ 955 KLD for Grain / cane syrup-based operations) will be treated through state of art ETP (Anaerobic, aerobic, Filters, & RO system). The plant will be based on Zero Liquid discharge system. Spent wash generation from the distillation which is a variable in different mode operations. Spent wash generated during molasses-based operations will be concentrated in MEE then concentrate from MEE will be used as fuel in Slop fired Boiler. Spent Wash (Slops) generation during Grain / cane syrup-based operations from Distillation, will be sent through separation of suspended solids in Decanter Centrifuge, part Thin Slops are concentrated in multi-effect evaporators to form a Thick (Protein) Syrup, which is mixed with the Wet Cake DWG separated earlier from Decanters. This interim product called DWGS has 30-32% w/w Solids is subject to drying in a rotating steam tube bundle dryer to deliver a value-added by-product – DDGS – Distillers Dried Grains with soluble and which has min. 90% Solids and max 10% moisture. This DDGS sells as Cattle Feed / Poultry Feed / Fish Feed based on its Protein Content. Hence, entire spent wash is decanted, concentrated into syrup in a Multi-Effect Evaporation followed by Drying, in order to achieve Zero Effluent Discharge.

Power requirement for proposed project will be 10 MW (maximum) will be met from Co-generation power plant of capacity 13 MW. Existing unit has 20 TPH Concentrated spent wash & bagasse fired boiler. Unit has

proposed 1 no.s of boiler of capacity 50 TPH (bio-mass based). Electro Static Precipitator (ESP) with a stack of height of 70 m is installed for controlling the particulate emissions within the statutory limit of 50 mg/Nm^3 for the proposed boilers

Details of process emissions generation and its management:

- Bag filter with a stack height of 70 m is installed for controlling the particulate emissions with existing 20 TPH slop fired boiler.
- ESP will be installed with proposed biomass-based boiler.
- Online Continuous Emission Monitoring System is already installed with the stack and data is transmitted to CPCB/SPCB servers.
- CO_2 generated during the fermentation process will be collected by utilizing CO_2 scrubbers and sold to authorized vendors.

Details of Solid waste/Hazardous waste generation and its management:

S. No.	Type of Waste	Quantity in Molasses based Distillery in TPD	Quantity in Grain / cane syrup-based Distillery in TPD	Mode of management
1	Ash	28	25	Having high potash content will be utilized as manure. Granulation plant capacity is 50 TPD is installed.
2	Yeast sludge	10	12	Will be mixed with ash and used as manure.

The certified compliance report submitted by the Ministry's Regional office at Lucknow vide letter VII/ENV/SCL-UP/1925/2020/271 dated 21.09.2021. IRO report mentioned that no non compliances were detected and no further action was required. EAC found the compliance status satisfactory.

As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed expansion of 120 KLPD will be for manufacturing of fuel ethanol only.

During the deliberations EAC directed PP to submit an undertaking for the following commitments:

- Industry shall construct rain water storage facility of capacity which can store at least 60 days fresh water requirement.
- Industry shall install solar plant of 0.5 MW and shall utilize it for captive requirement.
- Integrated Industry shall conform to ZLD
- Ash management details.

PP has submitted desired information as sought above and EAC found it to be in order. Further EAC suggested that PP shall allocate Rs. 2.00 Crores for CER and it shall be spent on providing solar power in nearby villages. All the proposed activities under CER shall be completed before the commissioning of the plant. PP agreed to it.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with the EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee deliberated on the CER plan and found to be addressing the issues in the study area. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of environmental clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance, subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). As per OM dated 16th June, 2021, project falls in category B2 and the proposed additional capacity of 120 KLPD shall be only for fuel ethanol manufacturing as per self-certification in form of an affidavit by the Project Proponent. Provided that subsequently if it is found that the ethanol, produced based on the EC granted as per this dispensation, is not being used completely for EBP Programme, or if ethanol is not being produced, or if the said distillery is not fulfilling the

requirements based on which the project has been appraised as category B2 project, the EC shall stand cancelled.

(ii). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(iii). The project proponent will treat and reuse the treated water within the factory and no waste or treated water shall be discharged outside the premises.

(iv). Total fresh water requirement shall be 1200 KLPD which will be met from ground water. Industry shall construct rain water storage facility of capacity which can store at least 60 days fresh water requirement. Extraction of ground water shall not be done without obtaining prior permission of CGWA/concerned authority. No ground water recharge shall be permitted within the premises.

(v). Effluent generated shall be treated through ETP.

(vi). CO_2 generated from the process shall be bottled/made solid ice and utilized/sold to authorized vendors.

(vii). Occupational Health Centre for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with required safety kits/mask for personal protection.

(viii). Training shall be imparted to all employees on safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.

(ix). The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.

(x). Process organic residue and spent carbon, if any, shall be sent to Cement other suitable industries for its incinerations. ETP sludge, process inorganic & evaporation salt shall be disposed of to the TSDF.

(xi). The company shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize waste; (b) Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapour recovery system. (f) Use of high pressure hoses for equipment clearing to reduce wastewater generation.

(xii). The green belt of 5 m width shall be developed in nearly 33% of the total project area, mainly along the plant periphery. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map. Development of greenbelt shall be completed along with commissioning of the project.

(xiii). PP proposed to allocate Rs. 2.00 Crores for CER and it shall be spent on providing solar power in nearby villages. All the proposed activities under CER shall be completed before the commissioning of the plant.

(xiv). There shall be adequate space inside the plant premises earmarked for parking of vehicles for raw materials and finished products as per CPCB norms and no parking to be allowed outside on public places.

(xv). Storage of raw materials shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.

(xvi). Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.

(xvii). A separate Environmental Management Cell (having qualified person with Environmental Science/Environmental Engineering/specialization in the project area) equipped with full-fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.

Agenda No. 42.8

Proposed expansion of Sugar Factory capacity from 7500 to 13,200 TCD, Distillery capacity from 45 to 145 KLPD (Rectified Spirit/ENA/Ethanol) and establishment of 24MW Co-generation Power Plant at Yeshwantnagar District: Satara, Maharashtra by M/s SAHYADRI SAHAKARI SAKHAR KARKHANA LTD- Amendment in Environment Clearance.

[IA/MH/IND2/228051/2021, J-11011/114/2018-IA-II(I)]

The proposal is for amendment in the Environmental Clearance granted by the Ministry of Environment, Forest and Climate Change (MOEF&CC), New Delhi vide letter no. J-11011/114/2018-IA-II(I) dated 28.10.2020

for the project expansion of Sugar Factory capacity from 7500 to 13,200 TCD, Distillery capacity from 45 to 145 KLPD (Rectified Spirit/ENA/Ethanol) and establishment of 24MW Co-generation Power Plant at Yeshwantnagar District: Satara, Maharashtra by M/s Sahyadri Sahakari Sakhar Karkhana Limited.

The project proponent has requested for amendment in the EC with details as under:

Sr. No.	Para of ToR/EC issued by MoEF&CC	Details as per EC	To be revised as/read as	Justification/reason
1	Para 10	ESP with stack height of 80 m for co-generation boilers and 80 m height for incineration boiler will be installed for controlling the particulate emission within the statutory limit of 150 mg/Nm^3 for the proposed boilers	It is proposed to adopt Bag-filter as APC equipment instead of ESP for incineration boiler only.	Advantages of Bag-filter over ESP such as; 1) Maintenance is low. 2) Energy consumption is much lower. 3) Easy to operate
2	Para 6	Certified compliance report for consent condition is issued by Karnataka SPCB.	Certified compliance report for consent condition is issued by Maharashtra SPCB.	Typographical error
3	Para 10	Power requirement shall be met from Mangalore Electricity Sully Company (MESCOM)	Power requirement shall be met from Maharashtra State Electricity Distribution Co. Ltd (MSEDCL)	Typographical error

EAC found the justifications satisfactory and **recommended** the amendments in EC, as proposed by the project proponent, with all other terms and conditions remain unchanged.

Agenda No. 42.9

Expansion of Distillery capacity from 120 KLPD to 700 KLPD and captive power Plant capacity from 5 MW to 16 MW at Bagalkot, Karnataka by M/S NIRANI SUGARS LIMITED- Amendment in Environment Clearance regarding.

[IA/KA/IND2/220064/2021, J-11011/130/2008-IA II(I)]

The proposal is for amendment in the Environmental Clearance granted by the Ministry of Environment, Forest and Climate Change (MOEF&CC), New Delhi vide letter no. J-11011/130/2008-IA II(I) dated 29.09.2021 for the project expansion of of Distillery capacity from 120 KLPD to 700 KLPD and captive power Plant capacity from 5 MW to 16 MW at Bagalkot, Karnataka by M/S Nirani Sugars Limited.

The project proponent has requested for amendment in the EC with details as under:

Sl. No.	Para of EC issued by MoEF & CC	Details as per the EC	To be revised/ read as	Justification/reasons
1.	EC Specific Condition point no. (ii), page 8 of 12 the EC vide letter no. J-11011/130/2008-IA II(I) dated 27.09.2021 issued by MoEF & CC.	No construction work shall be started prior to final direction of court. After disposal of court case, construction work shall start after obtaining prior permission from SPCB	Construction work shall start after obtaining prior permission from SPCB	The court case is not likely to be disposed early in view of the Court procedures. Implementation of the project under the EBP program will get delayed if we wait till the final outcome of the court case. Therefore, the request is made for Amendment to EC condition. Further Chairman, KSPCB recommended to

				delete/revise this condition.

During deliberations PP has informed that the court case was filed by KSPCB for alleged violation of Water (Prevention and Control of Pollution) Act, 1974. Further, PP has informed that industry shall abide by the final outcome of the case and shall take prior permission from KSPCB for implementation of the expansion. Further, PP has submitted a No Objection Certificate dated 30th September, 2021 issued by Chairman, KSPCB to delete/revise the condition stipulated at Specific Condition point no. (ii), page 8 of 12 the EC vide letter no. J-11011/130/2008-IA II(I) dated 27.09.2021 issued by MoEF & CC with certain conditions. EAC found the justification valid and sought affidavit for the same. After detailed deliberations EAC **recommended** the amendments in EC, as proposed by the project proponent, with all other terms and conditions remain unchanged.

21st October, 2021 (Thursday)

Agenda No. 42.10

Onshore Oil & Gas development drilling and production in DumdumaPengeri Area in TinsukiaDistrict under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML Tinsukia Assam by M/s OIL INDIA LIMITED- Consideration of Environment Clearance reg.

[IA/AS/IND2/220363/2007, J-11011/1251/2007 - IA II (I)]

The Project Proponent and the accredited Consultant M/s ERM India Pvt. Ltd made a detailed presentation on the salient features of the project and informed that:

The proposal is for environmental clearance to the project Onshore Oil & Gas development drilling and production in DumdumaPengeri Area in TinsukiaDistrict under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML Tinsukia Assam by M/s Oil India Limited.

All Offshore and onshore oil and gas exploration, development & production proposals are listed at S.N. 1(b)of Schedule of Environment Impact Assessment (EIA) Notification under category 'A' and are appraised at Central Level by Expert Appraisal Committee (EAC).

Standard ToR has been issued by Ministry vide letter No. J-11011/1251/2007 - IA II (I) dated 1st June, 2018. Ministry had issued EC earlier vide letter no. J-11011/1251/2007-IA-II(I); dated 1st November

2011 to the existing Exploratory drilling of 1 well at Dumduma-Pengry Area, District Tinsukia by M/s Oil India Limited.

Public Hearing for the proposed project has been conducted by the State Pollution Control Board on 13th March 2020 in Tinsukia district presided by Additional Deputy Commissioner, Tinsukia district. The main issues raised during the public hearing are related to protection of ecology and environment, development activities -improvement of infrastructure in schools, health initiatives, social initiatives in the area, funds for toilet development etc. It was informed that no litigation is pending against the proposal.

The details of products and capacity are as under:

S. No	Product Details	Existing Quantity	Proposed Quantity	Total Quantity
1.	Wells and production installations	1 well	26 wells and 3 production installations	27 wells and 3 production installations

The total land required for the project will be 990000 m2. M/s Oil India Ltd. will develop greenbelt at the proposed production installations having total area of 52500 m^2.

The estimated project cost is Rs. 1109.40 crore. Recurring cost for public hearing action plan, greenbelt plan, wildlife conservation plan and environmental control measures will be a total of INR 0.9341 crores per annum. Oil India Ltd. will earmark INR 1.775 crores as part of PH Action Plan in for Tinsukia district in line with the comments and suggestions made by the local public during Public Hearing. Additionally, Oil India Ltd. will comply with the conditions mentioned by EAC in this regard. Total Employment will be 60 persons as direct & 120 persons indirect after expansion for each drill site construction and drilling. Oil India Ltd. will earmark INR 1.775 crores as part of PH Action Plan in Tinsukia district in line with the comments and suggestions made by the local public during Public Hearing. Additionally, Oil India Ltd. will comply with the conditions mentioned by EAC in this regard. OIL proposes to allocate funds for CSR activity as per CSR Act and Rules, Govt. of India.

There are no national parks, wildlife sanctuaries, Biosphere Reserves, Tiger/Elephant Reserves etc. within 10 km of the well locations or production installations. Bogapani elephant corridor is located within 1 km of the proposed well. Buri Dehing River is flowing through south-eastern portion of the Block.

Ambient air quality monitoring was carried out at 8 locations during 2.01.2019 to 26.03.2019 and the baseline data indicates the ranges of average concentrations as: PM_{10} (76.17-80.57 µg/m^3), $PM_{2.5}$ (37.46-

40.11 µg/m^3), SO_2 (7.56-8.19 µg/m^3) and NO_2 (21.72-24.11 µg/m^3). AAQ modeling study for point source emissions indicates that the maximum incremental GLCs after the proposed project would be 15.38 µg/m^3, 0.01 µg/m^3, 0.07µg/m^3 and 0.10 µg/m^3 with respect to NOx, SO2, PM10 and HC. The resultant concentrations are within the National Ambient Air Quality Standards (NAAQS).

Total water requirement is 50 m^3/day of which fresh water requirement of 39 m^3/day will be met from groundwater. Effluent of 21.8 KLD quantity will be treated through ETP and Septic tank. The project will be based on Zero Liquid discharge system.

Power requirement will be met through two Diesel Generator Sets of 1250 kVA each. Another 1250 kVA DG set will be kept as standby. Stack height of 7 m will be provided as per CPCB norms to the proposed DG sets.

Details of Process emissions generation and its management:
The operation of DG sets, movement of vehicles and machineries during construction and drilling, flaring of natural gas will result in the generation of air pollutants, if gas reserves are encountered during drilling operations. Stacks will be used with DG sets and flare system as per CPCB norms

Details of Solid waste/Hazardous waste generation and its management:

Drill cuttings and spent drilling mud will be disposed to HDPE lined pit within the drill site. The kitchen waste will be disposed in nearest municipal/village dumping site on a daily basis through approved waste handling contractors. Recyclable wastes will be periodically sold to local waste recyclers. Hazardous waste (waste and used oil) will be managed in accordance with Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2016.

Certified compliance report has been by Integrated Regional Office (IRO), Guwahati vide letter No. RO-NE/E/IA/AS/MI/58/1243-1245 dated 1st October 2021. EAC found the compliance status to be satisfactory.

During deliberation the following additional information was sought from PP:

i. Details of proposed wells and product installations.
ii. Noise Management Plan.
iii. Well abandonment and site restoration plan.

PP has submitted the information desired above and EAC found it in order. Also EAC noted that Bogapani elephant corridor is located within 1 km of the proposed well. In this regard PP informed that safety plan has been submitted for the same and production activities shall be done

ensuring safety considering movement of elephants based on season. Further EAC suggested PP shall allocate Rs. 1.00 Crore apart from the amount allocated to address issues raised in Public Hearing towards Corporate Environment Responsibility. PP shall utilize the amount in improving infrastructure in the schools nearby. PP agreed to it.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with EIA/EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the EIA/EMP report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee noted that the EIA/EMP report is in compliance of the ToR issued for the project, reflecting the present environmental concerns and the projected scenario for all the environmental components. The Committee has found the baseline data is within NAAQ standards. The Committee has deliberated the action plan proposed by the project proponent to arrest the incremental GLC due to the project. The Committee has also deliberated on the CER plan and found to be addressing the issues in the study area.

The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of Environmental Clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance and subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the

Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(ii). No pipelines or its part shall be laid in the Forest land/Protected Area without prior permission/approval from the Competent Authority.

(iii). The project proponent will treat and reuse the treated water within the drilling site location including at processing location and no waste or treated water shall be discharged outside the premises under any condition. Mobile ETP coupled with RO and mobile STP shall be installed to treat the waste water and sewage waste respectively.

(iv). During production, storage and handling, the fugitive emission of methane, if any, shall be monitored using appropriate technology.

(v). The project proponent also to ensure trapping/storing of the CO_2 generated, if any, during the process and handling.

(vi). Approach road shall be made pucca to minimize generation of suspended dust.

(vii). The project proponent shall make all arrangements for control of noise from the drilling activity. Acoustic enclosure shall be provided for the DG sets along with the adequate stack height as per CPCB guidelines.

(viii). Total fresh water requirement shall be 39 KLPD which will be met from ground water. Extraction of ground water shall not be done without obtaining prior permission of CGWA/concerned authority.

(ix). The company shall construct the garland drain to prevent runoff of any oil containing waste into the nearby water bodies. Separate drainage system shall be created for oil contaminated and non-oil contaminated.

(x). Drill cuttings separated from drilling fluid shall be adequately washed and disposed in HDPE lined pit. Waste mud shall be tested for hazardous contaminants and disposed according to HWMH Rules, 2016. No effluent/drilling mud shall be discharged/disposed off into nearby surface water bodies. The company shall comply with the guidelines for disposal of solid waste, drill cutting and drilling fluids for onshore drilling operation notified vide GSR.546(E) dated 30th August, 2005.

(xi). Oil spillage prevention and mitigation scheme shall be prepared. In case of oil spillage/ contamination, action plan shall be prepared to clean the site by adopting proven technology. The recyclable waste (oily sludge) and spent oil shall be disposed of to the authorized recyclers.

(xii). The project proponent shall take necessary measures to prevent fire hazards, containing oil spill and soil remediation as needed. At fixed installations or plants use of ground flare shall be explored. At the place of ground flaring, the overhead flaring stack with knockout drums shall be installed to minimize gaseous emissions during operation.

(xiii). The project proponent shall develop a contingency plan for H_2S release including all necessary aspects from evacuation to resumption of normal operations. The workers shall be provided with personal H_2S detectors in locations of high risk of exposure along with self-containing breathing apparatus.

(xiv). Blow Out Preventer system shall be installed to prevent well blowouts during drilling operations.

(xv). On completion of the project, necessary measures shall be taken for safe plugging of wells with secured enclosures to restore the drilling site to the original condition. The same shall be confirmed by the concerned regulatory authority from environment safety angle. In case of hydrocarbon not found economically viable, a full abandonment plan shall be implemented for the drilling site in accordance with the applicable DGH / Indian Petroleum Regulations.

(xvi). PP shall allocate Rs. 1.00 Crores towards CER and it shall be spent on improving infrastructure in schools nearby.

(xvii). No lead acid batteries shall be utilized in the project/site.

(xviii). Occupational health surveillance of the workers shall be carried out as per the prevailing Acts and Rules. All workers & employees shall be provided with required safety kits/mask for personal protection.

(xix). Oil content in the drill cuttings shall be monitored if oil-based mud is used and report shall be sent to the Ministry's Regional Office.

(xx). The project proponent shall prepare operating manual in respect of all activities, which would cover all safety & environment related issues and measures to be taken for protection. One set of environmental manual shall be made available at the drilling site/ project site. Awareness shall be created at each level of the management. All the schedules and results of environmental monitoring shall be available at the project site office. Remote monitoring of site should be done.

Agenda No. 42.11

Proposed 100 KLD Grain based distillery project alongwith 2.7 MW Cogeneration Plant at Mor, Mokama, Dist. Patna (Bihar) By

M/s BRAJENDRA KUMAR BUILDERS PRIVATE LIMITED- Consideration of Environment Clearance.

[IA/BR/IND2/228946/2021, J-11011/360/2021-IA-II(I)]

EAC desired that the proposal shall be considered only after obtaining document from competent authority related with conversion of land use to industrial purpose.

Accordingly, the proposal was *deferred* for the needful.

Agenda No. 42.12

Proposed 200 KLPD Grain based Ethanol Plant along with 6.0 MW Cogeneration Power Plant at Village Deogaon, Tehsil Maneswar, District Sambalpur (Odisha) by M/s Premier Alcobev Private Limited- Consideration of Environment Clearance

[IA/OR/IND2/229712/2021, J-11011/381/2021-IA-II(I)]

EAC desired that the proposal shall be considered only after obtaining document from competent authority related with conversion of land use to industrial purpose.

Accordingly, the proposal was *deferred* for the needful.

Agenda No. 42.13

Proposed 100 KLPD Grain Based Distillery at Ahmedabad Gujarat by M/s. Grain Span Nutrients Private Limited- Consideration of Environment Clearance.

[IA/GJ/IND2/229772/2021, J-11011/391/2021-IA-II(I)]

The Project Proponent and the accredited Consultant M/s. MITCON Consultancy & Engineering Services Ltd., made a detailed presentation on the salient features of the project and informed that:

The proposal is for environmental clearance for establishment of 100 KLPD Grain Based Distillery at Ahmedabad Gujarat by M/s. Grain Span Nutrients Private Limited.

All grain based distilleries producing ethanol, solely to be used for Ethanol Blended Petrol Programme of the Government of India are listed

at S.N. 5(ga) of Schedule of Environmental Impact Assessment (EIA) Notification, 2006 amendment vide S.O 2339 dated 16th June 2021 under category 'B-2' and are appraised at Central Level by Expert Appraisal Committee (EAC).

The project proposal is exempted from obtaining ToR & conducting Public Hearing as per EIA notification, 2006 amendment vide S.O 2339 dated 16th June 2021. It was informed that no litigation is pending against the project.

The details of products and capacity are as under:

Sr. No.	Particulates	Capacity
1.	Ethanol	100 KLPD
2.	Captive power plant	3.5MW

Proposed land area is 64,800 m^2. Industry will develop greenbelt in an area of 34.3 % i.e., 22,200 m^2 out of total area of the project.

The estimated project cost is Rs 127.3 Cr. Total capital cost earmarked towards environmental pollution control measures is Rs. 4.21 Cr and the recurring cost (operation and maintenance) will be about Rs. 31.5 lakhs per annum. Total Employment will be 202 persons as direct & indirect. Industry proposes to allocate Rs 1.9 Cr. @ Greenfield project: 1.5% of total project cost (Rs. 127.3 Cr.) towards Corporate Environment Responsibility.

There are no national parks, wildlife sanctuaries, Biosphere Reserves, Tiger / Elephant Reserves, Wildlife Corridors etc., within 10 km distance from the project site. There is no River within 5km radius of the proposed project. River Rodh is 8.8km towards NW of the project site.

AAQ modeling study for point source emissions indicates that the maximum incremental GLCs after the proposed project would be 0.066 µg/m^3, 0.044 µg/m^3, 3.15 µg/m^3 and 0.768 µg/m^3 with respect to PM_{10}, $PM_{2.5}$, SO_2 and NO_X. Maximum ground level concentration occurred at a distance of 486 to 527 m in East direction. There were no village observed in downwind direction.

The total freshwater requirement for the proposed project is 556 CMD which will be sourced from groundwater. Total effluent generation from various units will be 1500 CMD. (Raw stillage will be 807 CMD, Condensate, spent lees and blow down will be 693 CMD*)* Raw stillage will be sent to decanter followed by MEE followed by dryer to produce DDGS. Rest all other effluent stream will be treated in 750 CMD CPU.

Power requirement will be 2.65 MW and will be met from own captive power plant. Proposed unit will have 500 kVA x1. DG set will be used only as standby during power failures. Stack height >11 m will be

provided as per CPCB norms to the proposed DG set. Industry proposes to install boiler of capacity 30 TPH with 3.5 MW TG. Electrostatic precipitator with 56 m stack will be installed for proposed boiler.

Details of process emissions generation and its management:

Project Activity	Anticipated pollutant	Management
Process emissions	CO_2 and Negligible VOCs.	CO_2 shall not be release in the air. Industry will provide CO_2 scrubber to scrub CO_2 and bottle it.
Stack, Fugitive emissions, material handling.	PM_{10}, $PM_{2.5}$, NO_X, SO_2,	Electrostatic precipitator with 56 m stack.

Details of Solid waste/Hazardous waste generation and its management:

Sr.No.	Type of waste	Quantity	Final Disposal
1.	Coal ash	52 TPD	Sold to brick manufacturers
2.	Agri waste and husk ash	22.5 TPD	Ash will be used as manure
3.	CPU Sludge	25 TPD	Used as manure.
4.	Spent oil	0.6 KLA	Authorized recycler
5.	DDGS	70 TPD	Sold to cattle feed

As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed capacity of 100 KLPD will be for manufacturing of fuel ethanol only.

During the deliberations EAC directed PP to submit an undertaking for the following commitments:

- Proposed parking area shall be increased to 15 %.
- PP shall allocate Rs. 25 Lakhs Fund for occupational health and safety.
- For Ethanol production fresh water requirement should not exceed 4.0 kL/kL.
- Industry shall construct rain water storage facility of capacity from which it can meet at least 60 days fresh water requirement.
- The proposed budget on CER i.e Rs 2.0 crores shall be spent on installation of solar power & improving infrastructure of schools within villages nearby. It was also suggested that the proposed activities under CER shall be completed before the commissioning of the plant.

PP has submitted the desired information but the amount of fresh water requirement and CER is not as decided by EAC.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields,

have examined the proposal submitted by the Project Proponent in desired form along with the EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee deliberated on the CER plan and found to be addressing the issues in the study area. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of environmental clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance, subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). As per OM dated 16th June, 2021, project falls in category B2 and the proposed additional capacity of 100 KLPD shall be only for fuel ethanol manufacturing as per self-certification in form of an affidavit by the Project Proponent. Provided that subsequently if it is found that the ethanol, produced based on the EC granted as per this dispensation, is not being used completely for EBP Programme, or if ethanol is not being produced, or if the said distillery is not fulfilling the requirements based on which the project has been appraised as category B2 project, the EC shall stand cancelled.

(ii). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(iii). The project proponent will treat and reuse the treated water within the factory and no waste or treated water shall be discharged outside the premises.

(iv). Total fresh water requirement shall not exceed 4kL fresh water consumed/kL production of Ethanol and it will be met from ground water. Extraction of ground water shall not be done without obtaining prior permission of CGWA/concerned authority. No ground water recharge shall be permitted within the premises. Industry shall construct rain water storage facility of capacity from which it can meet at least 60 days fresh water requirement.

(v). The spent wash shall be concentrated and dried to form DDGS to be used as cattle feed.

(vi). CO_2 generated from the process shall be bottled/made solid ice and utilized/sold to authorized vendors.

(vii). Occupational Health Centre for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with required safety kits/mask for personal protection.

(viii). Training shall be imparted to all employees on safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.

(ix). The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.

(x). Process organic residue and spent carbon, if any, shall be sent to Cement other suitable industries for its incinerations. ETP sludge, process inorganic & evaporation salt shall be disposed of to the TSDF.

(xi). The company shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize waste; (b) Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapour recovery system. (f) Use of high pressure hoses for equipment clearing to reduce wastewater generation.

(xii). The green belt of 5 m width shall be developed in nearly 33% of the total project area, mainly along the plant periphery. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map. Development of greenbelt shall be completed along with commissioning of the project.

(xiii). PP proposed to allocate Rs. 2.00 Crores for CER and it shall be spent on shall be spent on installation of solar power & improving infrastructure of schools within villages nearby. All the proposed activities under CER shall be completed before the commissioning of the plant.

(xiv). There shall be 15% space inside the plant premises earmarked for parking of vehicles for raw materials and finished products as per CPCB norms and no parking to be allowed outside on public places.

(xv). Storage of raw materials shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.

(xvi). Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.

(xvii). A separate Environmental Management Cell (having qualified person with Environmental Science/Environmental Engineering/specialization in the project area) equipped with full-fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.

Agenda No. 42.14

Expansion of 60 KLPD Molasses Based Distillery to 150 KLPD B & C Molasses/Cane Syrup based distillery by M/s. Natural Sugar and Allied Industries Ltd. (NSAIL) located at Sainagar, Village Ranjani, Tal. Kallam, Dist. Osmanabad, Maharashtra - Consideration of Environment Clearance.

[IA/MH/IND2/223246/2021, IA-J-11011/35/2021-IA-II(I)]

The proposal was earlier placed before the EAC (Ind-2) in its 40th and 41st meeting held during 14th - 16th September, 2021 and 28th - 30th September, 2021 respectively wherein EAC deferred the proposal and desired certain requisite information/inputs.

Information desired by the EAC and responses submitted by the project proponent is as under:

S. No	ADS	Reply of PP	Observation of EAC
1.	During the deliberations it was informed to EAC	PP/Consultant has stated that never concealed	EAC deliberated

	that the CCR issued by IRO, Nagpur dated 29.06.2021 mentioned that there is no court case against the project whereas PP has submitted (Form-2) that there is an ongoing court case against the project since 2015. Further, EAC has also noted that PP/consultant have concealed the fact in the documents and in presentation. EAC directed PP to resubmit the case furnishing the details of court case.	any information wrt Court case. As far as mention of 'no court case' in IRO MoEFCC report dated 29.06.2021 is concern, the same was discrepancy which was communicated to IRO when observed. Subsequent to communication of discrepancy, IRO have revised the report for statement of court case against Violation of 30 to 60 KLPD distillery. Copy of same has been submitted. Further, details of court case were also presented in Form-2, EDS reply and EC presentation at slide NO.2 Sr. 17. Further. PP has again submitted the documents wrt court case No. 300168/2015 dated 08.04.2015 pending in Osmanabad District Court filed against Violation of 30 to 60 KlPD distillery. The latest online status and court case documents have been submitted.	the issue and found it satisfactory.

The Project Proponent and the accredited Consultant M/s. Equinox Environments (I) Pvt. Ltd., made a detailed presentation through Video Conferencing (VC) on the salient features of the project and informed that:

The proposal is for environmental clearance to the project for Expansion of 60 KLPD Molasses Based Distillery to 150 KLPD B & C Molasses/Cane

Syrup based distillery by M/s. Natural Sugar and Allied Industries Ltd. (NSAIL) located at Sainagar, Village Ranjani, Tal. Kallam, Dist. Osmanabad, Maharashtra.

The project/activities are covered under category A of item 5 (g) 'Distilleries' of the Schedule to the EIA, 2006 and requires appraisal at central level by the sectoral Expert Appraisal Committee (EAC). The proposal has been submitted under the Ministry's EIA Notification, 2006 amendments vide Notification no. S.O. 345(E) dated 17th January 2019 & extension of notification S.O. 750(E) dated 17th February 2020, S.O 980(E) dated 2nd March, 2021. Accordingly, the proposal has been appraised as category 'B2' project.

The project proposal is exempted from obtaining ToR & conducting Public Hearing as per EIA notification, 2006 amendment vide S.O 980(E) dated 2nd March, 2021. It was informed that litigation is pending against the project. A court case is pending against distillery for violation (for Capacity 30-60 KLPD) in Osmanabad district court vide No. 300168/2015 dated 08.04.2015.

SEIAA, Maharashtra has issued EC earlier vide letter No.SIA/MH/IND2/50667/2006 dated 31st March, 2020 to the existing 60 KLPD Molasses based Distillery in favour of M/s. Natural Sugar and Allied Industries Ltd. (NSAIL).

The details of products and capacity are as under:

Industrial Unit	**Product**	**Quantity**		
		Existing-	**Expansion-**	**Total After Expansion**
Distillery Unit	Rectified Spirit (RS)/ ENA	60	--	60
	Ethanol (C-Heavy)	60	90	150
	Ethanol (B-Heavy)	--	150	150
	Ethanol (Cane Syrup)	--	150	150
	Fusel Oil	2.4	3.6	6

Total plot land area is 5,16,006 M^2. Existing built-up area 92,960 M2; additional built-up for proposed project will be 5400 M^2. Industry has already developed green belt 2,67,093 M^2 (51.7% out of total plot area). Deification of existing Green belt will be done under expansion activity. The estimated project cost is Rs. 129.58 Crores including existing investment of Rs. 69.58 Crores. The distillery will be operated for 330 days. Total capital cost earmarked towards environmental pollution control measures under proposed project will be Rs.5.3 Crores and the Recurring cost (operation and maintenance) will be about Rs.0.65 Crores per annum. Total Employment will be 170 persons as direct & indirect

after proposed project. Industry proposes to allocate Rs.60 Lakh @ of 1 % towards Corporate Social Responsibility.

There are no national parks, Biosphere Reserves, Tiger/Elephant Reserves, Wildlife Corridors etc. within 10 Km Study Area. Manjara River is flowing at a distance 4 Km from East to west.

Total water requirement after proposed project will be 2400 CMD. Out of which 442 CMD will be fresh water taken from Manjara river. The process effluent generated after expansion of 150 KLPD Molasses/Cane Syrup based Distillery would be in the form of raw spentwash to the tune of 1200 M^3/D. The same would be forwarded for Bio-methanation and concentrate in MEE, conc. spentwash to the tune of 160 M^3/D (1.06 KL/KL of alcohol) would be blended with coal/bagasse and burnt in existing 20 TPH incineration boiler. Other effluents viz. spent lees @ 202 M^3/D, MEE condensate @ 1040 M^3/D and allied effluents @ 75 M^3/D will be treated in CPU under Distillery. Treated effluent from CPU will be reused in process and boiler makeup, thereby achieving Zero Liquid Discharge (ZLD) for Distillery.

Power requirement for proposed project will be 2200 KW which will be met from own Co-Gen Plant. Existing 285 KVA DG Set, which will be operated only during failure. No additional DG set will be installed under expansion activity. Existing distillery has 20 TPH Incineration boiler. ESP with a stack of height of 60 M is installed for controlling the particulate emissions within the statutory limit of 115 mg/Nm^3 for the boiler.

Details of process emissions generation and its management:

The CO_2 generation shall take place in fermenters of the distillery. CO_2 to the tune of 124 MT/Day shall be released from 150 KLPD distillery plant. CO_2 under existing unit is being compressed, bottled and supplied to manufacturers of beverages. The same practice shall be followed after distillery expansion.

Details of Solid waste/Hazardous waste generation and its management:

No.	Industrial Unit	Type	Quantity (MT/M)		Disposal
			Existing	After Expansion	
1	Distillery	Boiler Ash	360	1140	Supply to brick manufacturing
		Yeast Sludge	360	960	Burnt in Incineration Boiler
		CPU	17	40	Used as Manure

		Sludge			

Visit of IRO, MoEFCC, Nagpur was conducted on 14.06.2021 and issued certified compliance report for the project vide File No. 5-40/2013(Env)/8198 dated 29.06.2021.

As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed expansion of 90 KLPD will be for manufacturing of fuel ethanol only.

During deliberations PP has stated that a court case is pending against distillery for violation (for Capacity 30-60 KLPD) in Osmanabad district court vide No. 300168/2015 dated 08.04.2015. Further, PP has also submitted Bank Guarantee for violation in previous EC to Maharashtra Pollution Control Board. EAC was satisfied of the reply by PP and suggested that PP shall submit NOC from MPCB to the Ministry.

After deliberations, EAC directed that PP shall construct a brick making plant within the industry which shall utilize spent wash and coal ash after combustion in incineration boiler for making bricks. Further, EAC suggested that PP shall utilize funds allocated for RS. 1.0 Crore towards CER for providing drinking water facilities and for installing solar street lights within nearby villages. PP shall install minimum 0.5 MW Solar Generation Plant in factory premises. PP agreed for the same and submitted an undertaking in the compliance of the above.

PP has submitted the desired information as sought above and EAC found it to be in order and recommended the proposal for grant of EC.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with the EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee noted that the EMP report is in compliance of the PFR. The Committee deliberated on the CER plan and found to be addressing the issues in the study area. The Committee has found the additional information submitted by the project proponent to be satisfactory and addressing the issues raised by the Committee. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time

and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of environmental clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance, subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). As per OM dated 16th June, 2021, project falls in category B2 and the proposed additional capacity of 90 KLPD shall be only be used for fuel ethanol manufacturing as per self-certification in form of an affidavit by the Project Proponent. Provided that subsequently if it is found that the ethanol, produced based on the EC granted as per this dispensation, is not being used completely for EBP Programme, or if ethanol is not being produced, or if the said distillery is not fulfilling the requirements based on which the project has been appraised as category B2 project, the EC shall stand cancelled.

(ii). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(iii). The project proponent will treat and reuse the treated water within the integrated industry and no waste or treated water shall be discharged outside the premises.

(iv). Total fresh water requirement for the industry shall not exceed 2400 CMD and it will be met from Manjara River. No ground water recharge shall be permitted within the premises. Rainwater shall be collected in storage ponds and utilized for plant activities. Ground water monitoring shall be done regularly and report is to be submitted to concerned authorities regularly.

(v). Raw spent wash will be sent for Bio-Methanation and concentrate in MEE. Concentrated spentwash will burnt in inceneration boiler. PP shall install brick manufacturing plant within factory for utilization of ash obtained from combustion for manufacturing bricks.

(vi). CO_2 generated from the process shall be bottled/made solid ice and utilized/sold to authorized vendors.

(vii). Occupational Health Centre for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with required safety kits/mask for personal protection.

(viii). Training shall be imparted to all employees on safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.

(ix). The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.

(x). Process organic residue and spent carbon, if any, shall be sent to Cement other suitable industries for its incinerations. ETP sludge, process inorganic & evaporation salt shall be disposed of to the TSDF.

(xi). The company shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize waste; (b) Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapour recovery system. (f) Use of high pressure hoses for equipment clearing to reduce wastewater generation.

(xii). The green belt of at least 5-10 m width shall be developed in nearly 33% of the total project area, mainly along the plant periphery. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map.

(xiii). As committed PP shall spend Rs. 1.0 Crore for providing drinking water facilities and for installing solar street lights within nearby villages.

(xiv). There shall be adequate space inside the plant premises earmarked for parking of vehicles for raw materials and finished products as per CPCB norms and no parking to be allowed outside on public places.

(xv). Storage of raw materials shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.

(xvi). Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB

server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.

(xvii). A separate Environmental Management Cell (having qualified person with Environmental Science/Environmental Engineering/specialization in the project area) equipped with full-fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.

Agenda No. 42.15

Proposed expansion of Bio-Ethanol Refinery of 100 KLPD by M/s. Bharat Petroleum Corporation Limited located at Plot no. 610 and plot no. 598 (Part-I), Baulsingha Village, Bhatli Tehsil, Bargarh District, Odisha - Consideration of Environment Clearance.

[IA/OR/IND2/221065/2021, IA-J-11011/351/2017-IA-II(I)]

The proposal was earlier placed before the EAC (Ind-2) in its 40th meeting held during 14th - 16th September, 2021 wherein EAC deferred the proposal and desired certain requisite information/inputs.

Information desired by the EAC and responses submitted by the project proponent is as under:

S. No	ADS	Reply of PP	Observation of EAC
1.	During the appraisal EAC observed that proposed fresh water requirement is high. Therefore, EAC directed PP to revise water balance reducing requirement of fresh water.	The revised fresh water consumption for 1G ethanol plant shall be around 3.95 liter/liter of ethanol production (non-monsoon season).	EAC noted that the fresh water requirement has been revised to 395 KLPD and found it in satisfactory.
2.	Further, EAC desired that PP shall incorporate details of rainwater harvesting while calculating fresh water requirement.	Rain water harvesting of around 15 kl per day is expected during monsoon season. Fresh water consumption during monsoon season shall be 3.80 liter/liter of ethanol production. Revised water balance is submitted.	EAC deliberated the issue and found it satisfactory.

The Project Proponent and the accredited Consultant M/s. Sd Engineering Services Pvt. Ltd made a detailed presentation on the salient features of the project and informed that:

The proposal is for environmental clearance to the project for Proposed expansion of Bio-Ethanol Refinery of 100 KLPD by M/s. Bharat Petroleum Corporation Limited located at Plot no. 610 and plot no. 598 (Part-I), Baulsingha Village, Bhatli Tehsil, Bargarh District, Odisha.

As per the MoEF&CC Notification S.O. 2339(E), dated 16th June, 2021, a special provision in the EIA Notification, 2006-(Schedule 5 (ga), Category B2) is made, wherein for all applications made for Grain based distilleries with Zero Liquid Discharge producing ethanol; solely to be used for Ethanol Blended Petrol Programme of the Government of India shall be considered under B2 Category and appraised at Central Level by Expert Appraisal Committee (EAC) with condition that the project proponent shall file a notarized affidavit that ethanol produced from proposed project shall be used completely for EBP Programme.

Standard ToR and public Hearing conduction is not applicable as the project falls under category B2 as per OM dated 16th June, 2021. It was informed that no litigation is pending against the project.

Ministry had issued EC earlier vide letter no. IA-J-11011/351/2017-IA-II(I) dated 10/08/2018 to the existing project of Ligno-cellulosic 2G Ethanol Plant of 100 KLPD.

The details of products and capacity are as under:

Sr. No.	Product / By-product	Unit	Quantity (Capacity)			Remark
			Existing (2G)	Proposed (1G)	Total	
1	Ethanol	KLPD	100	100	200	Product
2	Fusel oil	L/d	200	200	400	By Product
3	DDGS	TPD	0	51	51	Co-Product

Existing land area is 227150 m^2 and no additional land will be required for proposed expansion. Industry will develop greenbelt in an area of 33 % i.e., 20424 m^2 (To meet the 33% Green Belt requirement, Green belt of 5.04 acres (20424 sq.m) in being developed inside the plot while remaining Green belt of 15.28 acres (61835 sq.m) is being developed in additional Land allotted outside the plot area through Department of Forest) out of total area of the project. The estimated project cost is Rs. 170 Cr. including existing investment of Rs.747.46 Cr. Total capital cost earmarked towards environmental pollution control measures is Rs. 3.4 Cr. and the Recurring cost (operation and maintenance) will be about Rs. 0.34 Cr per annum. Total additional employment will be 25 persons per shift (Skilled: 10 nos. per shift + Unskilled: 15 nos. per shift) after expansion. Industry already

allocated/spent more than Rs. 4.25 Cr (more than @ of 2.5 %) towards Corporate Social Responsibility in the state of Odisha in current financial year.

There is Debrigarh wildlife sanctuary away from plot area by distance of 7.6 km towards NEE direction. Eco Sensitive Zone (notified vide dated 07th June, 2017) around sanctuary is away from plot area by distance of 2.65 km towards NEE direction. Danta river is flowing in the NEE (3.4 km) and Jira river is 7.86 km in SSW from the project site.

Water requirement for 1G ethanol plant is 2139 CMD (Fresh – 395 CMD & Recycled-1744 CMD) will be met from canal ~ 7 km Bargarh canal. Total Industrial Effluent of 46.978 m^3/Hr (1128 CMD) quantity will be treated through existing ETP of capacity: 67 m^3/hr i.e. 1608 CMD; complying with MoEF&CC/CPCB norms. Treated process condensates & treated effluent shall be recycled. The plant will be based on Zero Liquid discharge system.

Power requirement after expansion will be 18 MW including (Existing15 MW + Proposed 3 MW) and will be met from Western electricity Supply Company of Odisha Limited (WESCO). Also 3 MW captive power plant (CPP) shall be proposed for catering the power requirement (1G Ethanol plant). Existing unit has 2 DG sets of 2500 KVA capacity each and same shall be utilized for proposed plant also. Stack height (16 m) will be provided as per CPCB norms to the DG sets. Existing unit has 2 boilers of capacity 48TPH and fuel as Mixture feed (Syrup: 250 TPD + Lignin cake: 380 TPD + Rice straw: 262 TPD). Additionally 1 boiler of capacity 30TPH and fuel as Rice Husk/Straw (210 TPD) will be used. ESP with a stack of height of 90 m (common stack) for 48TPH boiler and 39 m for 30 TPH boiler will be installed for controlling the particulate emissions within the statutory limit of 150 mg/Nm^3 for the proposed boilers.

Details of process emissions generation and its management:

CO2 shall be emitted and adequate measures shall be taken. Biogas shall be generated which shall be flared/burned in boiler

Details of Solid waste/Hazardous waste generation and its management:

Non- Hazardous Waste

Sr. No	Type of Waste	Quantity (TPD)			Source of Generation	Disposal
		Existing	Proposed	Total		
1.	Dewatered Sludge	12 TPD	3 TPD	15 TPD	Process Condensate Treatment	as manure for agricultural

					Plant	fields
2.	Boiler Ash	120 TPD	35 TPD	155 TPD	From Boiler	Sale to Brick Manufacturer Industry
3.	Mud	21 TPD	0	21 TPD	-	Landfilling

Hazardous Waste: There is no Hazardous Waste from site

Details of Certified compliance report submitted by RO, MoEF&CC. – CCR received from MoEF&CC RO-Bhubaneshwar vide letter dated File No. 101-1034/EPE/955 dated 18/08/2021.

As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed capacity of 100 KLPD will be for manufacturing of fuel ethanol only.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with the EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee noted that the EMP report is in compliance of the PFR. The Committee deliberated on the CER plan and found to be addressing the issues in the study area. The Committee has found the additional information submitted by the project proponent to be satisfactory and addressing the issues raised by the Committee. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of environmental clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act,

1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance, subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). As per OM dated 16th June, 2021, project falls in category B2 and the proposed capacity of 100 KLPD shall be only be used for fuel ethanol manufacturing as per self-certification in form of an affidavit by the Project Proponent. Provided that subsequently if it is found that the ethanol, produced based on the EC granted as per this dispensation, is not being used completely for EBP Programme, or if ethanol is not being produced, or if the said distillery is not fulfilling the requirements based on which the project has been appraised as category B2 project, the EC shall stand cancelled.

(ii). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(iii). The project proponent will treat and reuse the treated water within the factory and no waste or treated water shall be discharged outside the premises.

(iv). Total fresh water requirement shall not exceed 395 KLPD will be met from Bargarh canal. Prior permission shall be obtained from the concerned regulatory authority/CGWA in this regard, and renewed from time to time. No ground water recharge shall be permitted within the premises.

(v). The spent wash shall be concentrated and dried to form DDGS to be used as cattle feed.

(vi). CO_2 generated from the process shall be bottled/made solid ice and utilized/sold to authorized vendors.

(vii). Occupational Health Centre for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with required safety kits/mask for personal protection.

(viii). Training shall be imparted to all employees on safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.

(ix). The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.

(x). Process organic residue and spent carbon, if any, shall be sent to Cement other suitable industries for its incinerations. ETP sludge, process inorganic & evaporation salt shall be disposed of to the TSDF.

(xi). The company shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize waste; (b) Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapour recovery system. (f) Use of high pressure hoses for equipment clearing to reduce wastewater generation.

(xii). The green belt of at least 5-10 m width shall be developed in nearly 33% of the total project area, mainly along the plant periphery. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map.

(xiii). As per the Ministry's OM dated 30.09.2020 superseding the OM dated 01.05.2018 regarding the Corporate Environmental Responsibility, and as per the action plan proposed by the project proponent to address the socio-economic and environmental issues in the study area, the project proponent, as committed, shall provide education funds in technical training centers/ support in nearby village's schools, support in health care facilities, drinking water supply and funds for miscellaneous activities like solar street lights, battery, solar panel etc., in the nearby villages. The action plan shall to be completed within time as proposed.

(xiv). There shall be adequate space inside the plant premises earmarked for parking of vehicles for raw materials and finished products as per CPCB norms and no parking to be allowed outside on public places.

(xv). Storage of raw materials shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.

(xvi). Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.

(xvii). A separate Environmental Management Cell (having qualified person with Environmental Science/Environmental Engineering/specialization

in the project area) equipped with full-fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.

Agenda No. 42.16

Proposal for distillery expansion from 200 KLPD to 845 KLPD to manufacture Ethanol at Belgaum, Karnataka by M/s. The Ugar Sugar Works Ltd located at Ugar Khurd village, Athani Taluk, Belgaum District, Karnataka State - Consideration of Environment Clearance reg.

[IA/KA/IND2/221757/2021, J-11011/335/2012-IA II (I)]

The proposal has been considered in the 39th EAC meeting wherein expansion has been recommended without achieving existing EC production capacity i.e 200 KLPD. The proposal has been referred back to EAC by competent authority to provide justification for recommending the proposal without fully achieving the production capacities of existing EC. In this regard EAC informed that the following things were considered before recommending the proposal:

- Production of biofuels is the need of hour and the proposal is in line with EBP programme under National Policy of Biofuels.
- Increase in production capacity results in the optimum utilization of raw materials and other utilities involved.
- Economies of scale are better for a project of larger production capacity compared to a project of smaller production capacity.
- There has been no compromise to the environmental standards/issues as the project is adhering to Zero Liquid Discharge.
- PP has submitted the proposal with CCR (Certified Compliance Report) issued by concerned IRO (Integrated Regional Office) with the capacity at which plant is operating.
- As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed expansion will be for manufacturing of fuel Ethanol only.

Agenda No. 42.17

Proposed expansion of sugarcane crushing capacity from 10000 TCD to 15000 TCD to augment the requirement of sugarcane syrup/juice as raw material during sugarcane crushing season and to expand the Distillery capacity from 300 KLPD to 600 KLPD for production of Ethanol and captive power plant from 5 MW to 8 MW under EBP programme by M/s. Shri Sai Priya Sugars Ltd.,

located at Survey Nos. 144, 145, 146, 147, 148, 149, 150 & 151 of Maigur Village and Survey Nos. 238 & 239 of Hipparagi Village, Jamakhandi Taluk, Bagalkot District, Karnataka - Consideration of Environment Clearance.

[IA/KA/IND2/219708/2021, J-11011/277/2010-IA II(I)]

The proposal has been considered in the 39th EAC meeting wherein expansion has been recommended without achieving existing EC production capacity i.e 300 KLPD. The proposal has been referred back to EAC by competent authority to provide justification for recommending the proposal without fully achieving the production capacities of existing EC. In this regard EAC informed that the following things were considered before recommending the proposal:

- Production of biofuels is the need of hour and the proposal is in line with EBP programme under National Policy of Biofuels.
- Increase in production capacity results in the optimum utilization of raw materials and other utilities involved.
- Economies of scale are better for a project of larger production capacity compared to a project of smaller production capacity.
- There has been no compromise to the environmental standards/issues as the project is adhering to Zero Liquid Discharge.
- PP has submitted the proposal with CCR (Certified Compliance Report) issued by concerned IRO (Integrated Regional Office) with the capacity at which plant is operating.
- As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed expansion will be for manufacturing of fuel Ethanol only.

Agenda No. 42.18

Proposed Increase in Distillery capacity from 135 KLPD to 350 KLPD to produce Ethanol Based on Sugarcane juice/ Syrup/"C"/"B" Heavy Molasses/ Grains/ Raw Sugar by M/s. SGZ & SGA Sugars (JV) Limited located at Turchi, Taluka Tasgaon, District Sangli, Maharashtra - Consideration of Environment Clearance.

[IA/MH/IND2/216976/2020, J-11011/226/2020-IA-II(I)]

The proposal has been considered in the 40th EAC meeting wherein expansion has been recommended without achieving existing EC production capacity i.e 135 KLPD. The proposal has been referred back to

EAC by competent authority to provide justification for recommending the proposal without fully achieving the production capacities of existing EC. In this regard EAC informed that the following things were considered before recommending the proposal:

- Production of biofuels is the need of hour and the proposal is in line with EBP programme under National Policy of Biofuels.
- Increase in production capacity results in the optimum utilization of raw materials and other utilities involved.
- Economies of scale are better for a project of larger production capacity compared to a project of smaller production capacity.
- There has been no compromise to the environmental standards/issues as the project is adhering to Zero Liquid Discharge.
- PP has submitted the proposal with CCR (Certified Compliance Report) issued by concerned IRO (Integrated Regional Office) with the capacity at which plant is operating.
- As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed expansion will be for manufacturing of fuel Ethanol only.

Agenda No. 42.19

Panipat Refinery Capacity Expansion from Existing 15 MMTPA to 25 MMTPA within the Existing Refinery Complex by M/S. Indian Oil Corporation Limited (IOCL) located at PR 42-128, Baholi Village, Panipat District, Haryana - Consideration of Environment Clearance reg.

[IA/HR/IND2/220613/2018, J-11011/177/2016- IA II(I)]

The proposal was earlier placed before the EAC (Ind-2) in its 40th meeting held during 14th - 16th September, 2021 wherein EAC deferred the proposal and desired certain requisite information/inputs.

Information desired by the EAC and responses submitted by the project proponent is as under:

S. No	ADS	Reply of PP	Observation of EAC
1.	The emission concentrations of different stack is mentioned in g/sec, which is required to be converted in mg/Nm3 w.r.t gas/liquid fuel type	The tabulation after conversion of values to mg/Nm^3 has been submitted.	EAC deliberated the issue and found it satisfactory.

	of boiler, furnace, power plant, FCC generators. The emission norms are prescribed in mg/Nm3 and fuel used by the refinery is mixed fuel. Accordingly, the concentration of PM, SOX, NOX, CO, H2S of the stack should be mentioned in mg/Nm3.		
2.	Further Sulphur content in liquid fuel in % is not mentioned and recovery of sulphur in % in terms of capacity (Tonnes/day) is required.	Sulphur content in the liquid fuel is less than 0.5%. Total Sulphur Recovery Unit capacity is 135% of recoverable sulphur. The sulphur balance for proposed SRU requirement in P25 Project has been submitted.	EAC deliberated the issue and found it satisfactory.
3.	As the plant is located in NCR zone, what extra precaution has been taken by the unit to reduce further air pollution in NCR area.	Precautions taken for the proposed facility to reduce further air pollution in NCR area: a) RLNG will be the major fuel for the proposed facility. Liquid fuel consumption will be minimized *except in case of emergency*. b) VOC recovery system will be installed in the proposed ETP. c) Low NOx burners will be used in the proposed furnaces. The same are already in use in the existing furnaces. d) Vacuum Gas Oil (VGO) Hydrotreater unit is being incorporated to remove sulphur from the VGO stream before feeding to	EAC found the explanation satisfactory.

		downstream conversion units. e) Off-gases will be treated with amine to remove the sulphur present in it before being utilized in furnaces. f) Ten number of ambient air stations (2 in Panipat city, 1 in township & 7 within the refinery premises) have been installed by IOCL Panipat for monitoring of ambient air quality as per the NAAQS standards. g) 2G and 3G Plants are already under implementation by IOCL Panipat. The 2G plant will help in reduction of PM caused by indiscriminate prairie burning.	
4.	Existing List of Hazardous emissions in work environment including Hydrogen Sulfide, the levels (annual average) in micrograms, Additional hazardous emissions following additional, plant, technology, raw material use and waste, Medical surveillance using Biological monitoring, Results of Bio monitoring.	List of Hazardous Emissions: VOCs (Methane and other HCs), Benzene, H2S, SO2, NOx, PM, CO, Sulphides / Di-Sulphides. Measures for arresting hazardous emissions in work environment for the proposed facility: a) VOC recovery system shall be installed in proposed ETP facility. b) External Floating roof tanks will have double foam seals to	EAC found the explanation satisfactory.

		reduce fugitive emissions. c) LDAR monitoring through external agency will be conducted on quarterly basis for leak detection of VOCs and any leak is being attended promptly. d) H2S gas detectors shall be installed at H2S potential locations for early detection and rectifications. In potential units Operating personnel shall be provided with personal responders. e) Amine absorption system shall be incorporated to scavenge H2S, which will then be routed to SRU for extraction of sulphur in elemental form. No new chemical, waste and raw material is being envisaged in proposed facility. So, no further addition of any new hazardous emissions from the proposed facility. Biological Monitoring: Occupational Health Assessment is done of the employees at fixed periodicity. Reports are generated and monitored for adverse impact, if any. Bio monitoring detail has been submitted.	

5.	Compliance report of recommendations given by the committee constituted by Hon'ble NGT comprising of members of NEERI & CPCB.	As per the present status, all recommendations have been complied. The latest compliance status has been submitted.	EAC found the reply satisfactory.
6.	Total pollution load generated in terms of sulphur dioxide emissions & mitigating measures for the same along with standby sulphur recovery unit in case of failure of any SRU to avoid acid rain in the surrounding areas.	5 Sulphur Recovery Unit are existing. 2 additional units will be installed. Hence, total 7 units shall be available with a combined capacity of 135% of recoverable sulphur. Accordingly, one unit will be in standby mode. The sulphur balance with capacity calculation has been submitted.	EAC found the reply satisfactory.
7.	No effluent shall be discharged in any of drains which may lead to pollution in river Yamuna.	Proposed facility shall be having ZLD. Hence, no effluent shall be discharged outside the premises.	EAC found the reply satisfactory.
8.	As per policy of government, 10% of H_2 shall be produced by the PP through Green Hydrogen route.	IOCL shall comply with the policy of Government on Green H2.	EAC found the reply satisfactory.

The project proponent and their consultant M/s. Hubert Enviro Care System (P) Ltd, Chennai, made a detailed presentation through Video Conferencing (VC) on the salient features of the project.

The proposal is for Environmental Clearance to the project for Panipat Refinery Capacity Expansion from Existing 15 MMTPA to 25 MMTPA within the Existing Refinery Complex by M/S. Indian Oil Corporation Limited (IOCL) located at PR 42-128, Baholi Village, Panipat District, Haryana.

All main products: Propylene, LPG, Naphtha, MS BS-VI, ATF, HSD BS-VI, Bitumen, RPC, Sulphur and LOBS listed at S. No. 4 (a) - "Petroleum Refining Industries" of Schedule of Environmental Impact Assessment (EIA) Notification under Category 'A', and are appraised by Central Level by Expert Appraisal Committee (EAC).

The ToR has been issued by Ministry vide letter No. IA- J-11011/177/2016-IA II(I); dated 24th August, 2018. Public Hearing for the proposed project has been conducted by Haryana State Pollution

Control Board on 06.04.2021 and chaired by Deputy Commissioner, Panipat. The main issues raised during the public hearing are related to basic facilities for schools, labour facilities and crops getting damaged by neel gaye due to the green belt area of the PRPC. It was informed that no litigation is pending against the proposal.

Ministry had issued EC earlier vide letter no. J-11011/177/2016-IA-II(I) dated 26.03.2018 to the existing project in favour of M/s. Indian Oil Corporation Limited, Panipat Refinery.

The details of products and capacity are as under:

Existing & Proposed Products

S. No.	Products details	Unit	Existing Quantity	Proposed Quantity	Total Quantity
1	Propylene	TMTPA	123	554	677
2	LPG	TMTPA	438	752	1190
3	Naphtha	TMTPA	1435	407	1842
4	MS BS-VI	TMTPA	1965	1483	3448
5	ATF	TMTPA	1751	500	2251
6	HSD BS-VI	TMTPA	6932	5074	12006
7	Bitumen	TMTPA	449	41	490
8	RPC	TMTPA	884	0	884
9	Sulphur	TMTPA	200	187	387
10	LOBS	TMTPA	0	526	526

Existing & Proposed Capacities

S. No	Plant / Equipment / Facility	Units	Existing Configuration	Proposed Configuration	Final configuration after expansion
1.	CDU 1	MMTPA	7.5	-	7.5
2.	VDU 1	MMTPA	3.75	-	3.75
3.	Resid Fluidized Catalytic Cracking Unit (RDCCU)	MMTPA	0.85	-	0.85
4.	Propylene Separation Unit (PSU)	MMTPA	0.225	-	0.225
5.	Once Thru Hydrocracker Unit	MMTPA	1.9	-	1.9
6.	Continuous Catalytic Reforming Unit (CCRU)	MMTPA	0.65	-	0.65
7.	Hydrogen	TMTPA	38	-	38

S. No	Plant / Equipment / Facility	Units	Existing Configuration	Proposed Configuration	Final configuration after expansion
	Generation Unit (HGU)				
8.	VisbreakerUnit (VBU)	MMTPA	0.4	-	0.4
9.	Diesel Hydro Desulphurisation Unit (DHDS)	TMTPA	0.77	-	0.77
10.	Bitumen Blowing Unit (BBU)	MMTPA	0.5	-	0.5
11.	SulphurRecovery Units (SRU/SSRU)	TPD	2 *115	-	2 *115
12.	Amine Regeneration Unit	m^3/hr	400	-	400
13.	Sour Water Strippers I (Refinery)	m^3/hr	71.8	-	71.8
14.	Sour Water Strippers II (OHCU)	m^3/hr	16	-	16
15.	SR LPG treatment	MMTPA	0.142	-	0.142
16.	Merox: 1.FCCGasoline 2.CrackedLPG(FCC+DCU) 3.ATF/KERO	TPA	190000 200000+100000 1150000	-	190000 200000+100000 1150000
17.	Crude Distillation Unit (CDU-II)	MMTPA	7.5	-	7.5
18.	Vacuum Distillation Unit (VDU-II)	MMTPA	3.75	-	3.75
19.	Hydrocracker Unit	MMTPA	1.8 1.7	-	1.8 1.7
20.	Delayed Coker Unit	MMTPA	3.0	-	3.0
21.	Hydrogen Generation Unit (HGU –2&3)	MTPA	2*70	-	2*70
22.	Sulphur Recovery Units SRU (3,4 &5)	TPD	3 *225	-	3 *225
23.	Coker LPG Merox unit	MMTPA	0.1	-	0.1

S. No	Plant / Equipment / Facility	Units	Existing Configuration	Proposed Configuration	Final configuration after expansion
24.	Straight Run LPG Merox unit	MMTPA	0.142	-	0.142
25.	Diesel Hydrotreating Unit (DHDT)	TMTPA	3.5	-	3.5
26.	Amine Regeneration Unit (ARU-II)	m^3/hr	410	-	410
27.	Sour Water Stripper (SWS-III)	m^3/hr	170	-	170
28.	Hydrocracker Sour Water Stripper (SWS-IV)	m^3/hr	40	-	40
29.	NSU-II	TPA	0.75	-	0.75
30.	Naptha oxygen stripping unit	MTPA	400,000	-	400,000
31.	Naphtha hydrotreating	MTPA	500,000	-	500,000
32.	Continuous catalyst (Platforming + Regeneration)	MTPA	500,000	-	500,000
33.	Shell sulfolane extraction unit	MTPA	152,200	-	152,200
34.	Benzene Toluene fractionation unit	MTPA	379,800	-	379,800
35.	Paraxylene Extraction unit (PAREX)	MTPA	2,025,400	-	2,025,400
36.	Xylene fractionation unit	MTPA	481,700	-	481,700
37.	Trans alkylation Disproportionate (Tatoray) unit	MTPA	360,200	-	360,200
38.	Isomerisation unit (Isomar)	MTPA	1,656,500	-	1,656,500
39.	**PTA UNITS**	MTPA	553000	-	553000
40.	PXFEEDUNIT(NSU-I)	MMTPA (BH)	1.3	-	1.3
41.	NHT	TMTPA	410	-	410
42.	PENEX	TMTPA	400	-	400

S. No	Plant / Equipment / Facility	Units	Existing Configuration	Proposed Configuration	Final configuration after expansion
43.	RSU	TMTPA	470	-	470
44.	FCCGDU	TMTPA	370	-	370
45.	AVU	MMTPA	-	10	10
46.	State Run LPG treatment unit (SR-LPGT)	MMTPA	-	0.152	0.152
47.	VGO Hydrotreater unit	MMTPA	-	3.6	3.6
48.	Diesel hydrotreater unit	MMTPA	-	5.0	5.0
49.	Propylene Recovery unit	MMTPA	-	1.15	1.15
50.	Resid Hydrocracker unit- RHCU	MMTPA	-	2.5	2.5
51.	INDMAX	MMTPA	-	2.5	2.5
52.	NHT/ CCR/ ISOM	MMTPA	-	0.95/0.625/ 0.205	0.95/0.625/ 0.205
53.	HGU	MMTPA	-	0.081	0.081
54.	ALKYLATION	MMTPA	-	0.67	0.67
55.	SARU	MTPD	-	185	185
56.	CDW/LOBS	MMTPA	-	0.56	0.56
57.	SRU-I/II/ TGTU	TPD	-	2*465 /930	2*465 /930
58.	SWS-I/II	TPH	-	252+180	252+180
59.	ARU	TPH	-	1256	1256
60.	MUG Compressor	MMTPA	-	0.17	0.17

Proposed Utilities Capacity

S.No.	Utility	Units	Capacity	Remarks
1	Raw water	m^3/hr	2400	
2	Cooling water from CT1 and CT2	m^3/hr	64000	
3	DM water	m^3/hr	850	
4	Suspect condensate generation	TPH	232.5	This condensate shall be treated in CPU
5	HP steam	TPH	23.5	Case1, All units running at design capacity, except SRU operating to SRU balance
6	MP steam	TPH	231.5	Case1
7	LP steam	TPH	106.3	Case1

S.No.	Utility	Units	Capacity	Remarks
8	HP BFW	TPH	122.3	Case1
9	MP BFW	TPH	171	Case1
10	LP BFW	TPH	14.4	Case1
11	Power	KW	222513	Case1
12	Nitrogen	Nm^3/hr	6500	
13	RLNG	Kg/hr	115116	
14	Plant air	Nm^3/hr	9450	
15	Instrumentation air	Nm^3/hr	11895	
16	ETP	m^3/hr	450	
17	Flare	Kg/hr	2191374	Design

*Note- Total steam requirement is 549 TPH

Existing land area is 6319570.99 m^2 (1561.6 Acres). No additional land will be used for proposed expansion. Industry has already developed greenbelt in an area of 34.5 % (539 Acres) and will develop further 5.5% (86 Acres) greenbelt taking the total to 40% (since it is located in Panipat which is coming under CEPI index) i.e. 2529000 m^2 (625 Acres) out of total area of the project (1561.6 Acres). The estimated project cost is Rs.32946 Crore (30349 for P25+ 2597 Cr for PP). Total capital cost earmarked towards environmental pollution control measures is Rs. 28161.32 Lakhs and the Recurring cost (operation and maintenance) will be about Rs. 2742.74 Lakhs per annum. Total Employment will be 300 persons as direct and 480 persons as indirect after expansion. Industry proposes to allocate Rs.100 Lakhs @ of 5/2.5% towards Corporate Social Responsibility.

There are no national parks, wildlife sanctuaries, Biosphere Reserves, Tiger/Elephant Reserves, and Wildlife Corridors etc. within 10 km radius from the project site. Water bodies: Munak Drain (adjacent to project site(W), New Delhi Branch (Western Yamuna Canal) ~0.05km(S), Main Drain No 2/Indri Drain ~0.05km(E), New Delhi Parallel Branch (Western Yamuna Canal) ~0.1km(S), Gohana Distributary ~0.1km(S), Nahar Kuna Hansi/Hanal Nadi ~0.19km(N), Madlauda Minor ~0.22km(S), Thirana Minor ~0.23km(S), Khandra Drain ~0.67km(S), Begampur Minor ~0.8km(N), Joshi Drain ~0.82km(W), Untala Minor ~1.78km(S), Phurlak Drain ~2.14km(N), Tributary Drain No 1 ~2.32km(SSW), Gagsina East Drain ~2.62(N), Rer Kalan Minor ~2.67km(WNW), Kabir Branch/Bazida Distributary ~2.7km(E), Munak Minor ~2.76km(N), Hansi Branch(Western Yamuna Canal) ~4.31km(NW), Munak Canal ~4.46km(NNW), Goli Distributary ~4.88km(NNW), Gudah Minor ~5.34km(E), Binjhaul Minor ~5.39km(SE), Pabana/Pawana Drain ~5.47km(WNW), Nohra/Nauhra Drain ~5.68km(SSE), Ganda Nala/Panipat Main Drain ~5.7km(ESE), Joshi Distributary ~5.82km(W), Kurian Minor ~5.86km(NW), Untala Drain ~6.6km(S), Mor Majra Drain ~6.81km(W), Ganda Nala ~7.11km(E), Jind Distributary ~7.13km(W),

Khukrana Branch Canal ~7.21km(S), Bhalsi Minor ~7.87km(SSW), Lift Irrigation Channel ~9.7km(N) and Bhadaur Drain ~9.91km(S).

Ambient air quality monitoring was carried out at 8 locations during March 2019 to May 2019 and average baseline data indicates the ranges of concentrations as: PM_{10} (83.59 to 128 µg/m³), $PM_{2.5}$ (42.77 to 64.98 µg/m³), SO_2 (14.92 to 22.83 µg/m³) and NO_2 (27.89 to 43.71 µg/m³). AAQ modeling study for point source emissions indicates that the maximum incremental GLCs after the proposed project would be 2.89 µg/m^3, 30.52 µg/m^3 and 22.29 µg/m^3 with respect to PM, SOx, and NOx. The resultant concentrations are within the National Ambient Air Quality Standards (NAAQS).

Total water requirement is 1,62,864 m^3/day of which fresh water requirement of 98880 m^3/day will be met from Western Yamuna Canal.

Effluent of 1392 m^3/hr quantities will be treated through existing ETP of capacity 1075 m^3/hr & proposed ETP of capacity 450 m^3/hr. The quantity of 255m^3/hr of treated effluent discharged to Thirana Drain and remaining reused in the plant.

Wastewater treatment and Disposal Management as follows:

Unit	Existing (m^3/hr)	Proposed (m^3/hr)	After expansion (m^3/hr)	Disposal Method	Facility Details
Effluent	1030	362	1392	**Existing**: 255m^3/hr of treated effluent discharged to Thirana Drain and remaining reused in the plant **Proposed**: ZLD	**Existing**: Combined ETP-1 of capacity 400m^3/hr, Combined ETP-2 of capacity 400m^3/hr and Combined PX/PTA ETP of capacity 275m^3/hr **Proposed:** ETP of capacity 450m^3/hr. Sewage will be combined into the proposed ETP for treatment
Sewage	235	9	244		

Power requirement after expansion will be 397513 kVA including existing 175000 kVA where the existing is being met from Existing Gas Turbine while the proposed power of 222513 kVA will be met from Uttar Haryana Bijili Vitran Nigam Limites's. No DG set available in IOCL Panipat Refinery.

Existing unit has 2 nos of Boiler of 160 TPH & 230 TPH capacity of each, additionally 3 no. of Boiler of 160 TPH (2nos) & 230 TPH (1no) capacity is being used as standby and all are Low sulphur liquid fuel+Gas fired Boiler. Additionally, 3nos of Boiler of 300MTPH capacity of each is proposed from which 1no will be used as standby and all proposed are Gas+Low sulphur liquid fuel fired boiler will be installed.

Details of process emissions generation and its management:

Existing Process Emission

S. no	Process Stack	Exit Gas Volume (Nm3/Hr) @ 25C	Emission(g/s)			
			PM (g/sec)	SO2 (g/sec)	NOx (g/sec)	CO (g/sec)
A	**Panipat refining unit**					
1	RFCC Heater	10702.17	0.0380	0.1479	0.4250	0.0851
2	RFCC Boiler	77661.33	0.2431	1.1861	3.0435	0.7904
3	AVU- 1	335341.24	1.2370	4.8774	9.8125	1.9198
B	**MCR**					
4	OHCU- Recycle gas Heater	23609.14	0.1097	0.3090	0.8758	0.1427
5	OHCU LP Section	78410.6	0.3004	1.3114	2.9498	0.5985
6	DHDS- Furnace	24562.62	0.0721	0.3572	0.8727	0.2031
7	CCRU stack- FF101, FF 102 FF 204	73167.78	0.2833	1.2237	2.5233	0.5120
8	CCRU Stack- FF 201, FF 202 FF 203	36088.83	0.1536	0.7611	1.2068	0.2640
9	CCRU Stack- FF 205	21186.13	0.0816	0.3543	0.8081	0.1685
10	VBU	21385.69	0.0766	0.4044	0.6146	0.1837
11	HGU	101595.74	0.5576	1.7731	4.0875	0.8401
C	**PR Expansion Unit**					
12	HCU Unit	42215.04	0.1867	0.5833	1.1249	0.2148
13	AVU- 2	341972.09	1.4230	5.9684	11.0780	2.7196
D	**Hydrogen Generation Unit**					
14	HGU-PDS	38499.52	0.1766	0.5039	1.2673	0.2694
15	HGU-76	140182.48	0.5775	1.9369	5.0540	1.2484
16	HGU-77	155111.13	0.7316	2.2560	5.1867	1.0362

S. no	Process Stack	Exit Gas Volume (Nm3/Hr) @ 25C	Emission(g/s)			
			PM (g/sec)	SO2 (g/sec)	NOx (g/sec)	CO (g/sec)
E	**Diesel Hydrotreater Unit**					
17	DHDT-72 Heater 01	44393.26	0.1599	0.6780	1.5773	0.4095
18	DHDT-72 Heater 02	45833.96	0.1892	0.8666	1.7721	0.4956
F	**Paraxylene Aromatic Section**					
19	CCR-Heater	47019.04	0.1614	0.6839	1.2775	0.2842
20	NHT Heater	12715.52	0.0377	0.2127	0.3521	0.0809
21	Xylene Charge Heater	52943.5	0.1610	0.6546	1.5215	0.3200
22	Isomer Charge Heater	18592.5	0.0525	0.2839	0.6412	0.0710
23	Tatoray charge Heater	18392.82	0.0580	0.2407	0.6150	0.1287
G	**Thermal Power Station**					
24	HRSG 01	146887.37	0.6218	2.0295	6.3700	0.6541
25	HRSG 02	148251.99	0.5819	1.9405	6.6619	0.6132
26	HRSG 03	159843.57	0.5093	2.6734	7.0993	0.7628
27	HRSG 04	151283.04	0.5429	2.2003	6.8771	0.6736
28	HRSG 05	158248.86	0.5495	1.9566	6.7801	0.5033
29	VHP Boiler 01	130260.73	0.5142	1.9894	5.1728	0.6629
30	VHP Boiler 02	134520.21	0.6681	2.3478	5.4824	0.6420
31	Utility Boiler 02	163531.04	0.7359	3.0921	6.5794	0.7282
H	Pur. Teraphthalic AC-Aromatic section					
32	Fired combustion preHeater	72693.78	0.3354	0.9515	2.7727	0.2312
33	Hot oil heater	73286.64	0.2463	0.7994	2.2975	0.4662
34	thermal Oxidizer	16642.03	0.0733	0.1573	0.5739	0.0794
I	**Delayed Coker Unit**					
35	DCU	13826.97	0.0679	0.2413	0.3974	0.1012
J	**MS Quality Unit**					
36	HDS (303 Heater 201) (MSQ)	63025.7	0.2495	0.7792	1.6795	0.4410
37	NHT (301 H101)	-	-	-	-	-
38	Old SRU-22/44	126752.64	-	-	-	-
39	CPP VHP-3	149983.92	-	-	-	-
40	SRU-26	126752.54	-	-	-	-
41	New SRU -57	151935.71	-	-	-	-
42	UB-1	146307.28	-	-	-	-
43	BBU Heater	-	-	-	-	-

S. no	Process Stack	Exit Gas Volume (Nm3/Hr) @ 25C	Emission(g/s)			
			PM (g/sec)	SO2 (g/sec)	NOx (g/sec)	CO (g/sec)
44	BBU incinerator	-	-	-	-	-
45	NSRU	-	-	-	-	-
K	**BS-VI**	-	-	-	-	-
46	Prime G	-	-	-	-	-
47	DHDT	-	-	-	-	-
48	HGU	180000	-	-	-	-
Total (g/s)			**12.7641**	**48.7328**	**117.4312**	**19.5453**
Total (Kg/hr)			**45.95076**	**175.4381**	**422.7523**	**70.36308**

Note: Item no.37 to 48 are idle. So the emissions are not mentioned.

Proposed Process Emission

S. No	Stack details	Stack Coordinates		Stack Details					Emission per stack (g/s)			
		N	E	Height (m)	Temp (°C)	Dia. (m)	Exit Velocity (m/s)	Flue gas Flow Rate (Nm3/hr)	PM	SO_2	NOx	CO
1.	AVU (CDU/VDU)	29°29'6.07"N	76°52'11.49"E	90	165	5.3	4.76	257400	0.751	50.8	13.829	8.297
2.	VGO- HDT	29°28'52.97"N	76°52'12.69"E	65	154	3.55	3.61	89750	0.125	0.306	4.778	1.972
3.	Diesel Hydrotreater Unit	29°29'0.89"N	76°52'10.39"E	48	165	2.1	5.12	41430	0.058	0.142	2.208	0.908
4.	MS Block_Charge Heater	29°28'55.06"N	76°52'25.87"E	70	161	2.8	6	92520	0.129	0.319	4.931	2.031
5.	NHT Charge Heater	29°28'55.44"N	76°52'19.27"E	55	204	1.55	5.98	25380	0.035	0.086	1.353	0.556
6.	Naphtha Stripper reboiler Heater	29°28'57.22"N	76°52'19.86"E	50	264	1.35	6	17260	0.024	0.058	0.919	0.378
7.	CDWU_HCR Reactor Feed Heater	29°28'52.39"N	76°52'48.73"E	40	370	0.85	6	5700	0.008	0.019	0.297	0.131
8.	CDWU_DW Reactor feed Heater	29°28'49.21"N	76°52'48.75"E	40	385	0.73	6	4150	0.006	0.014	0.217	0.094
9.	CDWU_Vaccum Column Feed Furnace	29°28'51.32"N	76°52'51.05"E	50	220	1.35	6	18300	0.025	0.064	0.975	0.403
10.	Resid Hydrocracking Unit (RHCU)	29°28'52.57"N	76°52'35.96"E	70	182	2.25	5.67	53160	0.074	0.183	2.833	1.167
11.	Resid Hydrocracking Unit (RHCU)_Vaccum Heater	29°28'47.64"N	76°52'33.42"E	65	206	0.964	5.28	8630	0.012	0.031	0.469	0.206
12.	Indmax FCC_Fresh Feed Furnace	29°29'0.65"N	76°51'45.77"E	60	155	1.8	6	38500	0.053	0.133	2.050	0.844

13.	Indmax FCC_Flue Gas cooler	29°28'58.47"N	76°51'50.63"E	60	200	3.5	12	260750	3.622	3.711	6.084	7.189
14.	Sulpur recovery unit (SRU)	29°29'8.51"N	76°51'45.77"E	65	290	2.6	21.38	216570	0.037	17.889	5.464	4.925
15.	Spent Acid Recovery unit (SARU)_APH System & Stack	29°29'7.13"N	76°51'49.23"E	60	200	0.8	3.5	3850	0.005	0.047	0.233	0.094
16.	Spent Acid Recovery unit (SARU)_Decomposition furnace burner	29°29'5.73"N	76°51'52.10"E	60	80	1	8	18790	0.159	2.000	0.778	0.467
17.	Hydrogen Generation Unit	29°29'1.13"N	76°52'25.54"E	60	188	3.4	7.64	155111.13	0.732	2.256	5.186	1.036
18.	CPP Stack	29°28'56.27"N	76°52'2.03"E	90	160	3.25	17.5	871660	11.555	101.795	78.190	22.303
Total (g/s)									**17.41**	**179.853**	**130.794**	**53.001**
Total (Kg/hr)									**62.676**	**647.4708**	**470.8584**	**190.8036**

Details of Solid waste/ Hazardous waste generation and its management:

Solid Waste (Operation Phase):

Municipal solid waste:

S. No	Waste	Quantity (kg/day)			Collection method	Treatment / disposal method
		Existing	Proposed	After expansion		
1	Organic waste	271.89	81	352.89	Bins	Composting and used as manure for Green Belt
2	Inorganic waste	181.26	54	235.26	Bins	Disposed through authorised vendors

Existing & Proposed Hazardous Waste Management:

S. No.	Plant	Waste category	Quantity (MTPA)		Source of Waste generation	Mode of Disposal/Facility
			Existing	Proposed		
1	DHDT	Spent Catalyst	134	175	DHDT	Disposed to SPCB authorised

S. No.	Plant	Waste category	Quantity (MTPA)		Source of Waste generation	Mode of Disposal/Facility
			Existing	Proposed		
						Recycler
2	CCR Regeneration Section	Spent Catalyst Fines	0.85	1.58	Catalyst Fines from Spent Catalyst Fines Collection Pot	Disposed to SPCB authorised Recycler
3	CCR Platforming Process Unit	Spent Catalyst	7.25	4.173	Spent catalyst from Reactors	Disposed to SPCB authorised Recycler
4	CCR Platforming Process Unit	Spent Adsorbent	0.6	31.2	Net GAS Chloride Treaters Adsorbents	To TSDF/ Disposed to SPCB authorised Recycler
5	CCR Platforming Process Unit	Spent Adsorbent	4.25	1.8	Fuel gas Chloride Adsorbent	To TSDF/ Disposed to SPCB authorised Recycler
6	CCR Platforming Process Unit	Spent adsorbent	0.05	1.26	LPG Chloride Treatment Adsorbent	To TSDF/ Disposed to SPCB authorised Recycler
7	CCR Platforming Process Unit	Spent Adsorbent	10.2	33.26	Debutanizer feed Chloride Treater	To TSDF/ Disposed to SPCB authorised Recycler
8	INDMAX FCC	Spent Catalyst	50	839.5	Indmax equilibrium catalyst (E-cat) is withdrawn from Indmax FCC unit.	To TSDF/ Disposed to SPCB authorised Recycler
9	Propylene Recovery unit	Spent adsorbent	10	20	Adsorbents from Propylene Driers	To TSDF/ Disposed to SPCB authorised Recycler
10	Propylene Recover	Spent adsorbent	20	11	Adsorbent from Arsine Guard Bed	To TSDF/ Disposed to SPCB

S. No.	Plant	Waste category	Quantity (MTPA)		Source of Waste generation	Mode of Disposal/Facility
			Existing	Proposed		
	y unit					authorised Recycler
11	HCU/RHCU Reaction Section	Spent Catalyst	136.5	5.256	Spent catalyst withdrawn from the reactors	To TSDF/ Disposed to SPCB authorised Recycler
12	UOP Naphtha Hydrotreating Process Unit	Spent Catalyst	1.4	4.5	Spent Catalyst from Reactor	To TSDF/ Disposed to SPCB authorised Recycler
13	PENEX	Spent Catalyst	1.4	2.96	Spent Catalyst From Reactor A	Disposed to SPCB authorised Recycler
14	PENEX	Spent Catalyst	10.25	1.48	Spent Catalyst From Reactor B	Disposed to SPCB authorised Recycler
15	PENEX	Spent Catalyst	5.125	0.987	Spent Catalyst From Reactor C	Disposed to SPCB authorised Recycler
16	PENEX	Spent Catalyst	4	0.312	Spent Catalyst from Methanator Reactor	Disposed to SPCB authorised Recycler
17	PENEX	Spent Adsorbent	4	0.45	Makeup Gas Chloride Treater	To TSDF/ Disposed to SPCB authorised Recycler
18	PENEX	Spent Molecular Sieve	7	3.25	Makeup Gas Driers	To TSDF/ Disposed to SPCB authorised Recycler
19	PENEX	Spent Molecular Sieve	1.19	0.595	Penex Feed Driers	To TSDF/ Disposed to SPCB authorised

S. No.	Plant	Waste category	Quantity (MTPA)		Source of Waste generation	Mode of Disposal/Facility
			Existing	Proposed		
						Recycler
20	VGOHDT	REACTOR SPENT CATALYST	NA	500	VGO REACTOR/ DIESEL OPOLISHING REACTOR	To TSDF/ Disposed to SPCB authorised Recycler
21	CDWU	Spent Catalyst	NA	3.762	HCR Reactor	Disposed to SPCB authorised Recycler
22	CDWU	Spent Catalyst	NA	3.864	DW Reactor	Disposed to SPCB authorised Recycler
23	CDWU	Spent Catalyst	NA	3.621	HDF Reactor	Disposed to SPCB authorised Recycler
24	SR LPG Treater	Spent Catalyst	NA	3.250	Spent Catalyst from Reactor	To TSDF/ Disposed to SPCB authorised Recycler
25	SR LPG Treater	Spent Grading Bed Catalyst	NA	0.15	Spent Grading Bed Catalyst from Reactor	To TSDF/ Disposed to SPCB authorised Recycler
26	HGU (Note-1)	Spent Catalyst	4.5	1.583	Spent Catalyst from Hydrogenation Reactor	To TSDF/ Disposed to SPCB authorised Recycler
27	HGU (Note-1)	Spent Catalyst	63	21	Spent Catalyst from Predesuffurization Reactor A/B (Dechlorination)	To TSDF/ Disposed to SPCB authorised Recycler
28	HGU (Note-1)	Spent Catalyst	18.12	505.2	Spent Catalyst from Predesuffurization Reactor	To TSDF/ Disposed to SPCB authorised

S. No.	Plant	Waste category	Quantity (MTPA)		Source of Waste generation	Mode of Disposal/Facility
			Existing	Proposed		
					A/B (Removal of Sulfur compound)	Recycler
29	HGU (Note-1)	Spent Catalyst	19	6.387	Spent Catalyst from Desuffurization Reactor (Removal of Sulfur compound)	To TSDF/ Disposed to SPCB authorised Recycler
30	HGU (Note-1)	Spent Catalyst	8	2.667	Spent Catalyst from Desuffurization Reactor (Deep Desuffurization)	To TSDF/ Disposed to SPCB authorised Recycler
31	HGU (Note-1)	Spent Catalyst	25	9.4	Spent Catalyst from Prereformer A/B	To TSDF/ Disposed to SPCB authorised Recycler
32	HGU (Note-1)	Spent Catalyst	8	5.883	Spent Catalyst from Reformer	To TSDF/ Disposed to SPCB authorised Recycler
33	HGU (Note-1)	Spent Catalyst	30	10.107	Spent Catalyst from High Temp Shift Reactor	To TSDF/ Disposed to SPCB authorised Recycler
34	HGU (Note-1)	Spent Catalyst	24	16.883	Spent Catalyst from Low Temp Shift Reactor	To TSDF/ Disposed to SPCB authorised Recycler
35	HGU (Note-1)	Catalyst Support Material (Ceramic balls)	16	5.6	Spent Support Material from Reactors,Prereformer, Reformer & Shift Reactors	To TSDF/ Disposed to SPCB authorised Recycler
36	HGU (Note-1)	Catalyst Support	28	9.79	Spent Support Material from	To TSDF/ Disposed to

S. No.	Plant	Waste category	Quantity (MTPA)		Source of Waste generation	Mode of Disposal/Facility
			Existing	Proposed		
		Material (Aluminium balls)			Reactors,Prereformer, Reformer & Shift Reactors	SPCB authorised Recycler
37	HGU /PSA (Note-1)	Spent Adsorbent	250	51.938	Spent Adsorbent from PSA	To TSDF/ Disposed to SPCB authorised Recycler
38	SRU	Spent Catalyst	36.8	53.5	Claus reactors	To TSDF/ Disposed to SPCB authorised Recycler
39	TGTU	Spent Catalyst	15	11.34	Reactor	To TSDF/ Disposed to SPCB authorised Recycler
40	SRU/TGTU	Catalyst Support Material (Ceramic/alumina balls)	8	11.4	Claus and TGTU reactors	To TSDF/ Disposed to SPCB authorised Recycler

Note-1: All data for HGU are preliminary for proposed case. Data given has been prorated from BS VI Panipat HGU data. Data shall be confirmed after getting data from the selected

Details of Certified compliance report submitted by RO, MoEF&CC officials done on 10-05-2021 and the compliance of EC recommendations was certified. Status of compliance is Partially Complied. ATR has been submitted to RO, MoEF&CC on 07.05.2021 depicting compliance.

During deliberations EAC sought the following information/commitments from PP:

i. In the new proposed facility, RLNG & FG (Fuel Gas) will be fired in furnaces & boilers in normal operations and liquid fuel (S < 0.5%) will be fired in case of emergency/ non availability of RLNG. Additional SOx emission from these new proposed facilities shall be 647 Kg/hr.
ii. IOCL shall comply with the policy of Government on Green H_2.

iii. Two Sulphur Recovery Units (having capacity 465 TPD for each unit) shall be installed in the proposed expansion project.
iv. Joint committee formed by Hon'ble NGT visited PRPC on 06.01.2021 for verification of compliance of NGT recommendations. Joint committee submitted the compliance report with respect to the NGT recommendations on 15.02.2021. Based on the compliance report given by the joint committee, OA 738/2018 has been disposed off by Hon'ble NGT on 22.03.2021.
v. The project shall conform to ZLD

PP has agreed to the above conditions and submitted the desired information as sought above; EAC found it to be in order and recommended the proposal for grant of EC. However, ZLD was not covered in the undertaking.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with EIA/EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the EIA/EMP report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee noted that the EIA/EMP report is in compliance of the ToR issued for the project, reflecting the present environmental concerns and the projected scenario for all the environmental components. The Committee has found the baseline data is within NAAQ standards. The Committee has deliberated the action plan proposed by the project proponent to arrest the incremental GLC due to the project. The Committee has found the additional information submitted by the project proponent to be satisfactory and addressing the issues raised by the Committee. The Committee has also deliberated on the CER plan and found to be addressing the issues in the study area. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of Environmental Clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as

mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, recommended the project for grant of environmental clearance, subject to compliance of terms and conditions as under, and general terms of conditions at Annexure:-

(i). The project shall conform to ZLD.

(ii). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(iii). The treated effluent of 4.2 KLPH shall be sent for deep sea discharge through diffuser recommended by NIO.

(iv). The National Emission Standards for Petroleum Oil Refinery issued by the Ministry vide G.S.R. 186(E) dated 18th March, 2008 and G.S.R.595(E) dated 21st August, 2009 as amended from time to time, shall be followed.

(v). Volatile organic compounds (VOCs)/Fugitive emissions shall be controlled at 99.997% with effective chillers/modern technology. For emission control and management, use of FG/NG in heater as fuel, adequate stack height, use of Low NOX burners in heater & boiler, continuous stack monitoring, Sulphur recovery plant, etc. shall be installed/ensured.

(vi). Total water requirement is 1,62,864 m^3/day of which fresh water requirement of 98880 m^3/day will be met from Western Yamuna Canal. Necessary permission in this regard shall be obtained from the concerned regulatory authority.

(vii). Process effluent/any wastewater shall not be allowed to mix with storm water. Storm water drain shall be passed through guard pond.

(viii). Hazardous chemicals shall be stored in tanks, tank farms, drums, carboys etc. Flame arresters shall be provided on tank farm, and solvent transfer to be done through pumps.

(ix). Process organic residue and spent carbon, if any, shall be sent to cement industries. ETP sludge, process inorganic & evaporation salt shall be disposed off to the TSDF.

(x). Fly ash should be stored separately as per CPCB guidelines so that it should not adversely affect the air quality, becoming air borne by wind or water regime during rainy season by flowing along with the storm water. Direct exposure of workers to fly ash & dust should be avoided. The ash from boiler shall be sold to brick manufacturers/cement industry.

(xi). The company shall undertake waste minimization measures as below: -

a. Metering and control of quantities of active ingredients to minimize waste.
b. Reuse of by-products from the process as raw materials or as raw material substitutes in other processes.
c. Use of automated filling to minimize spillage.
d. Use of Close Feed system into batch reactors.
e. Venting equipment through vapour recovery system.
f. Use of high pressure hoses for equipment clearing to reduce wastewater generation.

(xii). The green belt of 5-10 m width shall be developed in the total project area, mainly along the plant periphery, in downward wind direction, and along road sides etc. The project proponent shall ensure 33% greenbelt area vis-à-vis the project area through afforestation in the degraded area. The Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department.

(xiii). As per the Ministry's OM dated 30.09.2020 superseding the OM dated 01.05.2018 regarding the Corporate Environmental Responsibility, and as per the action plan proposed by the project proponent to address the socio-economic and environmental issues in the study area, the project proponent, as committed, shall provide education funds in technical training centers/ support in nearby village's schools, support in health care facilities, drinking water supply and funds for miscellaneous activities like solar street lights, battery, solar panel etc., in the nearby villages. The action plan shall to be completed within time as proposed.

(xiv). For the DG sets, emission limits and the stack height shall be in conformity with the extant regulations and the CPCB guidelines. Acoustic enclosure shall be provided to DG set for controlling the noise pollution.

(xv). The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.

(xvi). Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises. In case of the treated effluent to be utilized for irrigation/gardening, real time monitoring system shall be installed at the ETP outlet.

(xvii). Occupational health surveillance of the workers shall be done on a regular basis and records maintained as per the Factories Act.

(xviii). Process safety and risk assessment studies shall be further carried out using advanced models, and the mitigating measures shall be undertaken/implemented accordingly.

(xix). The PP should improve the efficiency of ETP Plant and the water discharge should be as per prescribed CPCB Norms. They should also install 24x7 hours monitoring system (of the discharge) and the same should be connected to the server of SCPB/CPCB.

22nd October, 2021 (Friday)

Agenda No. 42.20

Grain Base fuel ethanol unit of 190 KLD, 6 MW Co- generation power plant By product: 145 TPD of CO2 Generation & 97 TPD of DDGS by M/s. Zircon Advance Fuels Pvt. Ltd. Located at Khasara No. 282, 283, 284, 285 Village- Kundla Agar, Teh. Agar, Dist. Agar-Malwa, Madhya Pradesh - Consideration of Environment Clearance.

[IA/MP/IND2/231111/2021, J-11011/424/2021-IA-II(I)]

The Project Proponent and the accredited Consultant M/s. Creative Enviro Services, Bhopal (MP), made a detailed presentation on the salient features of the project and informed that:

The proposal is for environmental clearance to the project for Grain Base fuel ethanol unit of 190 KLD, 6 MW Co- generation power plant By product: 145 TPD of CO2 Generation & 97 TPD of DDGS by M/s. Zircon Advance Fuels Pvt. Ltd. Located at Khasara No. 282, 283, 284, 285 Village- Kundla Agar, Teh. Agar, Dist. Agar-Malwa, Madhya Pradesh.

As per the MoEF&CC Notification S.O. 2339(E), dated 16th June, 2021, a special provision in the EIA Notification, 2006-(Schedule 5 (ga), Category B2) is made, wherein for all applications made for Grain based distilleries with Zero Liquid Discharge producing ethanol; solely to be used for Ethanol Blended Petrol Programme of the Government of India shall be considered under B2 Category and appraised at Central Level by Expert Appraisal Committee (EAC) with condition that the project proponent shall file a notarized affidavit that ethanol produced from proposed project shall be used completely for EBP Programme.

Standard ToR and public Hearing conduction is not applicable as the project falls under category B2 as per OM dated 16th June, 2021. It was informed that no litigation is pending against the project.

The details of products and capacity are as under:

Sr No	Product Details	Existing Quantity	Proposed Quantity	Total Quantity
1.	Fuel Ethanol	Nil	190 KLD of Fuel Ethanol	190 KLD of Fuel Ethanol
2	Co generation of Power	Nil	6 MW	6 MW
3	DDGS	Nil	97 TPD	97 TPD

The acquired land area is 11.768 ha with proposed built-up area of 27000 sq mtrs. Green belt will be developed in area of 33 % i.e. 4.0 hact of area with 8000 number of trees within 02 years of time. The estimated project cost is Rs 175.2722 Crores. Total capital cost for environmental measures is proposed as Rs 1720 Lacs. The recurring cost (operation and maintenance) will be about Rs 92 Lacs per annum. Total Employment will be 100 persons as direct & 130 persons as indirect after the commissioning of project. Industry proposes to allocate Rs. 351 Lacs (2.0% of project cost) towards Corporate Environment Responsibility (CER).

There are no national parks, wildlife sanctuaries, Biosphere Reserves, Tiger/Elephant Reserves, Wildlife Corridors etc. lies within 10 km distance. No protected forest are reported in the study area. No Major River is flowing within distance of 10 km from the site.

Total water requirement is estimated to be 4170 KLD and after recycling & reuse of 3168 KLD of water, net fresh water requirement is estimated to be 1002 KLD, which will be supplied by Water Resource Department of Govt. of MP from Pipliya Kumar Dam. Spent wash of 1460 TPD will be treated through Multi Effect Evaporator with thermal recompression for thin slops evaporation and followed by CPU. The plant will be based on zero liquid discharge concept.

Power requirement for the project will 4566 KWH and will be met from Co-generation unit of 6 MW and MPSEB. 02 DG sets of 1010 KVA is proposed and will have Stack height of 30mt as per CPCB norms and will be used as standby during power failure. Unit will have 01 boilers of 50 TPH, which will be coal and husk fired. ESP with a stack having height of 46 mt will be installed for controlling the Particulate emissions (within statutory limit of 115 mg/nm^3) for proposed boiler.

Details of Process emissions generation and its management:

Details of Process emissions generation and its management w.r.t. fuel ethanol plant.

PM, SO_2, NO_X will be generated from the fuel combustion. Following measures are proposed for implementation:

- ESP shall be provided at stack of boiler to control the emission below 50 mg per cubic meter.
- Adequate stack height of 46 mt for boiler shall be provided for better dispersion.
- Dust collectors system shall be provided at various material transfer points.
- Online continuous monitoring system shall be provided for stack of boiler.
- Development of green belt shall be carried out in consultation with forest department.
- Dense phase conveying system for ash handling shall be provided to prevent the fugitive emission.
- Provision of cover over coal conveyors belt along with dust suppression system.
- Provision of dust mask for workers and instruction of compulsory use.
- It is proposed to use low sulphur coal in the boiler.
- CO2 generated during the fermentation process will be collected by utilizing CO_2 Scrubbers.

Details of Solid waste/ Hazardous waste generation and its management

Detail Of By Products / Solid/Hazardous Waste And Management			
Type Of Waste	**Quantity**	**Storage**	**Utilization/ Disposal**
DDGS – (by product)	97 TPD	Covered shed	Sold as Cattle Feed, Poultry &Fisheries
Boiler ash	19 TPD	Silo	Brick making or land filling
ETP sludge	60 KGD		As Manure
Waste papers/Boxes	1.5-2 TPD	Covered shed	to recyclers
Used Oil	< 500 Lit /Year	HDPE drums in covered shed	Given to re-cycler authorized by MPPCB/MoEF
Spent Resin from DM Plant	<50Kg/Yr	HDPE drums in covered shed	Given to re-cycler authorized by MPPCB/MoEF

As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed capacity of 190 KLD will be for manufacturing of fuel ethanol only.

During deliberations EAC sought the following information/commitments from PP:

- PP shall utilize fresh water 3.9 KL/KL ethanol.
- PP shall install 10% of the total power requirement from solar power.
- PP shall not utilize fuel as a coal.
- Brick manufacturing unit will be installed within the plant premises for utilization of fly ash.
- 15% of the total plant area will be reserved for parking.
- Development of greenbelt to be completed along with commissioning of the project.
- Company to construct a storage pond of 60 days capacity and the accumulated water to be used as fresh water thereby reducing fresh water consumption.
- The proposed budget allocate Rs. 3.51 Crores towards CER and it shall be used for construction/up-gradation of school building with provision of facilities e.g. Class rooms, playground, Laboratory, Library, Computer class, toilets, Drinking Water Facilities, solar light etc. for villagers free of cost.

PP has submitted the desired information as sought above and EAC found it to be in order and recommended the proposal for grant of EC.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with the EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee noted that the EMP report is in compliance of the PFR. The Committee deliberated on the CER plan and found to be addressing the issues in the study area. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of environmental clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance, subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). As per OM dated 16th June, 2021, project falls in category B2 and the proposed capacity of 190 KLD shall be only be used for fuel ethanol manufacturing as per self-certification in form of an affidavit by the Project Proponent. Provided that subsequently if it is found that the ethanol, produced based on the EC granted as per this dispensation, is not being used completely for EBP Programme, or if ethanol is not being produced, or if the said distillery is not fulfilling the requirements based on which the project has been appraised as category B2 project, the EC shall stand cancelled.

(ii). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(iii). The project proponent will treat and reuse the treated water within the factory and no waste or treated water shall be discharged outside the premises.

(iv). Total fresh water requirement shall not exceed 750 KLD (3.9 KL/KL) for any kind of raw material used and shall be met from Pipliya Kumar Dam. Prior permission shall be obtained from the concerned regulatory authority/CGWA in this regard, and renewed from time to time. No ground water recharge shall be permitted within the premises.

(v). The spent wash shall be concentrated and dried to form DDGS to be used as cattle feed. Brick manufacturing unit will be installed within the plant premises for utilization of fly ash.

(vi). CO_2 generated from the process shall be bottled/made solid ice and utilized/sold to authorized vendors.

(vii). Occupational Health Centre for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with required safety kits/mask for personal protection.

(viii). Training shall be imparted to all employees on safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.

(ix). The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.

(x). Process organic residue and spent carbon, if any, shall be sent to Cement other suitable industries for its incinerations. ETP sludge, process inorganic & evaporation salt shall be disposed of to the TSDF.

(xi). The company shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize waste; (b) Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapour recovery system. (f) Use of high pressure hoses for equipment clearing to reduce wastewater generation.

(xii). The green belt of at least 5-10 m width shall be developed in nearly 33% of the total project area, mainly along the plant periphery. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map.

(xiii). PP proposed to allocate Rs. 3.51 Crores towards CER and it shall be used for construction/up-gradation of school building with provision of facilities e.g. Class rooms, playground, Laboratory, Library, Computer class, toilets, Drinking Water Facilities, solar light etc. for villagers free of cost.

(xiv). There shall be adequate space inside the plant premises earmarked for parking of vehicles for raw materials and finished products as per CPCB norms and no parking to be allowed outside on public places.

(xv). Storage of raw materials shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.

(xvi). Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall

install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.

(xvii). A separate Environmental Management Cell (having qualified person with Environmental Science/Environmental Engineering/specialization in the project area) equipped with full-fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.

Agenda No. 42.21

Grain Base fuel ethanol unit of 120 KLD, 1.8 MW Co- generation power plant By product : 90 TPD of CO2 Generation & 65 TPD of DDGS by M/s. Great Galleon Ventures Limited located at Khasara No. 280/2, village-Sejwaiya Tehsil- Dhar Dist.- Dhar Madhya Pradesh - Consideration of Environment Clearance.

[IA/MP/IND2/231983/2021, J-11011/418/2021-IA-II(I)]

The Project Proponent and the accredited Consultant M/s. Creative Enviro Services, Bhopal (MP), made a detailed presentation on the salient features of the project and informed that:

The proposal is for environmental clearance to the project for Grain Base fuel ethanol unit of 120 KLD, 1.8 MW Co- generation power plant By product : 90 TPD of CO2 Generation & 65 TPD of DDGS by M/s. Great Galleon Ventures Limited located at Khasara No. 280/2, village-Sejwaiya Tehsil- Dhar Dist.- Dhar Madhya Pradesh.

As per the MoEF&CC Notification S.O. 2339(E), dated 16th June, 2021, a special provision in the EIA Notification, 2006-(Schedule 5 (ga), Category B2) is made, wherein for all applications made for Grain based distilleries with Zero Liquid Discharge producing ethanol; solely to be used for Ethanol Blended Petrol Programme of the Government of India shall be considered under B2 Category and appraised at Central Level by Expert Appraisal Committee (EAC) with condition that the project proponent shall file a notarized affidavit that ethanol produced from proposed project shall be used completely for EBP Programme.

Standard ToR and public Hearing conduction is not applicable as the project falls under category B2 as per OM dated 16th June, 2021. It was informed that no litigation is pending against the project.

The details of products and capacity are as under:

Sr No	Product Details	Existing Quantity	Proposed Quantity	Total Quantity
1.	Fuel Ethanol	Nil	120 KLD of fuel ethanol	120 KLD of fuel Ethanol
2	Co generation of Power	Nil	1.8 MW	1.8 MW
3	DDGS	Nil	65 TPD	65 TPD

The acquired land area is 6.82 ha with proposed built-up area of 23500 sq mtrs. Green belt will be developed in area of 33 % i.e. 2.3 ha of area with 4600 number of trees within 02 years of time. The estimated project cost is Rs 6500 Lacs. Total capital cost for environmental measures is proposed as Rs 2136.44 Lacs. The recurring cost (operation and maintenance) will be about Rs 78.66 Lacs per annum. Total Employment will be 50 persons as direct & 25 persons as indirect after the commissioning of project. Industry proposes to allocate Rs. 160 Lacs (2.5% of project cost) towards Corporate Environment Responsibility.

There are no national parks, wildlife sanctuaries, Biosphere Reserves, Tiger/Elephant Reserves, Wildlife Corridors etc. lies within 10 km distance. No protected forest are reported in the study area. Major River Chabal is flowing at a distance of 6.25 km in north direction.

Total water requirement is estimated to be 1426 KLD and after recycling & reuse of 966 KLD of water, net fresh water requirement is estimated to be 460 KLD (3.8 Kl per Kl) which will be supplied by DMIC Pithampur Jal Prabandhan Limited, Pithampur Dist Dhar (MP). Spent wash of 585 TPD will be treated through Multi Effect Evaporator with thermal recompression for thin slops evaporation and followed by CPU. The plant will be based on zero liquid discharge concept.

Power requirement for the project will 1800 KWH and will be met from Co-generation unit of 1.8 MW and MPSEB. Unit will have 01 boilers of 20 TPH, which will be coal and husk fired. ESP with a stack having height of 42 mt will be installed for controlling the Particulate emissions (within statutory limit of 115 mg/Nm3) for proposed boiler.

Details of Process emissions generation and its management:

Details of Process emissions generation and its management w.r.t. fuel ethanol plant.

PM, SO_2, NO_X will be generated from the fuel combustion. Following measures are proposed for implementation:

- ESP shall be provided at stack of boiler to control the emission below 50 mg per cubic meter.
- Adequate stack height of 42 mt for boiler shall be provided for better dispersion.
- Low Sulpher Coal Shall be Used having Sulpher content less than 0.4%.

- Dust collectors system shall be provided at various material transfer points.
- Online continuous monitoring system shall be provided for stack of boiler
- Development of green belt shall be carried out in consultation with forest department.
- Dense phase conveying system for ash handling shall be provided to prevent the fugitive emission.
- Provision of cover over coal conveyors belt along with dust suppression system.
- Provision of dust mask for workers and instruction of compulsory use.
- It is proposed to use low sulphur coal in the boiler.
- CO2 generated during the fermentation process will be collected by utilizing CO_2 Scrubbers.

Details of Solid waste/ Hazardous waste generation and its management:

Detail Of By Products / Solid/Hazardous Waste And Management			
Type Of Waste	**Quantity**	**Storage**	**Utilization/ Disposal**
DDGS – (by product)	65 TPD	Covered shed	Sold as Cattle Feed, Poultry &Fisheries
Boiler ash	30TPD	Silo	Brick making or land filling within the plant premises
ETP sludge	0.1MT/DAY	Drying Beds	Will be used as Manure
Used Oil	< 100 lit per year	HDPE drums in covered shed	Given to re-cycler authorized by MPPCB/MoEF
Spent Resin from DM Plant	<50Kg/Yr	HDPE drums in covered shed	Given to re-cycler authorized by MPPCB/MoEF

As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed capacity of 120 KLD will be for manufacturing of fuel ethanol only.

During deliberations EAC sought the following information/commitments from PP:

- Commitment towards compliance of zero discharge for existing and proposed units.
- Development of greenbelt to be completed along with commissioning of the project.
- 15% of the total plant area will be reserved for parking.

- Company to construct a storage pond of 60 days capacity and the accumulated water to be used as fresh water thereby reducing fresh water consumption.
- Brick manufacturing unit will be installed within the plant premises for utilization of fly ash.
- PP shall not utilize fuel as a coal.
- The proposed budget of Rs. 1.60 Crores towards CER activities to be increased to Rs. 2.0 Crores and it shall be used for construction/up-gradation of school building with provision of facilities e.g. Class rooms, playground, Laboratory, Library, Computer class, toilets, Drinking Water Facilities, solar light etc. for villagers free of cost

PP has submitted the desired information as sought above and EAC found it to be in order and recommended the proposal for grant of EC.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with the EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee noted that the EMP report is in compliance of the PFR. The Committee deliberated on the CER plan and found to be addressing the issues in the study area. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of environmental clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance, subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). As per OM dated 16th June, 2021, project falls in category B2 and the proposed capacity of 120 KLD shall be only be used for fuel ethanol manufacturing as per self-certification in form of an affidavit by the Project Proponent. Provided that subsequently if it is found that the ethanol, produced based on the EC granted as per this dispensation, is not being used completely for EBP Programme, or if ethanol is not being produced, or if the said distillery is not fulfilling the requirements based on which the project has been appraised as category B2 project, the EC shall stand cancelled.

(ii). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(iii). The project proponent will treat and reuse the treated water within the factory and no waste or treated water shall be discharged outside the premises.

(iv). Total water requirement is estimated to be 1426 KLD and after recycling & reuse of 966 KLD of water, net fresh water requirement is estimated to be 460 KLD (3.8 Kl per Kl) which will be supplied by DMIC Pithampur Jal Prabandhan Limited, Pithampur Dist Dhar (MP). Prior permission shall be obtained from the concerned regulatory authority/CGWA in this regard, and renewed from time to time. No ground water recharge shall be permitted within the premises.

(v). The spent wash shall be concentrated and dried to form DDGS to be used as cattle feed. Brick manufacturing unit will be installed within the plant premises for utilization of fly ash.

(vi). CO_2 generated from the process shall be bottled/made solid ice and utilized/sold to authorized vendors.

(vii). Occupational Health Centre for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with required safety kits/mask for personal protection.

(viii). Training shall be imparted to all employees on safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.

(ix). The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.

(x). Process organic residue and spent carbon, if any, shall be sent to Cement or any other suitable industries for its incinerations. ETP sludge, process inorganic & evaporation salt shall be disposed of to the TSDF.

(xi). The company shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize waste; (b) Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapour recovery system. (f) Use of high pressure hoses for equipment clearing to reduce wastewater generation.

(xii). The green belt of at least 5-10 m width shall be developed in nearly 33% of the total project area, mainly along the plant periphery. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map.

(xiii). PP proposed to allocate Rs. 2.0 crores towards CER and it shall be used for construction/up-gradation of school building with provision of facilities e.g. Class rooms, playground, Laboratory, Library, Computer class, toilets, Drinking Water Facilities, solar light etc. for villagers free of cost.

(xiv). There shall be adequate space inside the plant premises earmarked for parking of vehicles for raw materials and finished products as per CPCB norms and no parking to be allowed outside on public places.

(xv). Storage of raw materials shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.

(xvi). Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.

(xvii). A separate Environmental Management Cell (having qualified person with Environmental Science/Environmental Engineering/specialization in the project area) equipped with full-fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.

Agenda No. 42.22

Expansion of Grain based Distillery 120 KLPD to 250 KLPD & Co-Generation Power Plant from 3.5 to 5.55 MW by new installation 130 KLPD Grain based Ethanol plant by M/s. RSL Distilleries Private Limited located at Village Chandrao, Tehsil Indri, District Karnal, Haryana - Consideration of Environment Clearance

[IA/HR/IND2/233126/2011, J-11011/209/2011-IA-II(I)]

The Project Proponent and the accredited Consultant M/s. J.M. EnviroNet Pvt. Ltd., made a detailed presentation on the salient features of the project and informed that:

The proposal is for environmental clearance to the project for Expansion of Grain based Distillery 120 KLPD to 250 KLPD & Co-Generation Power Plant from 3.5 to 5.55 MW by new installation 130 KLPD Grain based Ethanol plant by M/s. RSL Distilleries Private Limited located at Village Chandrao, Tehsil Indri, District Karnal, Haryana.

All Distillery projects are listed at S. No. 5 (g) of Schedule of Environment Impact Assessment (EIA) and as per as per the EIA Notification 2006 and amendment vide Notification S.O. 345(E), dated the 17th January, 2019, S.O. 750(E), dated the 17th February, 2020, S.O. 980 (E) dated 02nd March, 2021 and S.O 2339(E) dated 16.06.2021 the proposal is to be appraised as B2 category and appraised at Central Level by Expert Appraisal Committee (EAC) with condition that the project proponent shall file a notarized affidavit that ethanol produced from proposed project shall be used completely for EBP Programme.

Standard ToR and public Hearing conduction is not applicable as the project falls under category B2 as per OM dated 2nd March, 2021 & 16th June, 2021. It was informed that no litigation is pending against the project.

M/s. RSL Distilleries Pvt. Ltd. has obtained Environmental clearance from MoEFCC vide F. No. J-11011/209/2011-IA-II(I) dated 10th September, 2013 for 120 KLPD Grain Based Distillery Plant & 3.5 MW Co-generation Power Plant at Village Chandrao, Tehsil Indri, District Karnal, Haryana.

The details of products and capacity are as under:

Particulars	**Capacity**			**Remarks**
	Existing	**Additional**	**Total after expansion**	
Grain based Distillery	120 KLPD	130 KLPD	250 KLPD	Additional increased 130 KLPD capacity will
Product	Extra Neutral Alcohol/Rectified	Ethanol (Biofuel)		

	Spirit/ Ethanol			be Ethanol (Biofuel) only
By Product	DWGS/DDGS and CO2	DDGS and CO2		
Co-generation Power Plant	3.5 MW	2.05 MW	5.55 MW	-
IMFL/CL Bottling Plant	80 lakh cases per annum	NIL	80 lakh cases per annum	No Change

Existing land area is 9.11 ha (22.5 acres), No additional land is required for the expansion, as the same will be done within the existing plant premises. Industry has already developed greenbelt in an area of 33% i.e. 3.1 ha (7.5 acres) out of total area of the project. The estimated expansion project cost is Rs. 40 Crores. Total capital cost earmarked towards environmental pollution control measures is Rs. 2.0 Crores and the Recurring cost (operation and maintenance) will be about Rs. 0.2 Crores / annum. No. of working days will be 350 days/annum. Total Employment will be 200 persons during operational phase after expansion. Industry proposes to allocate Rs. 80 Lakhs (2.0% of total project cost) towards Corporate Environment Responsibility (CER).

There are No National Parks, Reserved Forests (RF) / Protected Forests (PF), Wildlife Sanctuaries, Biosphere Reserves, Tiger/ Elephant Reserves, Wildlife Corridors etc. within 10 km radius. Dhanaura Escape & Nala (Adjacent in South direction), Prani Nadi (~1.5 km in East direction), Augmentation Canal (~2.5 km in NW direction), Yamuna River (~3.0 km in SE direction), Rakshi Nala (~5.5 km in NNW direction), Budhi Nadi (~6.0 km in East direction), Hanauri Drain (~6.5 km in WSW direction), Western Yamuna Canal (~6.5 km in NW direction), Khurdban Drain (~7.0 km in NNW direction) & Khera Drain (~7.5 km in WSW direction) are the water bodies available within 10 km radius.

Existing fresh water requirement is 730 KLPD and the additional fresh water requirement for expansion will be 610 KLPD. Hence, the total fresh water requirement after expansion will be 1340 KLPD which will be sourced from ground water. Effluent (MEE Condensate, blow down & others) of existing (507 m3/day) & Additional (544 m3/day) will be treated through state of art ETP/CPU. A full-fledged state of art ETP/CPU (Capacity 1200 KLPD) is already in place to treat waste water generated at the plant premises. The plant will be based on Zero Liquid discharge system.

The power requirement for the existing plant is 3.5 MW. Additional power

requirement for expansion project will be 2.05 MW. Total requirement after expansion will be 5.55 MW which will be sourced from 5.55 MW Co-Generation Power Plant. 1 x 700 KVA & 1 x 500 KVA DG sets are already present for emergency backup and no additional D.G set will be installed of expansion. Stack height (7 m) is provided as per CPCB norms. Existing power and steam requirement of the plant is being met by 35 TPH Biomass / Rice Husk / Paddy straw fired boiler having ESP as air pollution control device. As a part of expansion, the existing boiler capacity will be sufficient for steam. The unit proposes capacity enhancement of cogeneration power plant from 3.5 to 5.55 MW by modification & efficiency improvement in turbine. ESP with a stack of height of 50 meter has been installed with the existing boiler (35 TPH) for controlling the particulate emissions within the statutory limit of 50 mg/Nm3.

Details of process emissions generation and its management:

CO2 plant has already been installed in the existing unit for collection of CO2 generated (191 TPD) during Fermentation Process and the same will be expanded for proposed expansion.

Details of Solid waste/Hazardous waste generation and its management:

- Solid waste from the Grain based operations generally comprises of fibres and proteins in the form of DDGS (115 TPD), which will be ideally used as Cattle Feed.
- Ash (35 TPD) from the boiler is being /will be given to nearby brick manufacturers.
- Used oil (1.0 KL /annum) generated from the plant machinery/ gear boxes as hazardous waste is being/will be sold out to the CPCB authorized recycler.

Certified Compliance report of Existing EC obtained from Integrated Regional Office, MoEFCC, Chandigarh vide F. No: 4-1005/2011-RO(NZ)/588-589 dated 16.09.2021.

As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed capacity from 120 KLPD to 250 KLPD will be for manufacturing of fuel ethanol only.

During deliberation EAC sought the following commitments from PP:

- The capacity of rainwater storage tank should be of 60 days.
- No coal to be used as fuel in boiler.
- 15% area to be reserved for truck parking inside the plant premises.
- Proposed budget for social developmental activities to be increased to Rs. 1.0 Crore and to be spent on providing solar power to the nearby schools and villages. The company will provide solar power

to the nearby areas to the tune of 10% of total power consumption of the unit in form of solar lights/solar panels etc. The social developmental activities to be completed along with the commissioning of the project.

- Ash to be transferred in covered vehicles to the nearby brick manufacturers.

PP agreed to the above conditions and submitted an undertaking in compliance of the above.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with the EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee noted that the EMP report is in compliance of the PFR. The Committee deliberated on the CER plan and found to be addressing the issues in the study area. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of environmental clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance, subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). As per OM dated 16th June, 2021, project falls in category B2 and the proposed capacity from 120 KLPD to 250 KLPD shall be only be used for fuel ethanol manufacturing as per self-certification in form of an

affidavit by the Project Proponent. Provided that subsequently if it is found that the ethanol, produced based on the EC granted as per this dispensation, is not being used completely for EBP Programme, or if ethanol is not being produced, or if the said distillery is not fulfilling the requirements based on which the project has been appraised as category B2 project, the EC shall stand cancelled.

(ii). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(iii). The project proponent will treat and reuse the treated water within the factory and no waste or treated water shall be discharged outside the premises.

(iv). Existing fresh water requirement is 730 KLPD and the additional fresh water requirement for expansion will be 610 KLPD. Hence, the total fresh water requirement after expansion will be 1340 KLPD which will be sourced from ground water. Prior permission shall be obtained from the concerned regulatory authority/CGWA in this regard, and renewed from time to time.

(v). The spent wash shall be concentrated and dried to form DDGS to be used as cattle feed. Brick manufacturing unit shall be installed within plant for utilization of fly ash.

(vi). CO_2 generated from the process shall be bottled/made solid ice and utilized/sold to authorized vendors.

(vii). Occupational Health Centre for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with required safety kits/mask for personal protection.

(viii). Training shall be imparted to all employees on safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.

(ix). The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.

(x). Process organic residue and spent carbon, if any, shall be sent to Cement other suitable industries for its incinerations. ETP sludge, process inorganic & evaporation salt shall be disposed of to the TSDF.

(xi). The company shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize

waste; (b) Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapour recovery system. (f) Use of high pressure hoses for equipment clearing to reduce wastewater generation.

(xii). The green belt of at least 5-10 m width shall be developed in nearly 33% of the total project area, mainly along the plant periphery. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map.

(xiii). PP proposed to allocate Rs. 1.0 crores for CER and it shall be spent on installation of solar power to the villages nearby.

(xiv). There shall be adequate space inside the plant premises earmarked for parking of vehicles for raw materials and finished products as per CPCB norms and no parking to be allowed outside on public places.

(xv). Storage of raw materials shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.

(xvi). Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.

(xvii). A separate Environmental Management Cell (having qualified person with Environmental Science/Environmental Engineering/specialization in the project area) equipped with full-fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.

Agenda No. 42.23

Proposed 150 KLPD grain based distillery along with 4.0 MW Cogeneration power plant by M/s. Betul Biofuels Pvt. Ltd. located at village: Bodi Junavani , Tehsil and District Betul, Madhya Pradesh - Consideration of Environment Clearance.

[IA/MP/IND2/226867/2021, J-11011/372/2021-IA-II(I)]

The Project Proponent and the accredited Consultant M/s. Ampl Environ Pvt. Ltd., made a detailed presentation on the salient features of the project and informed that:

The proposal is for environmental clearance to the project for Proposed 150 KLPD grain based distillery along with 4.0 MW Cogeneration power plant by M/s. Betul Biofuels Pvt. Ltd. located at village: Bodi Junavani, Tehsil and District Betul, Madhya Pradesh.

As per the MoEF&CC Notification S.O. 2339(E), dated 16th June, 2021, a special provision in the EIA Notification, 2006-(Schedule 5 (ga), Category B2) is made, wherein for all applications made for Grain based distilleries with Zero Liquid Discharge producing ethanol; solely to be used for Ethanol Blended Petrol Programme of the Government of India shall be considered under B2 Category and appraised at Central Level by Expert Appraisal Committee (EAC) with condition that the project proponent shall file a notarized affidavit that ethanol produced from proposed project shall be used completely for EBP Programme.

Standard ToR and public Hearing conduction is not applicable as the project falls under category B2 as per OM dated 16th June, 2021. It was informed that no litigation is pending against the project.

The details of products and capacity are as under:

Unit	**Capacity**	**Product**
Grain Based Ethanol Plant	150 KLPD	Product –Ethanol (Fuel) By Product – DDGS & CO2
CO- Generation Plant	4.0 MW	Power

Total project area is 11.0 Acres for proposed project. Industry will develop greenbelt in an area of 33% i.e. 3.63 acres out of total area of the project. The estimated project cost is Rs. 110 Crores. Total capital cost earmarked towards environmental pollution control measures is Rs. 6.09 Crores and the Recurring cost (operation and maintenance) will be about Rs. 1.0 Crores / annum. No. of working days will be 330 days/annum. Total Employment will be 150 persons (Permanent 90 & temporary 60) during operation phase. Industry proposes to allocate INR 2.3 Crores of total project cost towards Corporate Environment Responsibility (CER).

No National Parks, Wildlife Sanctuaries, Biosphere Reserves, Tiger/ Elephant Reserves, Wildlife Corridors etc. lies within 10 km radius. Tapi Reserved Forest – 0.28 km – SW, Bodi Reserved Forest – 2.12 km – NNE, Kund Reserved Forest – 4.81 km – NW and Bor Nadi – 6.28 km – SW, Tank near Kumhali – 6.36 km – NE, Pond near Jin – 8.47 km – N , Machna River – 8.64 km – E, Pond near Kund Reserved Forest – 8.70 km – NW, Tapi River – 9.44 – S are the water bodies found within 10 km radius.

One Time Total water requirement for the project will be 4039 KLD which will be further reduced through recycling & reuse to 3126 KLD.

555 KLD will be fresh water demand for distillery plant @3.7KL/KL of Ethanol. The total fresh water demand for proposed project will be 913 KLD which will be sourced from ground water. The applications for permission of withdrawal of ground water has been submitted to CGWA. Effluent will be treated through state of art PCTP/Effluent Treatment Plant (Bio tower, clarifiers, ACF). The plant will be based on Zero Liquid discharge system.

Power requirement for Ethanol plant will be 3.44 MW, which will be sourced from the 4.0 MW Co-generation Power Plant. Unit will be having D.G. Sets of 1 x 1000 KVA which will be used as standby during power failure. Stack height (9 m) will be provided as per CPCB norms. Proposed Boiler of 30 TPH capacity with ESP as Air Pollution Control Equipment will be installed with a stack height of 70 m for controlling the particulate emissions within the statutory limit of 50 mg/Nm3.

Details of Process emissions generation and its management:

CO2 (82 TPD) generated during the fermentation process will be collected and sold to authorized vendors.

Details of Solid waste/ Hazardous waste generation and its management:

- Solid waste from the Grain based operations generally comprises of fibres and proteins in the form of DDGS (105 TPD), which will be ideally used as Cattle, poultry & fish feed ingredients.
- Ash (35 TPD) generated from boiler will be supplied to brick manufacturers.
- Used oil & grease (0.5 KL/Annum) generated from plant machinery/gear boxes as hazardous waste will be sold out to the CPCB authorized recyclers.

As per OM dated 16th June, 2021, PP has submitted self-certification in the form of affidavit declaring that the proposed capacity of 150 KLD will be for manufacturing of fuel ethanol only.

During deliberations EAC sought the following information/commitments from PP:

a) Brick manufacturing unit will be installed within the plant premises for utilization of fly ash.
b) 15% of the total plant area will be reserved for parking.
c) Development of greenbelt to be completed along with commissioning of the project.
d) OHS fund to be increased to Rs. 50 Lakhs per annum.

e) Company to construct a storage pond of 60 days capacity and the accumulated water to be used as fresh water thereby reducing fresh water consumption.
f) The proposed budget to be spent on social development activities to be increased Rs. 2.5 crores and to be spent on solar power and providing drinking water facilities.
g) Out of total power requirement 10 % shall be met from renewable energy
h) Further, EAC directed that PP shall submit land conversion document for industrial use and is in possession of the company.

PP has submitted the desired information except commitment (e).

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with the EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee noted that the EMP report is in compliance of the PFR. The Committee deliberated on the CER plan and found to be addressing the issues in the study area. The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of environmental clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance, subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). As per OM dated 16th June, 2021, project falls in category B2 and the proposed capacity of 150 KLPD shall be only be used for fuel ethanol manufacturing as per self-certification in form of an affidavit by the Project Proponent. Provided that subsequently if it is found that the ethanol, produced based on the EC granted as per this dispensation, is not being used completely for EBP Programme, or if ethanol is not being produced, or if the said distillery is not fulfilling the requirements based on which the project has been appraised as category B2 project, the EC shall stand cancelled.

(ii). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(iii). The project proponent will treat and reuse the treated water within the factory and no waste or treated water shall be discharged outside the premises.

(iv). The total fresh water demand for proposed project will be 913 KLD which will be sourced from ground water. Prior permission shall be obtained from the concerned regulatory authority/CGWA in this regard, and renewed from time to time. No ground water recharge shall be permitted within the premises. Company shall construct a storage pond of 60 days capacity and the accumulated water to be used as fresh water thereby reducing fresh water consumption.

(v). The spent wash shall be concentrated and dried to form DDGS to be used as cattle feed. Brick manufacturing unit will be installed within the plant premises for utilization of fly ash.

(vi). CO_2 generated from the process shall be bottled/made solid ice and utilized/sold to authorized vendors.

(vii). Occupational Health Centre for surveillance of the worker's health shall be set up. The health data shall be used in deploying the duties of the workers. All workers & employees shall be provided with required safety kits/mask for personal protection.

(viii). Training shall be imparted to all employees on safety and health aspects of chemicals handling. Safety and visual reality training shall be provided to employees.

(ix). The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms.

(x). Process organic residue and spent carbon, if any, shall be sent to Cement or any other suitable industries for its incinerations. ETP sludge, process inorganic & evaporation salt shall be disposed of to the TSDF.

(xi). The company shall undertake waste minimization measures as below (a) Metering and control of quantities of active ingredients to minimize waste; (b) Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapour recovery system. (f) Use of high pressure hoses for equipment clearing to reduce wastewater generation.

(xii). The green belt of at least 5-10 m width shall be developed in nearly 33% of the total project area, mainly along the plant periphery. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department. Records of tree canopy shall be monitored through remote sensing map.

(xiii). PP proposed to allocate Rs. 2.5 crores towards CER and it shall be used for installation of solar power, upgradation of schools and for providing drinking water for villagers free of cost.

(xiv). There shall be adequate space inside the plant premises earmarked for parking of vehicles for raw materials and finished products as per CPCB norms and no parking to be allowed outside on public places.

(xv). Storage of raw materials shall be either stored in silos or in covered areas to prevent dust pollution and other fugitive emissions.

(xvi). Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises.

(xvii). A separate Environmental Management Cell (having qualified person with Environmental Science/Environmental Engineering/specialization in the project area) equipped with full-fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.

Agenda No. 42.24

Expansion of Grain Based Distillery from 25 KLPD to 60 KLPD by M/s. Adlers Bioenergy Ltd. located at Sy. No. 284 (B), Village Gaurgaon, Taluka Kallamb, District Osmanabad, Maharashtra -

Consideration of Environment Clearance. [The project is under violation category].

[IA/MH/IND2/230734/2010, EC(MR)-2009/290/CR.57/TC.1]

As per directions of Madras High Court vide Writ Petition(MD) No. 11757 of 2021 and WMP(MD) No. 9239 of 2021 dated 15.07.2021 there has been an interim stay for considering proposals of violation category.

Accordingly, the proposal was *returned* in present form.

Agenda No. 42.25

On shore Oil & Gas exploration in Deomali PEL area in Tirap and Changlang Districts by M/s Oil India Limited (NEF PROJECT) located at Districts Tirap and Changlang, Arunachal Pradesh - Consideration of Environment Clearance reg.

[IA/AR/IND2/56550/2013, J-11011/98/2013-IA II (I)]

The PP/consultant were absent for the appraisal of the proposal. EAC has informed that if the proposal has been pending just for submitting required clearances the same may checked by the ministry and if found sufficient, it is recommended as per earlier recommendation. In this regard PP has submitted Stage-I FC but NBWL clearance was not obtained as mentioned in the earlier deliberations of the 12th EAC meeting held during 23rd -24th August, 2016.

In view of the above, EAC **recommended** this proposal, subject to clearance from NBWL if applicable.

ANNEXURE

GENERAL CONDITIONS FOR ENVIRONMENTAL CLEARANCE

(i) No further expansion or modifications in the plant, other than mentioned in the EIA Notification, 2006 and its amendments, shall be carried out without prior approval of the Ministry of Environment, Forest and Climate Change/SEIAA, as applicable. In case of deviations or alterations in the project proposal from those submitted to this Ministry for clearance, a fresh reference shall be made to the Ministry/SEIAA, as applicable, to assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any.

(ii) The energy source for lighting purpose shall be preferably LED based, or advanced having preference in energy conservation and environment betterment.

(iii) The overall noise levels in and around the plant area shall be kept well within the standards by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform to the standards prescribed under the Environment (Protection) Act, 1986 Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).

(iv) The company shall undertake all relevant measures for improving the socio-economic conditions of the surrounding area. CER activities shall be undertaken by involving local villages and administration and shall be implemented. The company shall undertake eco-developmental measures including community welfare measures in the project area for the overall improvement of the environment.

(v) The company shall earmark sufficient funds towards capital cost and recurring cost per annum to implement the conditions stipulated by the Ministry of Environment, Forest and Climate Change as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds so earmarked for environment management/ pollution control measures shall not be diverted for any other purpose.

(vi) A copy of the clearance letter shall be sent by the project proponent to concerned Panchayat, ZillaParishad/Municipal Corporation, Urban local Body and the local NGO, if any, from

whom suggestions/ representations, if any, were received while processing the proposal.

(vii) The project proponent shall also submit six monthly reports on the status of compliance of the stipulated Environmental Clearance conditions including results of monitored data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF&CC, the respective Zonal Office of CPCB and SPCB. A copy of Environmental Clearance and six monthly compliance status report shall be posted on the website of the company.

(viii) The environmental statement for each financial year ending 31st March in Form-V as is mandated shall be submitted to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the respective Regional Offices of MoEF&CC by e-mail.

(ix) The project proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the SPCB/Committee and may also be seen at Website of the Ministry and at https://parivesh.nic.in/. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same shall be forwarded to the concerned Regional Office of the Ministry.

(x) The project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of the project.

(xi) This Environmental clearance is granted subject to final outcome of Hon'ble Supreme Court of India, Hon'ble High Court, Hon'ble NGT and any other Court of Law, if any, as may be applicable to this project.

List of the Expert Appraisal Committee (Industry-2) members participated during Video Conferencing (VC) meeting

S. No.	Name and Address	Designation
1.	Dr. J. P. Gupta	Chairman
2.	Sh. R.K. Singh	Member
3.	Dr. Y.V. Rami Reddy	Member
4.	Dr. T. Indrasena Reddy	Member
5.	Sh. S. C. Mann	Member
6.	Dr. T. K. Joshi	Member
7.	Dr. J. S. Sharma	Member
8.	Sh. Dinabandhu Gouda, CPCB	Member
9.	Sh. Ashok Kr. Pateshwary, Director, MoEFCC	Member Secretary
MoEFCC		
10.	Dr. Mahendra Phulwaria	Scientist 'C'
11.	Sh. Kanaka Teja	Research Assistant

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Annexure -R3

F. No. IA- J-11011/1251/2007 - IA II (I)
Government of India
Ministry of Environment, Forest and Climate Change
(Impact Assessment Division)

Indira Paryavaran Bhawan
Jal Wing, 3rd Floor, Jor Bag Road,
New Delhi -110003

Dated: 08th March, 2022

To,
Principal chief conservator of forests, Assam,
Aranya Bhawan, Panjabari,
Guwahati, Kamrup (Metropolitan)
Pin – 781037

Sub: Onshore Oil & Gas development drilling and production in DumdumaPengeri Area in TinsukiaDistrict under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML Tinsukia Assam by M/s OIL INDIA LIMITED- Consideration of Environment Clearance reg.

Sir,

This has reference to online proposal No. IA/AS/IND2/220363/2007 for grant of EC to the above mentioned project.

2. It was observed that Bogapani elephant corridor is located within 1 km of one of the proposed wells. Further, the proposed area falls under the critical elephant habitat and corridor which connects the two States Assam and Arunachal Pradesh. The proposed diversion is completely falling under the Dihing-Patkai Elephant Reserve, Assam and South Arunachal Elephant Reserve, Arunachal Pradesh.

3. In this regard you are kindly requested to furnish your comments on impacts of proposed activities (Onshore Oil & Gas development drilling) on elephants and their habitat/ corridors conservation.

4. This issues with the approval of the competent authority.

08/03/22

(Ashok Kumar Pateshwary)
Director
Tel. No. 20819326

Copy to:

i. Shri. Sarbeswar Basumatary, Head(S&E), M/s OIL INDIA LIMITED.,Safety & Environment Department, Duliajan, Naharkathiya, Dibrugarh, Assam-786602.
ii. Inspector General of Forest, Indira Paryavaran Bhawan, Vayu Wing, 5th Floor, Jor Bag Road, New Delhi -110003

3970

ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

Safety & Environment Department
P.O. DULIAJAN-786602,
ASSAM, INDIA
Phone : 0374-2800542
Fax : 0374-2801796
Email: safety@oilindia.in

Ref No. S&E/E43(14)/97

Date: 27.01.2023

Annexure -R 4

To
The Director,
IA (II) Division,
Ministry of Environment, Forest & Climate Change,
Indira Paryavaran Bhawan,
Jor Bagh Road,
New Delhi – 110 003

Subject: Application seeking Environmental Clearance (EC) for proposed Onshore Oil and Gas development drilling and production in Tinsukia district under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML.

Reference: **MOEF&CC Letter No.- IA-J-11011/1251/2007-IA II (I) dated 8th March 2022**
Online Proposal No. IA/AS/IND2/220363/2007

Oil India Ltd. (OIL) intends to carry out Onshore Oil and Gas development drilling and production in Tinsukia district under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML. OIL has submitted the application online and the proposal no. is IA/AS/IND2/220363/2007.

The MoEF&CC IA-Divisions had some observations related to the proposal and send a letter (No.- IA-J-11011/1251/2007-IA II (I) dated 8th March 2022) to Principal Chief Conservator of Forests, Assam for his expert opinion and feedback. The ADS and response are provided below.

S No.	Queries	Response
1.	It was observed that Bogapani Elephant Corridor is located within 1 km of the proposed wells further the proposed area falls under the critical elephant habitat and corridor which connects the two states Assam and Arunachal Pradesh. The proposed diversion is completely falling under the Dihing-Patkai Elephant Reserve, Assam and South Arunachal Elephant Reserve, Arunachal Pradesh.	Bogapani Elephant Corridor is in Digboi Forest Division. The length and width of the corridor is 2.5-3.0 km and 0.5-1 km respectively. The frequency of usage of the corridor by elephant is Regular (Seasonal; September to February). Elephants move through Bogapani Tea Gardens, agricultural fields and human habitations once they have crossed NH 38 and the railway track near Ramnagar village. This railway track along with the national highway, is a major impediment to elephant movement in the corridor. *[Source: Right of Passage (2017).Elephant Corridors of India [2nd Edition]. Menon, V, Tiwari, S K, Ramkumar, K, Kyarong, S, Ganguly, U and Sukumar, R (Eds.). Conservation Reference Series No. 3.Wildlife Trust of India, New Delhi].* Out of 26 wells and 3 production installations, one well 833 is located within 1 km from the boundary of the Bogapani Elephant Corridor. The proposed well no. 833 will be dropped from the current proposal. Well locations and corridor distance plotted in toposheet is presented as **Annexure-I**. The proposed wells and production installations are located more than 10 km from Dehing Patkai National Park. During the period of active movement of elephants (September-February) in the area, site development and drilling activities at wells near the Bogapani Elephant Corridor will be avoided.

Some additional mitigation measures to be undertaken by the project include

- DG sets will be provided with acoustic enclosures and fence line noise barriers will be provided to reduce level of noise emitted from the drill sites;
- Appropriate shading of lights to be provided to prevent scattering.
- Approach road shall be made pucca to minimize generation of suspended dust

You are requested to consider the above proposal for grant of Environmental Clearance based on the above information.

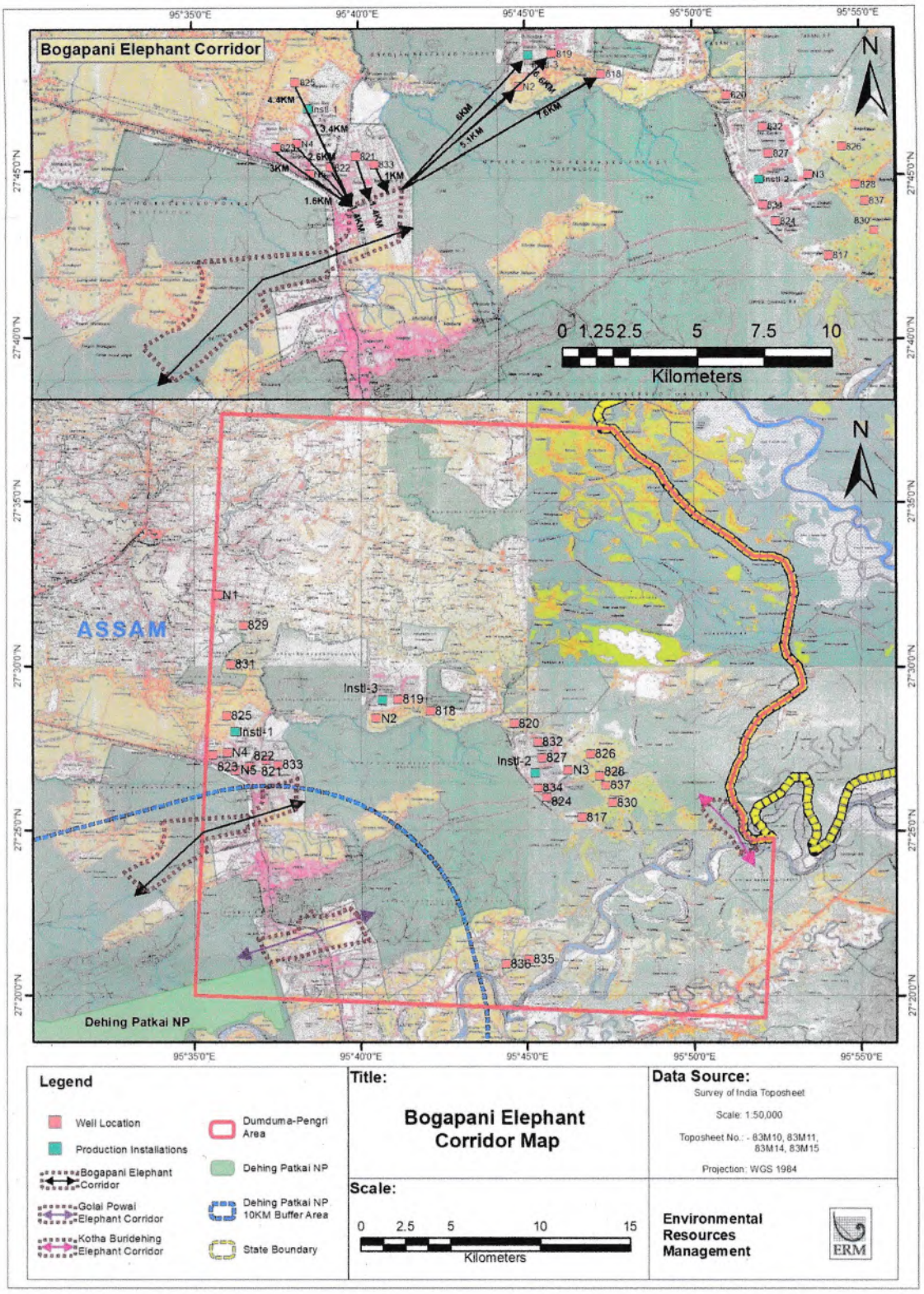
Thanking you.

Yours faithfully,
OIL INDIA LTD

(Ajit Chandra Haloi)
ED(HSE) &
Nodal Officer (EC, FC, NBWL)
For Resident Chief Executive

(A C Haloi)
ED - (HSE)
Nodal Officer (EC/FC/NBWL)
OIL INDIA LIMITED

Annexure-I


Bogapani Elephant Corridor
ASSAM
Dehing Patkai NP
Kilometers
Legend
Well Location
Production Installations
Bogapani Elephant Corridor
Golai Powai Elephant Corridor
Kotha Buridehing Elephant Corridor
Dumduma-Pengri Area
Dehing Patkai NP
Dehing Patkai NP 10KM Buffer Area
State Boundary
Title:
Bogapani Elephant Corridor Map
Data Source:
Survey of India Toposheet
Scale: 1:50,000
Toposheet No.: - 83M10, 83M11, 83M14, 83M15
Projection: WGS 1984
Scale:
Environmental Resources Management
ERM

ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

Safety & Environment Department
P.O. DULIAJAN-786602,
ASSAM, INDIA
Phone : 0374-2800542
Fax : 0374-2801796
Email : safety@oilindia.in

Ref. No. S&E/E-43(14)/96

Date:27.01.2023

UNDERTAKING

Oil India Ltd. (OIL) hereby undertake to drop one well, Well no. 833 from the list of 26 wells and 3 Production Installations, as it is located within 1 km from the boundary of Bogapani Elephant corridor for the proposal of "Onshore Oil & Gas Development drilling and production in Dumduma-Pengeri Area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML" Proposal no: IA/AS/IND2/220363/2007; File No. J-11011/1251 /2007-IA II (I)

Accordingly, the proposal may be considered for grant of Environmental Clearance for 25 wells and 3 Production Installations.

Above is for your kind information please.

Thanking you,

Yours faithfully,
OIL INDIA LTD

(Ajit Chandra Haloi)
ED(HSE) &
Nodal Officer (EC, FC, NBWL)
For Resident Chief Executive

(A C Haloi)
ED - (HSE)
Nodal Officer (EC/FC/NBWL)
OIL INDIA LIMITED

Ref No. S&E/E43 (14)/995 Date: 09.10.2023

Annexure -R 5

To
The Director - IA, II(I) &
The Member Secretary, EAC Industry – II,
Ministry of Environment, Forest & Climate Change,
Indira Paryavaran Bhawan,
Jor Bagh Road,
New Delhi – 110 003.

Sub: Reply to ADS for the application seeking Environmental Clearance (EC) for Onshore Oil & Gas Development drilling and production in Dumduma-Pengeri Area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML.

Ref: Proposal No. IA/AS/IND2/220363/2007 & File No. J-11011/1251/2007 - IA II (I).

Sir,

Oil India Ltd. (OIL) submitted application for Environmental Clearance for the proposal "Onshore Oil & Gas Development drilling and production in Dumduma-Pengeri Area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML" vide proposal no. IA/AS/IND2/220363/2007.

An ADS was raised on 05.09.2023, please find below the point wise compliance to the observations of the committee constituted as per order dated 08.12.2017.

S No.	Observation	Compliance
1.	Oil is leaking from underground pipelines in the Reserve forest.	Committee visited three sites namely Pit No. 512, 513 and 139 in the Digboi region and prepared the report based on those findings alone. The concerned premises as inspected by the committee doesn't have any crude oil pipeline. There is no leakage or seepage of crude oil through any underground pipelines in the Reserve Forest area. Also, all the pipelines are periodically supervised and monitored by OIL.
2.	At several places, oily sludge pits of abandoned wells have been found and natural drains pass through these pits.	Digboi Oil Fields have been in existing since last 100 years. The Crude Oil was discovered in the far east of India at Digboi in 1889 by the erstwhile Assam Railway & Trading Co (AR&T), which subsequently developed the Digboi Oil Field, located within the present day Dihing Patkai Reserve Forest. OIL came into existence, much later in the year 1959 as a Joint Venture Company of Burmah Oil Company and Government of India and was subsequently fully nationalized in the year 1981. Oil India Limited has inherited a few pits containing oily debris located within the Reserved Forest from the erstwhile Assam Railway & Trading Co (AR&T). However, OIL has carried out bio-remediation of natural phenomenon of oil seepage using Oil Zapper technology. Also, in the NGT order dated 08.12.2017, it was mentioned that the committee noticed natural seepage in drain no.1 of Digboi oil field which was also accepted by the Tribunal.

S No.	Observation	Compliance
3.	Oil spill have been found in several oil producing wells and Crude Gathering Stations. No fencing had been provided at these well sites.	No oil spill exists in these areas as mentioned by the committee in the report. However, if any oil spill occurs during operations or any other concern is found in the pipeline, the same is rectified immediately and the site is cleaned and restored. OIL has provided iron fencings at the well sites, but due to miscreant activities and thefts by the locals, fencing is missing at some of the sites. OIL is carrying out regular inspection of well sites and providing fencings wherever necessary.
4.	More than 800 wells have been drilled since the operation of Burma Oil Company Limited. OIL India Ltd. does not even have the inventories of these abandoned oil wells, let alone treatment of these pits.	Oilfields are in operation since 1889 and OIL was incorporated in 1959 and has inherited these fields from the erstwhile Assam Railway & Trading Co (AR&T). Post 1959, OIL is maintaining the inventory of the wells (644 nos. of shut-in wells, 293 nos. of abandoned wells, 45 are producing wells). Also, OIL has been carrying out bioremediation whenever oily sludge/seepage is found in any of the pits due to natural phenomenon.
5.	In the three oil sludge remediation sites visited, the remediation has not resulted in complete conversion of oily sludge into biodegradable matter. They do not even maintain the inventors of abandoned oil wells.	OIL has carried out bioremediation activities in the pits but due to reoccurrence of natural seepage, oil sludge accumulation was observed. OIL has carried out Bioremediation of these pits and will continue to carry out the bioremediation whenever seepage is observed. Also, OIL is maintaining the inventories of the wells post 1959.
6.	OIL India Ltd. has been unable to stop the release of untreated oil effluent in open sludge pits and seepage areas around oil rigs in the Digboi Oil field.	In the Hon'ble NGT judgement it was mentioned that no untreated oil effluent in open sludge pits is being released by OIL and the occurrence of oily sludges is owing to natural seepage and not due to any action/inaction of OIL.

You are requested to consider the above proposal for grant of Environmental Clearance based on the above information.

Thanking you

Yours faithfully,

(Ajit Chandra Haloi)
Executive Director (HSE) &
Nodal Officer (EC, FC, NBWL)
For Resident Chief Executive

(A C Haloi)
ED - (HSE)
Nodal Officer (EC/FC/NBWL)
OIL INDIA LIMITED

Annexure -R 6

ऑयल इंडिया
OIL INDIA

HSE Department
Oil India Limited
Duliajan, Dibrugarh, 786602, Assam
Phone : 0374-2800542
Email: safety@oilindia.in

संदर्भ सं./Ref. No.: S&E/E/43 (14)/200 दिनांक/Date: 23.02.2024

From	:	Chief General Manager (HSE) I/C
To	:	The Director - IA, II(I) & The Member Secretary, EAC Industry – II, Ministry of Environment, Forest & Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi – 110 003.
Subject	:	Reply to ADS for the application seeking Environmental Clearance (EC) for Onshore Oil & Gas Development drilling and production in Dumduma-Pengeri Area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML.
Ref	:	Proposal No. IA/AS/IND2/220363/2007 & File No. J-11011/1251/2007 - IA II (I).

Sir,

Oil India Ltd. (OIL) applied for Environmental Clearance for the proposal "Onshore Oil & Gas Development drilling and production in Dumduma-Pengeri Area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML" vide proposal no. IA/AS/IND2/220363/2007.

An ADS was raised on 04.12.2023 to submit the compliance to the observation of the Ministry committee report dated 04.01.2023 related to the ongoing court case in compliance to Hon'ble NGT Judgement dated 08.12.2017 in Original Application No. 19 of 2014 filed in Dr. Kashmira Kakati vs UoI & Ors. The point-wise reply to the committee's findings is enclosed as **Annexure – I**.

Thanking you.

23/02/2024

(Rajendra Singh Garbyal)
Chief General Manager (HSE) I/C
Nodal Officer (EC, FC, NBWL)
For Resident Chief Executive

Encl: As above.

Annexure - I

The findings of the Committee with respect to OIL and the responses are as follows:

1. Finding *No. 1:* ***Oil is leaking from underground pipelines in the Reserve Forest***
   i. The Committee has alleged that pipelines have been found to be leaking however, no specifications have been provided by the Ld. Committee with respect to the said area /block. It may be noted that the Committee visited only 3 sites, namely Pit No. 512, 513 and 139 in the concerned Digboi region wherein there are no underground crude oil pipelines.
   ii. OIL periodically monitors and supervises its pipelines and all its pipelines are in good condition. Additionally, these pipelines are also audited by Oil Industry Safety Directorate (OISD) periodically. In view of the above, it is reiterated that there is no leakage or seepage of crude oil through any underground pipelines in the Reserve Forest area.

2. Finding *No. 2:* ***At several places, oily sludge pits of abandoned wells have been found and natural drains pass through these pits.***
   i. It is pertinent to mention that the Digboi Oilfield has a rich historical background which plays a significant role in the present context. The concerned Digboi Oilfields have been in existence for more than 125 years. The crude oil was discovered at Digboi in 1889 by the erstwhile Assam Railway & Trading Co (AR&T), which subsequently developed the Digboi Oil Field, located within the present-day Dihing Patkai Reserve Forest area.
   ii. OIL came into existence, much later in the year 1959 with oil resources of Nahorkatiya, Hoogrijan & Moran field with 48 wells as a Joint Venture Company of Burmah Oil Company and Government of India. OIL was subsequently nationalized in the year 1981 as a result of nationalisation, OIL acquired the assets of Digboi oilfield which were under control of Assam Oil Company till then.
   iii. OIL along with the Digboi Oilfield also inherited a few pits containing oily debris located within the Reserved Forest. Since then, OIL has undertaken proactive measures for bioremediation of the oily debris accumulated due to natural phenomenon of oily seepage.

iv. It is humbly submitted and reiterated that the historical and geographical background of the Digboi Oilfield has also been well accepted by the NGT in the Impugned Order dated 08.12.2017 since the Impugned Order *inter alia* specifically records that the *Committee noticed natural seepage in drain no. 1 of Digboi Oilfield* and has not been challenged by any party till date.

v. Though, seepage of oil is accepted as a natural phenomenon by the Hon'ble NGT, OIL has on its own accord undertaken bio-remediation activities by using Oil zapper technology in the Digboi Oilfield region and has been successful in reducing the Total Petroleum Hydrocarbons (TPH) in the area to negligent levels. Oil zapper technology utilizes the bioremediation potential of specific microbes that degrades the toxic hydrocarbon compounds leaving behind non-hazardous end products or metabolites and hence no harmful effects. Not only this is environment-friendly technique, but also is highly cost effective when compared to storage of oily waste/oily sludge in sludge pits.

3. Finding *No. 3:* ***Oil spill have been found in several oil producing wells and Crude Gathering Stations. No fencing had been provided at these well sites.***

i. It is most humbly submitted that the findings of the Committee are unfortunately not supported by any pictures or on ground task reports. However, it merits the attention of your office that in case an oil spill occurs, the same is rectified immediately and the site is cleaned and restored, as per the internal SOPs of OIL.

ii. It is further humbly submitted that OIL had also iron fenced well sites, howsoever owing to number of thefts of iron fencing, at time few wells may be unfenced. OIL, time and again addresses these concerns, even though the issue of theft is a recurring one. Since, the wells are spread over a large area most of them are abandoned wells, physical monitoring of these wells in thick and dense forest becomes practically impossible.

4. *Finding No. 4:* ***More than 800 wells have been drilled since the operation of Burma Oil Company Ltd. Oil India Ltd does not even have the inventories of these abandoned on wells, let alone treatment of these pits.***

i. It is humbly submitted that the oilfields have been in operation since 1889 and OIL inherited the Oilfield in 1981 only. Since then, OIL has been maintaining the wells records and the same have been subjected to various audits by independent/statutory agencies. There are a total of about 982 wells out of

which about 651 are shut-in, about 293 are abandoned and 38 are producing wells.

ii. It is further most humbly submitted that OIL has been carrying out the task of Bioremediation of these oily sludges much prior to the Judgment passed by the Hon'ble NGT.

iii. It is humbly submitted that as and when oily sludge/seepage is found due to the natural phenomenon, OIL undertakes bio- remediation of the area time to time. Despite the bio-remediation work being carried out in the area, the oil seepage has been observed to be a natural seepage and is recurring in nature.

iv. It is stated that the Office of Divisional Forest Officer, Digboi Division by Letter no. B/NGT/2022/2743-45 dated 16.11.2022 had requested OIL to provide details, including location, number of pits, geo-coordinates, area and map of the open sludge pits, oil pits and contaminated water bodies in and around the Dihing Patkai Elephant Reserve. OIL accordingly in bona fide *vide* reply dated 28.11.2022 had shared the geo-coordinates of the Natural and artificial pits in the Digboi Oil Field along with the Map showing the location of the pits.

5. *Finding No. 5:* ***In the three oil sludge remediation sites visited, the remediation has not resulted in complete conversion of oily sludge into biodegradable matter. They do not even maintain the inventories of abandoned oil wells.***

i. It is most humbly stated that as per the findings of the Committee, despite the bio-remediation work being carried out in the area, oil seepage has been observed, which appears to be a natural seepage and not owing to any action or inaction of OIL. OIL has been taking remedial measures since July 2010 and the entire oil debris has already been treated through Bio remedial measures. since it is a natural phenomenon, the recurrence of the oily sludges has been observed in the Region.

ii. It is submitted that given the said circumstances, OIL is again undertaking bio-remediation work in the area and shall continue to address the issue, as and when observed.

6. *Finding No. 6:* ***Oil India limited has been unable to stop the release of untreated oil effluent in open sludge pits and seepage areas around oil rigs in the Digboi Oil field.***

i. It is submitted that the judgment passed by the Hon'ble NGT observes that no untreated oil effluent in open sludge pits is being released by OIL and that occurrence of oily sludges as witnessed owing to natural seepage and not due to any action/ inaction of OIL as against the finding of the Committee.

ii. It is most humbly stated that the reports of the pits (visited by the Committee) for the test conducted to examine the soil quality by taking a sample of Oily sludge in proximity of wells as prevalent before and after application of Oil Zapper shows remarkable deduction in presence of Total Petroleum Hydrocarbons (HE-TPH). It is most humbly stated that evidently the process of Bio-remediation and application of Oil Zapper technology has aided drastic reduction in the amount of Hydrocarbons to negligent levels in the areas adjoining the oil wells.

iii. However, it is most humbly stated that the fresh seepage as observed is possibly due to a natural phenomenon and appropriate actions have been taken for bioremediation by OIL through TERI. The experts from TERI visited the concerned site for analysis of the present circumstances and the proposal on bioremediation is being submitted by them.

2. We trust the above response to the findings of the committee provides sufficient clarification as desired.

(Rupam Jyoti Sutradhar)

Deputy General Manager (HSE)

Annexure -R 7

ऑयल इंडिया
OIL INDIA

HSE Department
Oil India Limited
Duliajan, Dibrugarh, 786602, Assam
Phone : 0374-2800542
Email: safety@oilindia.in

संदर्भ सं./Ref. No.: S&E/E/43 (14)/640

दिनांक/Date: 19.06.2024

From	:	Executive Director (HSE &ESG)
To	:	The Director - IA, II(I) & The Member Secretary, EAC Industry – II, Ministry of Environment, Forest & Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi – 110 003.
Subject	:	Reply to ADS for the application seeking Environmental Clearance (EC) for Onshore Oil & Gas Development drilling and production in Dumduma-Pengeri Area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML.
Ref	:	Proposal No. IA/AS/IND2/220363/2007 & File No. J-11011/1251/2007 - IA II (I).

Sir,

Oil India Ltd. (OIL) applied for Environmental Clearance for the proposal "Onshore Oil & Gas Development drilling and production in Dumduma-Pengeri Area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML" vide proposal no. IA/AS/IND2/220363/2007.

An ADS was raised on 20.05.2023 seeking the compliance of ADS letter dated 04.12.2023, where OIL has been advised to approach the Ministry after final outcome of the ongoing court case and meanwhile submit the compliance to the observation of the Ministry's committee report dated 04.01.2023.

In this regard, we would like to inform you that OIL's reply to the observation of the Ministry committee report dated 04.01.2023 was already submitted to your estimeed office vide our letter Ref No.: S&E/E/43 (14)/200 dated 23.02.2024. (Copy Enclosed as **Annexure-1**) and the present status of the proceeding of the Hon'ble NGT order dated 24.07.2023 is given as below:

"On hearing dated 14.09.2023, the Hon'ble NGT directed OIL to file fresh affidavit within four weeks. Accordingly, OIL filed detailed counter affidavit before the Hon'ble NGT. However, Respondent No. 2 State of Assam and Respondent No. 4, Assam State Pollution Control Board have sought time to file the reply within three weeks as per last order dated 08.04.2024. The next hearing is fixed on 18.07.2024".

OIL vide letter dated 27.01.2023, has also requested to Ministry that our proposed wells of Dumduma Pengry Proposal are located more than 10 km from Dehing Patkai National Park and also assured to drop one proposed well No 833 which is at a dispance of one kilometer from the Bopagani Elephant Corridor and our other proposed locations are more than 1 km from Bogapani Elephant Corridor.(Copy enclosed **Annexure-2**)

View above, we request your good office , to kindly consider our submission and extend your support for further processing of the Proposal for the grant of Environmnet Clearance.

Thanking you.

कार्यकारी निदेशक (एचएसई एवं ईएसजी)
Executive Director (HSE & ESG)
नोडल अधिकारी (ईसी/एफसी/एनबीडब्ल्यूएल)
Nodal Officer (EC/FC/NBWL)
ऑयल इंडिया लिमिटेड
Oil India Limited

19/06/2024

(Rajendra Singh Garbyal)
Executive Director (HSE & ESG)
Nodal Officer (EC, FC, NBWL)
For Resident Chief Executive

Encl: As above.

Annexure-1

ऑयल इंडिया
OIL INDIA

HSE Department
Oil India Limited
Duliajan, Dibrugarh, 786602, Assam
Phone : 0374-2800542
Email: safety@oilindia.in

संदर्भ सं./Ref. No.: S&E/E/43 (14)/200

दिनांक/Date: 23.02.2024

From	:	Chief General Manager (HSE) I/C
To	:	The Director - IA, II(I) & The Member Secretary, EAC Industry – II, Ministry of Environment, Forest & Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi – 110 003.
Subject	:	Reply to ADS for the application seeking Environmental Clearance (EC) for Onshore Oil & Gas Development drilling and production in Dumduma-Pengeri Area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML.
Ref	:	Proposal No. IA/AS/IND2/220363/2007 & File No. J-11011/1251/2007 - IA II (I).

Sir,

Oil India Ltd. (OIL) applied for Environmental Clearance for the proposal "Onshore Oil & Gas Development drilling and production in Dumduma-Pengeri Area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML" vide proposal no. IA/AS/IND2/220363/2007.

An ADS was raised on 04.12.2023 to submit the compliance to the observation of the Ministry committee report dated 04.01.2023 related to the ongoing court case in compliance to Hon'ble NGT Judgement dated 08.12.2017 in Original Application No. 19 of 2014 filed in Dr. Kashmira Kakati vs UoI & Ors. The point-wise reply to the committee's findings is enclosed as **Annexure – I**.

Thanking you.

23/02/2024

(Rajendra Singh Garbyal)
Chief General Manager (HSE) I/C
Nodal Officer (EC, FC, NBWL)
For Resident Chief Executive

Encl: As above.

Annexure - I

The findings of the Committee with respect to OIL and the responses are as follows:

1. Finding *No. 1:* ***Oil is leaking from underground pipelines in the Reserve Forest***
   i. The Committee has alleged that pipelines have been found to be leaking however, no specifications have been provided by the Ld. Committee with respect to the said area /block. It may be noted that the Committee visited only 3 sites, namely Pit No. 512, 513 and 139 in the concerned Digboi region wherein there are no underground crude oil pipelines.
   ii. OIL periodically monitors and supervises its pipelines and all its pipelines are in good condition. Additionally, these pipelines are also audited by Oil Industry Safety Directorate (OISD) periodically. In view of the above, it is reiterated that there is no leakage or seepage of crude oil through any underground pipelines in the Reserve Forest area.

2. Finding *No. 2:* ***At several places, oily sludge pits of abandoned wells have been found and natural drains pass through these pits.***
   i. It is pertinent to mention that the Digboi Oilfield has a rich historical background which plays a significant role in the present context. The concerned Digboi Oilfields have been in existence for more than 125 years. The crude oil was discovered at Digboi in 1889 by the erstwhile Assam Railway & Trading Co (AR&T), which subsequently developed the Digboi Oil Field, located within the present-day Dihing Patkai Reserve Forest area.
   ii. OIL came into existence, much later in the year 1959 with oil resources of Nahorkatiya, Hoogrijan & Moran field with 48 wells as a Joint Venture Company of Burmah Oil Company and Government of India. OIL was subsequently nationalized in the year 1981 as a result of nationalisation, OIL acquired the assets of Digboi oilfield which were under control of Assam Oil Company till then.
   iii. OIL along with the Digboi Oilfield also inherited a few pits containing oily debris located within the Reserved Forest. Since then, OIL has undertaken proactive measures for bioremediation of the oily debris accumulated due to natural phenomenon of oily seepage.

iv. It is humbly submitted and reiterated that the historical and geographical background of the Digboi Oilfield has also been well accepted by the NGT in the Impugned Order dated 08.12.2017 since the Impugned Order *inter alia* specifically records that the *Committee noticed natural seepage in drain no. 1 of Digboi Oilfield* and has not been challenged by any party till date.

v. Though, seepage of oil is accepted as a natural phenomenon by the Hon'ble NGT, OIL has on its own accord undertaken bio-remediation activities by using Oil zapper technology in the Digboi Oilfield region and has been successful in reducing the Total Petroleum Hydrocarbons (TPH) in the area to negligent levels. Oil zapper technology utilizes the bioremediation potential of specific microbes that degrades the toxic hydrocarbon compounds leaving behind non-hazardous end products or metabolites and hence no harmful effects. Not only this is environment-friendly technique, but also is highly cost effective when compared to storage of oily waste/oily sludge in sludge pits.

3. Finding *No. 3:* ***Oil spill have been found in several oil producing wells and Crude Gathering Stations. No fencing had been provided at these well sites.***

i. It is most humbly submitted that the findings of the Committee are unfortunately not supported by any pictures or on ground task reports. However, it merits the attention of your office that in case an oil spill occurs, the same is rectified immediately and the site is cleaned and restored, as per the internal SOPs of OIL.

ii. It is further humbly submitted that OIL had also iron fenced well sites, howsoever owing to number of thefts of iron fencing, at time few wells may be unfenced. OIL, time and again addresses these concerns, even though the issue of theft is a recurring one. Since, the wells are spread over a large area most of them are abandoned wells, physical monitoring of these wells in thick and dense forest becomes practically impossible.

4. *Finding No. 4:* ***More than 800 wells have been drilled since the operation of Burma Oil Company Ltd. Oil India Ltd does not even have the inventories of these abandoned on wells, let alone treatment of these pits.***

i. It is humbly submitted that the oilfields have been in operation since 1889 and OIL inherited the Oilfield in 1981 only. Since then, OIL has been maintaining the wells records and the same have been subjected to various audits by independent/statutory agencies. There are a total of about 982 wells out of

which about 651 are shut-in, about 293 are abandoned and 38 are producing wells.

ii. It is further most humbly submitted that OIL has been carrying out the task of Bioremediation of these oily sludges much prior to the Judgment passed by the Hon'ble NGT.

iii. It is humbly submitted that as and when oily sludge/seepage is found due to the natural phenomenon, OIL undertakes bio- remediation of the area time to time. Despite the bio-remediation work being carried out in the area, the oil seepage has been observed to be a natural seepage and is recurring in nature.

iv. It is stated that the Office of Divisional Forest Officer, Digboi Division by Letter no. B/NGT/2022/2743-45 dated 16.11.2022 had requested OIL to provide details, including location, number of pits, geo-coordinates, area and map of the open sludge pits, oil pits and contaminated water bodies in and around the Dihing Patkai Elephant Reserve. OIL accordingly in bona fide *vide* reply dated 28.11.2022 had shared the geo-coordinates of the Natural and artificial pits in the Digboi Oil Field along with the Map showing the location of the pits.

5. *Finding No. 5:* ***In the three oil sludge remediation sites visited, the remediation has not resulted in complete conversion of oily sludge into biodegradable matter. They do not even maintain the inventories of abandoned oil wells.***

i. It is most humbly stated that as per the findings of the Committee, despite the bio-remediation work being carried out in the area, oil seepage has been observed, which appears to be a natural seepage and not owing to any action or inaction of OIL. OIL has been taking remedial measures since July 2010 and the entire oil debris has already been treated through Bio remedial measures. since it is a natural phenomenon, the recurrence of the oily sludges has been observed in the Region.

ii. It is submitted that given the said circumstances, OIL is again undertaking bio-remediation work in the area and shall continue to address the issue, as and when observed.

6. *Finding No. 6:* ***Oil India limited has been unable to stop the release of untreated oil effluent in open sludge pits and seepage areas around oil rigs in the Digboi Oil field.***

i. It is submitted that the judgment passed by the Hon'ble NGT observes that no untreated oil effluent in open sludge pits is being released by OIL and that occurrence of oily sludges as witnessed owing to natural seepage and not due to any action/ inaction of OIL as against the finding of the Committee.

ii. It is most humbly stated that the reports of the pits (visited by the Committee) for the test conducted to examine the soil quality by taking a sample of Oily sludge in proximity of wells as prevalent before and after application of Oil Zapper shows remarkable deduction in presence of Total Petroleum Hydrocarbons (HE-TPH). It is most humbly stated that evidently the process of Bio-remediation and application of Oil Zapper technology has aided drastic reduction in the amount of Hydrocarbons to negligent levels in the areas adjoining the oil wells.

iii. However, it is most humbly stated that the fresh seepage as observed is possibly due to a natural phenomenon and appropriate actions have been taken for bioremediation by OIL through TERI. The experts from TERI visited the concerned site for analysis of the present circumstances and the proposal on bioremediation is being submitted by them.

2. We trust the above response to the findings of the committee provides sufficient clarification as desired.

(Rupam Jyoti Sutradhar)

Deputy General Manager (HSE)

ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

Safety & Environment Department
P.O. DULIAJAN-786602,
ASSAM, INDIA
Phone : 0374-2800542
Fax : 0374-2801796
Email: safety@oilindia.in

ANNEXURE-2

Ref No. S&E/E43(14)/97

Date: 27.01.2023

To
The Director,
IA (II) Division,
Ministry of Environment, Forest & Climate Change,
Indira Paryavaran Bhawan,
Jor Bagh Road,
New Delhi – 110 003

Subject: Application seeking Environmental Clearance (EC) for proposed Onshore Oil and Gas development drilling and production in Tinsukia district under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML.

Reference: **MOEF&CC Letter No.- IA-J-11011/1251/2007-IA II (I) dated 8th March 2022**
Online Proposal No. IA/AS/IND2/220363/2007

Oil India Ltd. (OIL) intends to carry out Onshore Oil and Gas development drilling and production in Tinsukia district under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML. OIL has submitted the application online and the proposal no. is IA/AS/IND2/220363/2007.

The MoEF&CC IA-Divisions had some observations related to the proposal and send a letter (No.- IA-J-11011/1251/2007-IA II (I) dated 8th March 2022) to Principal Chief Conservator of Forests, Assam for his expert opinion and feedback. The ADS and response are provided below.

S No.	Queries	Response
1.	It was observed that Bogapani Elephant Corridor is located within 1 km of the proposed wells further the proposed area falls under the critical elephant habitat and corridor which connects the two states Assam and Arunachal Pradesh. The proposed diversion is completely falling under the Dihing-Patkai Elephant Reserve, Assam and South Arunachal Elephant Reserve, Arunachal Pradesh.	Bogapani Elephant Corridor is in Digboi Forest Division. The length and width of the corridor is 2.5-3.0 km and 0.5-1 km respectively. The frequency of usage of the corridor by elephant is Regular (Seasonal; September to February). Elephants move through Bogapani Tea Gardens, agricultural fields and human habitations once they have crossed NH 38 and the railway track near Ramnagar village. This railway track along with the national highway, is a major impediment to elephant movement in the corridor. *[Source: Right of Passage (2017).Elephant Corridors of India [2nd Edition]. Menon, V, Tiwari, S K, Ramkumar, K, Kyarong, S, Ganguly, U and Sukumar, R (Eds.). Conservation Reference Series No. 3.Wildlife Trust of India, New Delhi].* Out of 26 wells and 3 production installations, one well 833 is located within 1 km from the boundary of the Bogapani Elephant Corridor. The proposed well no. 833 will be dropped from the current proposal. Well locations and corridor distance plotted in toposheet is presented as **Annexure-I**. The proposed wells and production installations are located more than 10 km from Dehing Patkai National Park. During the period of active movement of elephants (September-February) in the area, site development and drilling activities at wells near the Bogapani Elephant Corridor will be avoided.

Some additional mitigation measures to be undertaken by the project include

- DG sets will be provided with acoustic enclosures and fence line noise barriers will be provided to reduce level of noise emitted from the drill sites;
- Appropriate shading of lights to be provided to prevent scattering.
- Approach road shall be made pucca to minimize generation of suspended dust

You are requested to consider the above proposal for grant of Environmental Clearance based on the above information.

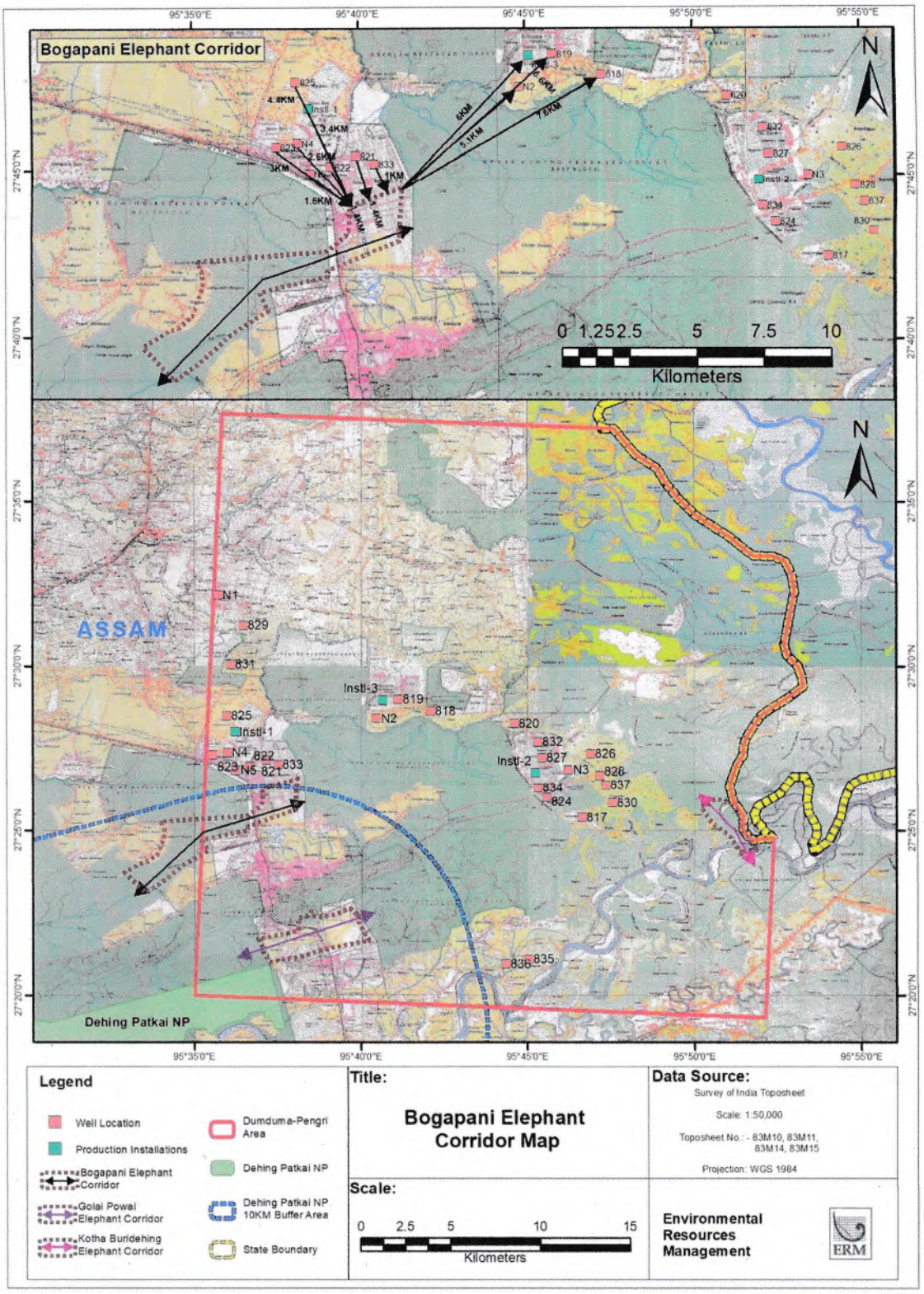
Thanking you.

Yours faithfully,
OIL INDIA LTD

(Ajit Chandra Haloi)
ED(HSE) &
Nodal Officer (EC, FC, NBWL)
For Resident Chief Executive

(A C Haloi)
ED - (HSE)
Nodal Officer (EC/FC/NBWL)
OIL INDIA LIMITED

Annexure-I


Bogapani Elephant Corridor
95°35'0"E
95°40'0"E
95°45'0"E
95°50'0"E
95°55'0"E
27°45'0"N
27°40'0"N
27°35'0"N
27°30'0"N
27°25'0"N
27°20'0"N
N
0 1.252.5 5 7.5 10
Kilometers
ASSAM
Dehing Patkai NP
Insti-1
Insti-2
Insti-3
N1
N2
N3
N4
N5
Legend
Well Location
Production Installations
Bogapani Elephant Corridor
Golai Powai Elephant Corridor
Kotha Buridehing Elephant Corridor
Dumduma-Pengri Area
Dehing Patkai NP
Dehing Patkai NP 10KM Buffer Area
State Boundary
Title:
Bogapani Elephant Corridor Map
Data Source:
Survey of India Toposheet
Scale: 1:50,000
Toposheet No.: - 83M10, 83M11, 83M14, 83M15
Projection: WGS 1984
Scale:
0 2.5 5 10 15
Kilometers
Environmental Resources Management
ERM

Annexure -R 8

ऑयल इंडिया
OIL INDIA

HSE Department
Oil India Limited
Duliajan, Dibrugarh, 786602, Assam
Phone : 0374-2800542
Email: safety@oilindia.in

संदर्भ सं./Ref. No.: S&E/E/132/1045

दिनांक/Date: 14.10.2024

To,
Dr. Vimal Kumar Hatwal
Scientist-E
Ministry of Environment and Forests,
Government of India
Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi- 110003
Email: vk.hatwal@gov.in

Subject: Grant of Environmental Clearance on the Recommendations of the Expert Appraisal Committee held on 21.10.2021.

Respected Sir,

I, Ms Mallika Baruah Sarma, ED(HSE&ESG) ,making this representation on behalf of Oil India Limited, i.e., the Project Proponent herein, as its duly authorised representative. This representation is with respect to the Environmental Clearance of the Project Onshore, Oil & Gas development drilling and production in Dumduma Pengeri Area in Tinsukia District under Petroleum Mining Lease (PMLs) namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML at Tinsukia Assam, proposed by Oil India Limited (OIL). It is clarified that the project is an expansion of the Environmental Clearance priorly granted vide Ministry's clearance letter dated 01.11.2011, bearing no. F No. J-11011/1251/2007-IA II (I).

It is further emphasised that public consultation is a widely publicised open house procedure wherein all stakeholders, local inhabitants are duly informed through newspaper, electronic modes and other publishing mediums about the exact date, time and location of the public consultation meeting.

Public consultation process is very different from Public hearing which was originally envisaged in 1994 EIA notifications. 2006 onwards the entire EC process was heavily dependent on constructive participation of all local stakeholder in a public

consolation giving communities, local stakeholders unprecedented rights to review, guide, consult behalf a project is recommended for environment clearance by the EAC.

With regard to the public hearing for the proposed project, the Pollution Control Board, Assam (Bamunimaidan, Guwahati – 781021) published the Public Hearing Notice ("**Notice**") in Janasanyog on 10.02.2020 as per provision of Government of India's Notification on Environmental Impact Assessment dated 14.09.2006.

It was duly notified that the public hearing for the proposed project was fixed. The public hearing was conducted on 13.03.2020.

The Notice informed that the interested persons of the locality including bonafide residents, environmental activists group, NGOs within the neighbourhood of the proposed project are requested to attend the aforesaid public hearing on the date, time and venue as stated above for getting their statements, suggestions, comments, views recorded regarding likely environmental impact and mitigation measures if any. Also, they may send their views and opinions within one month from the date of publication of this public hearing notice to the head office of the Board.

Furthermore, this Notice also categorically mentioned that to familiarise with the proposed project of the project proponent interested public, group etc. may go through the Executive Summary of Draft Environmental Impact Assessment EIA report and Draft EIA Report available at the following places:

i) The Deputy Commissioner's Office, Tinsukia district, Assam.

ii) District Industry Center, Tinsukia district, Assam.

iii) President/Secretary of the concerned Gaon Panchayat under whose jurisdiction the proposed site falls.

iv) Chief Executive Officer, Zilla Parishad, Tinsukia district, Assam.

v) Ministry of Environment & Forests, Govt. of India, Regional Office, Law-U-Sib, Lumbatngen, Near MTC Workshop, Shillong-793021.

vi) Regional Office of the Board at Dibrugarh, Assam.

vii) The Head Office of the Board, Bamunimaidam, Guwahati-21.

viii) The Executive Summary of EIA report and Draft Environmental Impact Assessment (EIA) will also be available in the Board's Website at http://www.pcbassam.org

A copy of the Notice dated 10.02.2020 is enclosed as **Annexure-1.**

In view thereof, the Public Hearing for the proposed project was conducted by the designated authority, i.e., the Pollution Control Board, Assam on 13.03.2020 in Tinsukia district presided by the Additional Deputy Commissioner, Tinsukia district. The main issues raised during the public hearing were related to the protection of ecology and environment, development activities - improvement of infrastructure in schools, health initiatives, social initiatives in the area, funds for toilet development etc. All the concerns raised by participants in the public consultation had been adequately addressed by the Project Proponent and the same was reiterated before the Expert Appraisal Committee ("**EAC**").

The 2006 Notification underscores the importance of public consultation. Public consultation, as it states, is "the process by which the concerns of local affected persons and others who have a plausible stake in the environmental impacts of the project or activity are ascertained with a view to take into account all the material concerns in the project or activity design as appropriate".

Public consultation provides value in seeking the views of those in the local area as well as beyond, who have a plausible stake in the project or activity. Public consultation is a mandatory process which is designed to hear the voices of those communities which would be affected by the activity. It involves a process of confidence building by giving an important role to those who have a plausible stake as it invites the stakeholders, locals, environment activists and other interested parties to put forward their concerns.

The State Pollution Control Board has to conduct hearings and to forward the proceedings to the regulatory authority within the stipulated time. It is also a vital duty of the State Pollution Control Board to place on the website of the Pollution Control Board a summary of the EIA report in the prescribed format and the making available of the draft EIA report by the regulatory authority on a written request by any person concerned, for inspection.

Thereafter, on 21.10.2021, EAC recommended the Environmental Clearance for the project Onshore, Oil & Gas development drilling and production in Dumduma Pengeri Area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML at Tinsukia Assam proposed by Oil India Limited. Admittedly, the EAC recommended the Environmental Clearance with certain conditions.

In view of the recommendation given by EAC and subsequent clarifications provided by Project Proponent from time to time there is no more reason for not issuing in a letter for environmental clearance.

Further giving due consideration to the Prime Minister's vision to meet the nation's energy requirements, generate revenue, and reduce India's import dependency, it is crucial to continue Exploration & Production (E&P) activities in the prospective areas. In this regard the Project Proponent has provided all necessary clarifications to various letters, EDS, and ADS sought

by the Ministry of Environment, Forest and Climate Change ("**MoEF&CC**") time to time, regarding this proposal. However, the Environmental Clearance (EC) has not yet been granted.

On 04.12.2023, OIL received a communication from MoEF&CC, after a period of two (2) years, requesting OIL to approach the Ministry after the outcome of the ongoing court case/ pending litigation before the Hon'ble National Green Tribunal. The mentioned matter, Original Application No. 19 of 2014, pertains to the protection of the elephant population and elephant reserves. This delay hampers our progress towards energy self-sufficiency and the economic growth of the country.

It becomes pertinent to mention that the Petitioner in the aforementioned matter, who lives in the same district wherein public consultation was conducted, could have attend the hearing or may provide her views/comments/suggestions/ statements regarding likely environmental impact and mitigation measures. However, Ms. Kashmira Kakati did not attend the public consultation. A copy of the attendance sheet of public consultation is enclosed as **Annexure-2.**

It may be noted that Dr. Kashmira Kakati filed a case (OA 19/2014) before the Hon'ble NGT against OIL regarding the protection of the elephant habitats in Golai and Bogapani corridors and prevent OIL any effluent or toxic pollutants to reach this ecologically sensitive habitat and ensure zero liquid discharge. The said case was filed against eleven (11) respondents including OIL, IOCL, COAL, etc. It is pertinent to mention that the Digboi Oilfield has a rich historical background which plays a significant role in the present context. The concerned Digboi Oilfields have been in existence for more than 125 years. The crude oil was discovered at Digboi in 1889 by the erstwhile Assam Railway & Trading Co (AR&T), which subsequently developed the Digboi OilField, located within the present-day Dihing Patkai Reserve Forest area.

OIL came into existence, much later in the year 1959 with oil resources of Nahorkatiya, Hoogrijan & Moran field with 48 wells

as a Joint Venture Company of Burmah Oil Company and Government of India. OIL was subsequently nationalized in the year 1981. As a result of nationalisation, OIL acquired the assets of Digboi oilfield which were under control of Assam Oil Company till then. OIL along with the Digboi Oilfield also inherited a few pits containing oily debris located within the Reserved Forest. Since then, OIL has undertaken proactive measures for bioremediation of the oily debris accumulated due to natural phenomenon of oily seepage.

OIL had only drilled one well in past in Dumduma Pengri area after EIA Notification 2006. On 01.10.2021, the Director of the monitoring cell of the MoEF&CC vide file no. RO-NE/E/EA/AS/MI/58/1243-1245 released a monitoring report on the Exploratory Drilling of 1 well at Dumduma-Pengeri Area, District Tinsukia, Assam by Ms. Oil India Limited. It was found that OIL has made significant strides in meeting the majority of the stipulated conditions for the final grant of Environmental Clearance.

It is humbly submitted and reiterated that the historical and geographical background of the Digboi Oilfield has also been well accepted by the NGT in its Order dated 08.12.2017 since the said Order inter alia specifically records that the NGT appointed Committee noticed natural seepage in drain no. 1 of Digboi Oilfield and the said averment has not been challenged by any party till date.

It is noteworthy to mention that during this entire duration of more than two (2) years, the Project Proponent has been diligent, compliant and sincere in providing all the documents, compliance reports and in complying with all the statutory requirements for the grant of Environmental Clearance. Further, OIL also gave an undertaking to drop well no. 833 which falls within 1 Km distance from the Bogapani Elephant corridor and also clarified that none of the locations are falling within 10 Km Eco Sensitive Zone (ESZ) areas of Dihing-Patkai National Park (NP) and all other locations are more than 1 Km away from the

Bogapani Elephant corridor. The copy is enclosed as **Annexure-3**.

It is important to point out that in above O.A. No. 19 of 2014 before the Hon'ble National Green Tribunal, the court has not yet issued any stay order or prohibited the Project Proponent from applying for EC and conducting exploration and production activities in that area.

The EAC, while dealing and deciding the Application seeking Environmental Clearance during the public consultation, was well versed with the issues connected with the elephant population as well as continuation of O.A. No. 19 of 2014 before the Hon'ble National Green Tribunal.

OIL had earlier carried out the detailed EIA study based on the Terms of Reference issued by MoEF & CC and following the due procedure of Public Hearing. As the ongoing petitions and all their concerns had been adequately addressed by the Project Proponent, EAC must have realised that OIL has adequate strength and an Environmental Management Plan to take care of all issues related to Environment. In few cases for locations/pipelines falling in forest area, OIL has already paid 2% of the project cost towards "**Human Elephant Conflict Mitigation & Wildlife Conservation plan**" at Digboi Division & Doomdooma Division(Near to proposed EC area in Dumduma Pengri area) in CAMPA account.

The Project Proponent has a fundamental duty to ensure energy security of our country as natural gas is a cleanest fuel among all the fossil fuels and its timely extraction further helps to fulfil energy demand and India's commitment to International Treaties for promoting energy requirement. OIL has always been at the forefront of embracing new technologies and concepts for opening new vistas and putting a stride forward towards sustainable energy security of the nation. OIL has been developing, operating, and managing energy parks, which is not just pure business for the project proponent but is a way to view the future world.

OIL periodically monitors and supervises its pipelines and all its pipelines are in good condition. Additionally, these pipelines are also audited by Oil Industry Safety Directorate (OISD) periodically. In view of the above, it is reiterated that there is no leakage or seepage of crude oil through any underground pipelines in the Reserve Forest area. In any case, the Environmental Management Plan which will be attached with the EC, will put strict obligations on the Project Proponent to ensure that migration routes of elephants, disruption of elephant corridors, shall not get affected, while extracting gas from the wells in question. Additionally, OIL also assures your good office that all the mitigation measures and human elephant conflict management plan will be strictly followed during the operation of Oil & Gas Exploration and Production activity.

It is most humbly submitted that the findings of the NGT appointed Committee are unfortunately not supported by any pictures or on ground task reports. However, it merits the attention of your office that in case an oil spill occurs, the same is rectified immediately and the site is cleaned and restored, as per the internal Standard Operating Procedures (SOPs) of OIL.

It is also most humbly stated that as per the findings of the NGT appointed Committee, despite the bio-remediation work being carried out in the area, oil seepage has been observed, which appears to be a natural seepage and not owing to any action or inaction of OIL. OIL has been taking remedial measures since July 2010 and the entire oil debris has already been treated through Bio remedial measures. Since it is a natural phenomenon, the recurrence of the oily sludges has been observed in the region and Bio remedial actions are taken on any occurrences.

It is submitted that given the said circumstances, OIL is committed and gives undertaking to strictly complying to all the conditions of EC, which can be granted in view of recommendations dated 21.10.2021 and while balancing the energy security of the country, which shall not compromise on protecting forest and wildlife.

In view of the above, we humbly request you to reconsider the application number IA/AS/IND/220363/2007, J-11011/1251/2007-IA II (I) for grant of Environmental Clearance and kindly provide us with an opportunity for personal hearing before your good office, whereby we can explain the above in further detail.

Thanking you in anticipation.

Yours faithfully,
For **Oil India Limited**

14/10/24

(Mallika Baruah Sarma)
Executive Director (HSE & ESG)
Nodal Officer (EC, FC, NBWL)
For Resident Chief Executive

Encl: As above.

ऑयल इंडिया लिमिटेड
Oil India Limited
भारत सरकार के अधीन
एक महारत्न सीपीएसई
A Maharatna CPSE under
Government of India

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प्लॉट नं. / Plot No.19, सेक्टर/Sector-16A,
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फोन/Phone: +91-120-2419000
ई-मेल/E-mail: oilindia@oilindia.in

Annexure -R 9

OIL/DED/01/09/104

October 30, 2024

The Member Secretary,
EAC (Industry-2),
Ministry of Environment, Forest & Climate Change,
Indira Paryavaran Bhawan,
Jor Bagh Road,
New Delhi – 110 003

Sub: Clarification in regards ongoing Court case against EC proposal no. IA/AS/IND2/220363/2007 for Dumduma-Pengry EC Block.

Ref : i) EC Proposal IA/AS/IND2/220363/2007 & File No J-11011/1251/2007-IA II (I)
ii) Letter dtd. 04.12.2023 from good office of yours (Annexure-I)
iii) DO Letter dtd. 03.10.204 from Additional Secretary, MoEF&CC to CMD, OIL (Annexure-II)

Dear Sir,

Kind reference is invited to the cited subject and the referred communications wherein we would like to submit the following for your kind consideration and grant of EC for the PML/PEL block, which is currently under hold.

2.0 The EC for the referred block PML was recommended in the 42nd EAC (Industry-2) meeting held during (20-22) October, 2021- Abstract from the minutes of EAC meeting dated (20-22) October, 2021 enclosed for your ready reference (Annexure-III). However, vide letter dated 04.12.2023, OIL was informed that EC for the said project was put on hold.

3.0 On 01.07.2024, OIL team having discussed the issue uploaded the details in PARIVESH portal on 27.02.2024 vide letter dated 23.02.2024 clarifying in detail about the ongoing litigations.

4.0 Subsequently, in response to a communication received vide DO letter from AS, MoEF&CC dated 03.10.2024 regarding concealment and misrepresentation by OIL, the following clarifications are submitted for kind appraisal.

a. The application filed before NGT a decade back on 31.01.2014 was with specific reference to conservation of "Golai" and "Bogapani" Elephants corridor and concerns due to various activities by IOCL, CIL & NHAI.

Contd.2/-

b. OIL has been made a Respondent No. 7 along with Coal India Ltd. (CIL), IOCL, NHAI, etc. owing to natural oil seepage occurring in the Digboi oil field since last 100 + years. This oil seepage has been a natural phenomenon in Digboi oil field, which has been reflected by a committee constituted by NGT. Few field photographs of oil seepage taken during 2014 and 2022 after remedial measures taken by OIL are enclosed for your ready reference (Annexure-IV).

c. As you would kindly appreciate, NGT disposed of the Original Application No.19/2014 vide its order dated 08.12.2017 pursuant to which no proceedings were initiated by or against Oil India Limited before any forum whatsoever.

d. Further, the appeal preferred by Coal India Limited before the Hon'ble Supreme Court of India initiated a separate enquiry against CIL and OIL for violation of Water Act, 1974 and Hazardous Waste Rules, 1989 did not directly concern OIL and was neither attended until November 2021.

Therefore, while submitting Form-2 for grant of EC on 11.10.2021 or during appraisal before EAC (Industry-2), OIL presented the facts without any reference to any ongoing court cases. Given the timeline stated as above (Annexure-V), we would earnestly request that this may please not be considered as concealment of facts by OIL.

5.0 We would like to submit that 876 sq Km of EC Block has no linkage with the decade old case filed before NGT since none of the project components are falling in "Bogapani" or "Golai" Elephant corridors. A map indicating the same is enclosed for kind reference please (Annexure-VI).

6.0 We would like to further apprise you that the case filed by Coal India Ltd. in May 2018 has already been disposed by the Hon'ble Supreme Court on 27.04.2023 directing NGT to give a fresh look on the matter.

7.0 Pursuant to the intent of enhanced exploration efforts of OIL, in the prolific fields of Mechaki, Borhapjan & Dumduma including the Digboi PML, we earnestly request you to consider issuance of EC which is on hold since December 2023. The tentative exploration campaign is enclosed for your ready reference please (Annexure-VII). While we earnestly request your favourable grant of EC, we hereby wish to offer our undertaking that should there be any direction by Hon'ble NGT, OIL will abide by the same.

Thanking you,

Yours faithfully,
OIL INDIA LIMITED

30/10

(Saloma Yomdo)
Director (E&D) &
Additional charge of Director (Operations)

Encls: as above

Copy to:

i) Dr. Amandeep Garg, IAS, Additional Secretary, MoEF&CC, GoI
ii) Chairman & Managing Director, OIL

Annexe I

File No. J-11011/1251/2007 - IA II (I)
Government of India
Ministry of Environment, Forest & Climate Change
Impact Assessment Division
***

Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi-110003

Dated: December 4th, 2023

To

M/s OIL INDIA LIMITED,
Shri. Ajit Chandra Haloi,CGM (HSE),
Safety & Environment Department,
Duliajan, Dibrugarh, Assam-786602.

Sub: Onshore Oil & Gas development drilling and production in Dumduma Pengeri Area in Tinsukia District under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML Tinsukia Assam by M/s OIL INDIA LIMITED- Consideration of Environment Clearance reg.

Sir,

This has reference to your online proposal no. IA/AS/IND2/220363/2007, dated 11th October, 2021 for environmental clearance to the above-mentioned project. The project was presented by the project proponent/consultant to the EAC (Industry-2) during meeting 20th – 22nd October in the Ministry.

2. Upon examination, it was noted that the proposed area and diversion involved falls under the critical elephant habitat and corridor which connects the two States Assam and Arunachal Pradesh. Further, it was also noted that there is an ongoing court case in compliance to Hon'ble NGT Judgement dated 08.12.2017 in Original Application No. 19 of 2014 filed in Dr. Kashmira Kakati vs UoI & Ors. for protection of elephant population in the country and to protect elephant corridors or elephant reserves.

3. M/s. Coal India Ltd. (which was one of the respondents in OA No. 19/2014) filed the C.A No. 9710-9711/2018 in Supreme Court of India, wherein, it approached the Court against certain directions on Hon'ble NGT Judgement dated 08.12.2017. Hon'ble Supreme Court vide order dated 10.08.2022 ordered the Ministry to file status report regarding the steps taken for implementation of directions given by the National Green Tribunal vide its order dated 08.12.2017. Accordingly, a committee was constituted by the Ministry and the report dated 04.01.2023 was submitted to Hon'ble Supreme Court. In the final Order, dated 27.04.2023, passed by the Hon'ble Supreme Court in C.A. No. 9710-9711/2018, it was held that since the compliance reports have been filed by the stakeholders and also put on record, therefore the matter will be remitted back to the Tribunal along with the compliance reports as a part of the record in O.A. No. 19/2014 on the file of the Tribunal and the Tribunal will look into the matter afresh. The matter was thus, remitted back to the Tribunal.

4. As per order of Hon'ble NGT dated 24.07.2023 it was alleged by the counsel

of the Applicant i.e., Dr. Kashmira Kakati, that the compliances have not been made by the Respondents and the directions contained in the Order dated 08.12.2017 passed by the Tribunal have not been reported to be complied till date and the counsel for respondents have asked for some time to file reply/compliance affidavit/objection/status report.

5. In view of the above, you are requested to approach the Ministry after final outcome of the ongoing court case. Meanwhile, you are requested to submit compliance to observation of Ministry's committee report dated 04.01.2023.

(Dr. Vimal Kumar Hatwal)
Scientist-'E'

Copy to:

1. The Director, Project Elephant Division, Indira Paryavaran bhawan, MoEF&CC.
2. IA Monitoring Cell, MoEF&CC.

04/12/2023

(Dr. Vimal Kumar Hatwal)
Scientist-'E'
E-mail: vk.hatwal@gov.in

Annexe II

अमनदीप गर्ग, आई.ए.एस.
Amandeep Garg, IAS

सत्यमेव जयते

LiFE Lifestyle for Environment

अपर सचिव
भारत सरकार
पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय
ADDITIONAL SECRETARY
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST
& CLIMATE CHANGE

D.O. No. J-11011/1251/2007-IA-II(I)

Date: 3rd October, 2024

Dear Shri Rath,

I am writing to draw your kind attention to a proposal no. IA/AS/IND2/220363/2007, dated 11th October 2021, submitted by M/s. Oil India Ltd. seeking prior Environmental Clearance for the Onshore Oil & Gas development drilling and production project in Dumduma Pengeri Area, Tinsukia District, under PMLs, namely Mechaki PML, Borhapjan PML, Dumduma PML, and Digboi PML, Tinsukia, Assam.

2. Upon examination, it was found that there had been concealment of relevant facts regarding ongoing court matter related to the aforesaid projects by the authorized representative of M/s. Oil India Ltd (OIL) at the time of the submission of the application (i.e., 11.10.2021) for Environmental Clearance (EC) and also during the Expert Appraisal Committee (EAC) meeting held on October 20th to 22nd, 2021. The project has been under litigation in Hon'ble Supreme Court and National Green Tribunal in the matter titled Dr. Kashmira Kakati Versus Union of India & Ors (Original application no. 19 of 2014) and the same was not informed to the Expert Appraisal Committee/ Ministry by the concerned officials.

3. The Ministry, vide letter dated 04th December 2023 also issued Show Cause Notice (SCN) to M/s ERM India Pvt. Ltd (Consultant hired by M/s OIL India Ltd.) for the concealment of the court case in the aforesaid proposal. The consultant has, inter-alia, submitted a reply stating that no disclosure regarding the NGT's order/directions against the project in question was provided by Project Proponent(PP) to the consultancy. PP, vide email dated 20.03.2024, has informed that the aforesaid case was filed against eleven (11) respondents including OIL, IOCL, COAL, etc., which was disposed of on 8th December 2017 with various directions to be complied with by the Central and State Government. Additionally, the PP has stated that no case was pending against OIL as of the date of submission of the ToR application, i.e., 11.04.2018. However, the PP has not addressed the consultancy's claim that no disclosure was provided regarding the NGT orders/directions at the time of EC application.

Contd..2/-

4. It is pertinent to mention that as per the chronology of the case, the status of the case was 'pending in the Supreme Court' at the time of the EC application (i.e., 11.10.2021) and during the EAC meeting held from October 20th to 22nd, 2021. However, the concerned OIL officials neither revealed the aforesaid facts before EAC nor have they addressed the consultant's claim that no disclosure was provided regarding the NGT orders/directions.

5. The above concealment and misrepresentation by OIL officials has resulted in avoidable delay in taking decision on the project as reportedly the above-mentioned matter is still *sub judice*.

6. You would appreciate that such conduct on the part of OIL officials representing the Company during the Appraisal process is highly undesirable and unbecoming of a government servants. I would, accordingly, request you to kindly look into the matter expeditiously and responsibility may be fixed accordingly against concerned officials responsible for not presenting the true and complete information before the Expert Appraisal Committee (EAC) / Ministry, which is essential for an accurate and time-bound appraisal as, laid down in the EIA Notification, 2006, as amended.

With regards.

Yours sincerely,

(Dr. Amandeep Garg)

Dr. Ranjit Rath,
Chairman & Managing Director,
Oil India Limited,
Plot No. 19, Near Film City, Sector 16A,
Noida – 201301.
oilindia@oilindia.in

Annexe III

GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE
(IA DIVISION-INDUSTRY-2 SECTOR)
***

Dated: 01.11.2021

MINUTES OF THE 42nd MEETING OF THE EXPERT APPRAISAL COMMITTEE

(INDUSTRY-2 SECTOR PROJECTS)

HELD ON 20th – 22nd October, 2021

Venue: Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110003 through Video Conferencing (VC)

(i) Opening Remarks by the Chairman: The Chairman made hearty welcome to the Committee members and appreciated the efforts of the Committee. After opening remarks, the Chairman opened the EAC meeting for further deliberations.

(ii) Confirmation of minutes: The EAC, having taken note that final minutes were issued after incorporating comments received from the EAC members on the minutes of its 41st Meeting of the EAC (Industry-2) held during 28th - 30th September, 2021 conducted through Video Conferencing (VC), confirmed the same.

After welcoming the Committee Members, discussion on each of the agenda items was taken up ad-seriatim.

Details of the proposals considered during the meeting **conducted through Video Conferencing (VC)**, deliberations made and the recommendations of the Committee are explained in the respective agenda items as under: -

20th October, 2021 (Wednesday)

Agenda No. 42.1

Proposed 200 KLPD Grain based Ethanol Plant at village Begrajpur Paragana Khatauli District Muzaffarnagar Uttar Pradesh by M/s CRYSTAL BALAJI INDUSTRIES PRIVATE LIMITED- Consideration of Environment Clearance.

[IA/UP/IND2/228826/2021, J-11011/365/2021-IA-II(I)]

				delete/revise this condition.

During deliberations PP has informed that the court case was filed by KSPCB for alleged violation of Water (Prevention and Control of Pollution) Act, 1974. Further, PP has informed that industry shall abide by the final outcome of the case and shall take prior permission from KSPCB for implementation of the expansion. Further, PP has submitted a No Objection Certificate dated 30th September, 2021 issued by Chairman, KSPCB to delete/revise the condition stipulated at Specific Condition point no. (ii), page 8 of 12 the EC vide letter no. J-11011/130/2008-IA II(I) dated 27.09.2021 issued by MoEF & CC with certain conditions. EAC found the justification valid and sought affidavit for the same. After detailed deliberations EAC **recommended** the amendments in EC, as proposed by the project proponent, with all other terms and conditions remain unchanged.

21st October, 2021 (Thursday)

Agenda No. 42.10

Onshore Oil & Gas development drilling and production in DumdumaPengeri Area in TinsukiaDistrict under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML Tinsukia Assam by M/s OIL INDIA LIMITED- Consideration of Environment Clearance reg.

[IA/AS/IND2/220363/2007, J-11011/1251/2007 - IA II (I)]

The Project Proponent and the accredited Consultant M/s ERM India Pvt. Ltd made a detailed presentation on the salient features of the project and informed that:

The proposal is for environmental clearance to the project Onshore Oil & Gas development drilling and production in DumdumaPengeri Area in TinsukiaDistrict under PMLs namely Mechaki PML, Borhapjan PML, Dumduma PML and Digboi PML Tinsukia Assam by M/s Oil India Limited.

All Offshore and onshore oil and gas exploration, development & production proposals are listed at S.N. 1(b)of Schedule of Environment Impact Assessment (EIA) Notification under category 'A' and are appraised at Central Level by Expert Appraisal Committee (EAC).

Standard ToR has been issued by Ministry vide letter No. J-11011/1251/2007 - IA II (I) dated 1st June, 2018. Ministry had issued EC earlier vide letter no. J-11011/1251/2007-IA-II(I); dated 1st November

2011 to the existing Exploratory drilling of 1 well at Dumduma-Pengry Area, District Tinsukia by M/s Oil India Limited.

Public Hearing for the proposed project has been conducted by the State Pollution Control Board on 13th March 2020 in Tinsukia district presided by Additional Deputy Commissioner, Tinsukia district. The main issues raised during the public hearing are related to protection of ecology and environment, development activities -improvement of infrastructure in schools, health initiatives, social initiatives in the area, funds for toilet development etc. It was informed that no litigation is pending against the proposal.

The details of products and capacity are as under:

S. No	Product Details	Existing Quantity	Proposed Quantity	Total Quantity
1.	Wells and production installations	1 well	26 wells and 3 production installations	27 wells and 3 production installations

The total land required for the project will be 990000 m2. M/s Oil India Ltd. will develop greenbelt at the proposed production installations having total area of 52500 m^2.

The estimated project cost is Rs. 1109.40 crore. Recurring cost for public hearing action plan, greenbelt plan, wildlife conservation plan and environmental control measures will be a total of INR 0.9341 crores per annum. Oil India Ltd. will earmark INR 1.775 crores as part of PH Action Plan in for Tinsukia district in line with the comments and suggestions made by the local public during Public Hearing. Additionally, Oil India Ltd. will comply with the conditions mentioned by EAC in this regard. Total Employment will be 60 persons as direct & 120 persons indirect after expansion for each drill site construction and drilling. Oil India Ltd. will earmark INR 1.775 crores as part of PH Action Plan in Tinsukia district in line with the comments and suggestions made by the local public during Public Hearing. Additionally, Oil India Ltd. will comply with the conditions mentioned by EAC in this regard. OIL proposes to allocate funds for CSR activity as per CSR Act and Rules, Govt. of India.

There are no national parks, wildlife sanctuaries, Biosphere Reserves, Tiger/Elephant Reserves etc. within 10 km of the well locations or production installations. Bogapani elephant corridor is located within 1 km of the proposed well. Buri Dehing River is flowing through south-eastern portion of the Block.

Ambient air quality monitoring was carried out at 8 locations during 2.01.2019 to 26.03.2019 and the baseline data indicates the ranges of average concentrations as: PM_{10} (76.17-80.57 µg/m^3), $PM_{2.5}$ (37.46-

40.11 µg/m^3), SO_2 (7.56-8.19 µg/m^3) and NO_2 (21.72-24.11 µg/m^3). AAQ modeling study for point source emissions indicates that the maximum incremental GLCs after the proposed project would be 15.38 µg/m^3, 0.01 µg/m^3, 0.07µg/m^3 and 0.10 µg/m^3 with respect to NOx, SO2, PM10 and HC. The resultant concentrations are within the National Ambient Air Quality Standards (NAAQS).

Total water requirement is 50 m^3/day of which fresh water requirement of 39 m^3/day will be met from groundwater. Effluent of 21.8 KLD quantity will be treated through ETP and Septic tank. The project will be based on Zero Liquid discharge system.

Power requirement will be met through two Diesel Generator Sets of 1250 kVA each. Another 1250 kVA DG set will be kept as standby. Stack height of 7 m will be provided as per CPCB norms to the proposed DG sets.

Details of Process emissions generation and its management:
The operation of DG sets, movement of vehicles and machineries during construction and drilling, flaring of natural gas will result in the generation of air pollutants, if gas reserves are encountered during drilling operations. Stacks will be used with DG sets and flare system as per CPCB norms

Details of Solid waste/Hazardous waste generation and its management:

Drill cuttings and spent drilling mud will be disposed to HDPE lined pit within the drill site. The kitchen waste will be disposed in nearest municipal/village dumping site on a daily basis through approved waste handling contractors. Recyclable wastes will be periodically sold to local waste recyclers. Hazardous waste (waste and used oil) will be managed in accordance with Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2016.

Certified compliance report has been by Integrated Regional Office (IRO), Guwahati vide letter No. RO-NE/E/IA/AS/MI/58/1243-1245 dated 1st October 2021. EAC found the compliance status to be satisfactory.

During deliberation the following additional information was sought from PP:

i. Details of proposed wells and product installations.
ii. Noise Management Plan.
iii. Well abandonment and site restoration plan.

PP has submitted the information desired above and EAC found it in order. Also EAC noted that Bogapani elephant corridor is located within 1 km of the proposed well. In this regard PP informed that safety plan has been submitted for the same and production activities shall be done

ensuring safety considering movement of elephants based on season. Further EAC suggested PP shall allocate Rs. 1.00 Crore apart from the amount allocated to address issues raised in Public Hearing towards Corporate Environment Responsibility. PP shall utilize the amount in improving infrastructure in the schools nearby. PP agreed to it.

The EAC, constituted under the provision of the EIA Notification, 2006 and comprising of Experts Members/domain experts in various fields, have examined the proposal submitted by the Project Proponent in desired form along with EIA/EMP report prepared and submitted by the Consultant accredited by the QCI/ NABET on behalf of the Project Proponent. The EAC noted that the Project Proponent has given undertaking that the data and information given in the application and enclosures are true to the best of his knowledge and belief and no information has been suppressed in the EIA/EMP report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.

The Committee noted that the EIA/EMP report is in compliance of the ToR issued for the project, reflecting the present environmental concerns and the projected scenario for all the environmental components. The Committee has found the baseline data is within NAAQ standards. The Committee has deliberated the action plan proposed by the project proponent to arrest the incremental GLC due to the project. The Committee has also deliberated on the CER plan and found to be addressing the issues in the study area.

The EAC has deliberated the proposal and has made due diligence in the process as notified under the provisions of the EIA Notification, 2006, as amended from time to time and accordingly made the recommendations to the proposal. The Experts Members of the EAC have found the proposal in order and have **recommended** for grant of Environmental Clearance.

The environmental clearance granted to the project/activity is strictly under the provisions of the EIA Notification 2006 and its amendments. It does not tantamount/construe to approvals/consent/ permissions etc. required to be obtained or standards/conditions to be followed under any other Acts/ Rules/ Subordinate legislations, etc., as may be applicable to the project. The project proponent shall obtain necessary permission as mandated under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, as applicable from time to time, from the State Pollution Control Board, prior to construction & operation of the project.

The EAC, after detailed deliberations, **recommended** the project for grant of environmental clearance and subject to compliance of terms and conditions as under, and general terms of conditions at Annexure: -

(i). The company shall comply with all the environmental protection measures and safeguards proposed in the documents submitted to the

Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.

(ii). No pipelines or its part shall be laid in the Forest land/Protected Area without prior permission/approval from the Competent Authority.

(iii). The project proponent will treat and reuse the treated water within the drilling site location including at processing location and no waste or treated water shall be discharged outside the premises under any condition. Mobile ETP coupled with RO and mobile STP shall be installed to treat the waste water and sewage waste respectively.

(iv). During production, storage and handling, the fugitive emission of methane, if any, shall be monitored using appropriate technology.

(v). The project proponent also to ensure trapping/storing of the CO_2 generated, if any, during the process and handling.

(vi). Approach road shall be made pucca to minimize generation of suspended dust.

(vii). The project proponent shall make all arrangements for control of noise from the drilling activity. Acoustic enclosure shall be provided for the DG sets along with the adequate stack height as per CPCB guidelines.

(viii). Total fresh water requirement shall be 39 KLPD which will be met from ground water. Extraction of ground water shall not be done without obtaining prior permission of CGWA/concerned authority.

(ix). The company shall construct the garland drain to prevent runoff of any oil containing waste into the nearby water bodies. Separate drainage system shall be created for oil contaminated and non-oil contaminated.

(x). Drill cuttings separated from drilling fluid shall be adequately washed and disposed in HDPE lined pit. Waste mud shall be tested for hazardous contaminants and disposed according to HWMH Rules, 2016. No effluent/drilling mud shall be discharged/disposed off into nearby surface water bodies. The company shall comply with the guidelines for disposal of solid waste, drill cutting and drilling fluids for onshore drilling operation notified vide GSR.546(E) dated 30th August, 2005.

(xi). Oil spillage prevention and mitigation scheme shall be prepared. In case of oil spillage/ contamination, action plan shall be prepared to clean the site by adopting proven technology. The recyclable waste (oily sludge) and spent oil shall be disposed of to the authorized recyclers.

(xii). The project proponent shall take necessary measures to prevent fire hazards, containing oil spill and soil remediation as needed. At fixed installations or plants use of ground flare shall be explored. At the place of ground flaring, the overhead flaring stack with knockout drums shall be installed to minimize gaseous emissions during operation.

(xiii). The project proponent shall develop a contingency plan for H_2S release including all necessary aspects from evacuation to resumption of normal operations. The workers shall be provided with personal H_2S detectors in locations of high risk of exposure along with self-containing breathing apparatus.

(xiv). Blow Out Preventer system shall be installed to prevent well blowouts during drilling operations.

(xv). On completion of the project, necessary measures shall be taken for safe plugging of wells with secured enclosures to restore the drilling site to the original condition. The same shall be confirmed by the concerned regulatory authority from environment safety angle. In case of hydrocarbon not found economically viable, a full abandonment plan shall be implemented for the drilling site in accordance with the applicable DGH / Indian Petroleum Regulations.

(xvi). PP shall allocate Rs. 1.00 Crores towards CER and it shall be spent on improving infrastructure in schools nearby.

(xvii). No lead acid batteries shall be utilized in the project/site.

(xviii). Occupational health surveillance of the workers shall be carried out as per the prevailing Acts and Rules. All workers & employees shall be provided with required safety kits/mask for personal protection.

(xix). Oil content in the drill cuttings shall be monitored if oil-based mud is used and report shall be sent to the Ministry's Regional Office.

(xx). The project proponent shall prepare operating manual in respect of all activities, which would cover all safety & environment related issues and measures to be taken for protection. One set of environmental manual shall be made available at the drilling site/ project site. Awareness shall be created at each level of the management. All the schedules and results of environmental monitoring shall be available at the project site office. Remote monitoring of site should be done.

Agenda No. 42.11

Proposed 100 KLD Grain based distillery project alongwith 2.7 MW Cogeneration Plant at Mor, Mokama, Dist. Patna (Bihar) By

List of the Expert Appraisal Committee (Industry-2) members participated during Video Conferencing (VC) meeting

S. No.	Name and Address	Designation
1.	Dr. J. P. Gupta	Chairman
2.	Sh. R.K. Singh	Member
3.	Dr. Y.V. Rami Reddy	Member
4.	Dr. T. Indrasena Reddy	Member
5.	Sh. S. C. Mann	Member
6.	Dr. T. K. Joshi	Member
7.	Dr. J. S. Sharma	Member
8.	Sh. Dinabandhu Gouda, CPCB	Member
9.	Sh. Ashok Kr. Pateshwary, Director, MoEFCC	Member Secretary
MoEFCC		
10.	Dr. Mahendra Phulwaria	Scientist 'C'
11.	Sh. Kanaka Teja	Research Assistant

***

Annexure-IV(A)

Photographs of Few Sludge Pits (during 2014-2017): Referred in OA 19/2014 before NGT





Photographs of Few Sludge Pits (during 2014-2017): Referred in OA 19/2014 before NGT





Photographs of Few Sludge Pits (during 2014-2017): Referred in OA 19/2014 before NGT





Photographs of Few Sludge Pits (during 2014-2017): Referred in OA 19/2014 before NGT





Photographs of Few Sludge Pits (during 2014-2017): Referred in OA 19/2014 before NGT





Photographs of Few Sludge Pits (during 2014-2017): Referred in OA 19/2014 before NGT





Photographs of Sludge Pit Sites as on 27.09.2022: Referred in OA 19/2014 before NGT



Site near Well No.: 11



Site near Well No.:19

Photographs of Sludge Pit Sites as on 27.09.2022: Referred in OA 19/2014 before NGT



Ex-situ Bioremediation Pit near Well No.: 139



Site near Well No.:513

Photographs of Sludge Pit Sites as on 27.09.2022: Referred in OA 19/2014 before NGT



Site near Well No.:512

Annex-V

Timeline of Sequance of Events/ Ongoing Court Cases

Sl	Incident Date	Occurrence of Events/ Court Case Related at NGT and Supreme Court	Remarks
1	31.01.2014	Original Application (OA) No 19/2014 (M.A. NO. 216/2015 & M.A. NO. 1027/2015) filed by Dr Kashmira Kakoty, before NGT on 31.01.2014 with specific reference to conservation of "Golai" and "Bogapani" Elephant corridors under jurisdiction of the Digboi Forest division	(i) The OA was basically complaint against IOCL in regard construction of Oil Dispatch Terminal in Golai Elephant Corridor (ii) Dumping of wastes by Digboi Municipality in RF Discharge of Coal mine effluent in RF (iii) Construction of a By Pass Road by NHAI in the Elephant Corridor (iv) Bisecting of Bogapani Elephant Corridor by Tea Estate OIL has been entangled in OA 19/2014 as a Respondent no 7 along with Coal India Ltd (CIL) , IOCL, NHAI etc- Because of the natural oil seepage occurring in the 100+ years old Digboi oil field
2	16.03.2015	Report submitted by the committee constituted by MoEF&CC based on NGT's order dtd 04.02.2015 against OA No 19/2014	Report mentions that, Oil seepage is a natural phenomenon in Digboi field due to Oozing out of oil to the surface
3	08.12.2017	**Original Application No 19/2014 of Dr Kashmira Kakoty filed on 31.01.2014 was disposed of by NGT**	
4	11.04.2018	Submission of application by OIL for grant of TOR against the EC proposal No: IA/AS/IND2/220363/2007 for the 876 sq Km Dumduma- Pengri EC block comprising of (Mechaki, Borhapjan, Dumduma and Digboi) PMLs	**There was no ongoing court case against the project of OIL while submitting application on 11.04.2018**
5	19.05.2018	CA No 9710-9711/2018 filed by Coal India Limited (CIL) in supreme court, challenging NGT's order dtd 08.12.2017 against OA No 19/2014	NGT's order dtd 08.12.2017 directed for separate enquiry by Assam PCB against CIL and OIL for violation of Water Act, 1974 and Hazardous Waste (Management & Handling) Rules, 1989
6	May, 2019	OIL planned to start Drilling Campaign for 26 wells against the EC proposal No: IA/AS/IND2/220363/2007	Drilling of 25th and 26th wells planned to complete by October,2023 after obtaining EC applied initially for TOR on 11.04.2018

7	11.10.2021	Submission of Form-2 by OIL on for grant of EC against proposal No: IA/AS/IND2/220363/2007	
8	(20-22) October, 2021	42nd EAC (Industry-2) meeting , where OIL's EC proposal No: IA/AS/IND2/220363/2007 was appraised	**EC was recommended** in the 42nd EAC (Industry-2) meeting
9	November, 2021	OIL was neither concerned nor attended prior to NoV'21 against the CA No 9710-9711/2018 filed by Coal India Limited (CIL) in supreme court, challenging NGT's order dtd 08.12.2017 against OA No 19/2014	**Hence OIL was not in a position to apprise about any ongoing court case while submitting Form-2 for grant of EC on 11.10.2021 or during appraisal before EAC (Industry-2) in its 42nd meeting held during (20-22) October, 2021-Which thus may please not be considered as concealment of fact please.**
10	04.01.2023	Report submitted by the committee constituted by MoEF&CC based on Supreme Court's order dtd 10.08.2022 against CA No 9710-9711/2018 filed By Coal India Limited on 19.05.2018	Report highlights only about the Oil seepage issue in the 100+ years old Digboi field of OIL , which is a natural phenomenon in Digboi field due to Oozing out of oil to the surface
11	04.12.2023	**Member Secretary, EAC (Industrt-2) advised OIL that, EC for the project is put on hold due to ongoing court case and OIL should approach Ministry for grant of EC only after final closure of the court case**	
12	27.04.2023	**CA No 9710-9711/2018 filed by Coal India Limited (CIL) in May, 2018 disposed of by the Supreme Court on and referred back to NGT along with compliance reports submitted by the associated parties with directive to NGT to give a fresh look to the matter in accordance with law by giving opportunity of hearing to the respective parties**	
13	27.02.2024	OIL uploaded letter dtd 23.02.2024 in PARIVESH portal clarifying Member Secretary, EAC (Industrt-2) in details about the ongoing Court Case etc	
14	01.07.2024	OIL team met Member Secretary, EAC (Industrt-2) in person and handed over a copy of the letter uploaded in PARIVESH portal on 27.02.2024 (letter dtd 23.02.2024)	
15	03.10.2024	Additional Secretary, MoEF&CC vide his DO letter informed CMD, OIL about concealment and misrepresentation of facts against EC proposal No: IA/AS/IND2/220363/2007 leading to avoidable delay with respect to grant of EC for the referred project	

Annexe VI

95°40'0"E

95°50'0"E

27°30'0"N

27°20'0"N

N

S

E

W

N1

829

831

825

Instl-1

823

N4

821

822

833

N5

Instl-3

819

818

N2

820

832

827

826

835

836

N3

Instl-2

830

828

837

834

824

817

DSF BLOCK

DUMDUMA PART-C

BORHAPJAN

DUMDUMA PART-B

Bogapani Elephant Corridor

DIGBOI

Golai Powai Elephant Corridor

ASSAM

ARUNACHAL PRADESH

Kotha Buridehing Elephant Corridor

1:90,000

0 4.5 9 Km.

MAP CRS : WGS_1984

ऑयल इंडिया
OIL INDIA

TEAM GIS

Annex-VII

Tentative Drilling Plan for 26 wells in 876 sq Km Doomdooma-Pengri EC Block (wef May, 2019 up to Oct'23)

Sl no	Well and Production Installations	Latitude	Longitude	Corresponding PML	Distance from Bogapani Elephant Corridor	Original Work Execution Plan
1	N1	27°31'28.30"N	95°35'52.23"E	Borhapjan PML (31 sq Km)	9.92 Km	May, 2019
2	829	27°31'13.53"N	95°36'28.86"E		9 Km	Oct'19
3	831	27°30'3.29"N	95°36'6.62"E		7.10 Km	March, 2020
4	Prod Inst-1	27°28'0.43"N	95°36'13.39"E		3.5 Km	August, 2020
5	N4	27°27'22.51"N	95°35'59.79"E		2.65 Km	Oct'21
6	N5	27°26'50.42"N	95°36'14.89"E		1.69 Km	March, 2022
7	822	27°26'57.23"N	95°36'39.48"E		1.40 Km	July, 2022
8	821	27°27'9.05"N	95°37'10.02"E		1.47 Km	Dec'22
9	833 (Dropped)	27°27'0.63"N	95°37'31.95"E		< 1 Km	May, 2023
10	825	27°28'29.79"N	95°35'59.07"E	Dumduma PML (106.54 sq Km)	4.45 Km	May, 2019
11	823	27°27'17.91"N	95°35'34.21"E		3.10 Km	May, 2019
12	820	27°28'15.77"N	95°44'36.40"E		Far away	Oct'19
13	832	27°27'41.83"N	95°45'19.31"E		Far away	Oct'19
14	827	27°27'13.32"N	95°45'26.22"E		Far away	March, 2020
15	Prod Inst-2	27°26'46.08"N	95°45'14.54"E		Far away	March, 2020
16	834	27°26'18.24"N	95°45'18.93"E		Far away	August, 2020
17	N3	27°26'51.50"N	95°46'13.37"E		Far away	August, 2020
18	826	27°27'20.56"N	95°46'53.82"E		Far away	Oct'21
19	828	27°26'40.67"N	95°47'10.21"E		Far away	Oct'21
20	837	27°26'23.03"N	95°47'20.84"E		Far away	March, 2022

21	830	27°26'46.38"N	95°46'46.28"E	**Dumduma PML** **(106.54 sq Km)**	Far away	**March, 2022**
22	**Prod Inst-3**	27°28'58.21"N	95°40'39.32"E		Far away	**July, 2022**
23	819	27°28'59.66"N	95°41'7.82"E		Far away	**July, 2022**
24	N2	27°28'24.95"N	95°40'27.72"		Far away	**Dec'22**
25	818	27°28'38.51"N	95°42'6.84"E		Far away	**Dec'22**
26	835	27°27'1.22"N	95°45'57.33"E		Far away from Bogapani Elephant Corridor and **18.60 Km** from Dihing Patkai NP	**May, 2023**
27	836	27°27'1.20"N	95°46'38.87"E		Far away from Bogapani Elephant Corridor and **19.60 Km** from Dihing Patkai NP	**May, 2023**
28	824	27°26'0.47"N	95°45'34.64"E	**Digboi PML (51.99 sq Km)** ***Operational since 1889** **(135 years old field where more than 1,000 wells drilled so far)**	12.36 Km	**Oct'23**
29	817	27°25'23.51"N	95°46'37.84"E		14.20 Km	**Oct'23**

Annexure -R 10

MATTER IS LISTED ON 27.04.2023 COURT 5 ITEM 105

SECTION XVII

IN THE HONBLE SUPREME COURT OF INDIA

CIVIL APPELLATE JURISDICTION

CIVIL APPEAL NO. 9710-9711 OF 2018

IN THE MATTER OF:-

COAL INDIA LIMITED ...APPELLANT

VERUS

KASHMIRA KAKATI & ORS. ...RESPONDENTS

INDEX

Sl. No.	Particulars	Copies	Court Fee
01.	Compliance Affidavit on Behalf of the Respondent No. 8, Oil India Limited.	1+3	Nil/-
	TOTAL		**Nil/-**

Copy to,
Mr Neeraj Kumar Gupta, Advocate, (neerajattorney@gmail.com)
Mr Suvodeep Gupta, Advocate, (shuvodeep_roy@rediffmail.com)
Mr Mayuri Raghvanshi, Advocate (raghuvanshi.mayuri@gmail.com)
Mr Avijit Roy, Advocate, (avijitroy.aor@gmail.com)
Mr Gurmeet Singh Makker, Advocate, (gs.makkar@gov.in)

Filed by

TRUST LEGAL
Advocate for the Respondent
D-415, Defence Colony,
New Delhi 110024,
(Computer Code : 2725, Mob No.: 9899545281
Email: gaichangadvocate@gmail.com

New Delhi
Date :26.04.2023

Gmail

Gaichangpou Gangmei <gaichangadvocate@gmail.com>

Compliance Affidavit on Behalf of the Respondent No. 8, Oil India Limited.CA NO.9710-9711 OF 2018

1 message

Gaichangpou Gangmei <gaichangadvocate@gmail.com> Wed, Apr 26, 2023 at 8:26 PM
To: neerajattorney@gmail.com, raghuvanshi.mayuri@gmail.com, avijitroy.aor@gmail.com, gs.makkar@gov.in, shuvodeep_roy@rediffmail.com

Sir / Madam,

Please find attached a copy of Compliance Affidavit on Behalf of the Respondent No. 8, Oil India Limited.CA NO.9710-9711 OF 2018, Listed Before the Hon'ble Supreme Court on 27.04.2023 court 5 item 103.

Kindly note this email shall be treated as proof of service.



Gaichangpou Gangmei,
Advocate-on-Record
Mob. +91 9899545281
Office:
Q22 B First Floor,
Jangpura Extension,
New Delhi-110 014
Off : 011-41112715
email: ***gaichang@gaichangadvocate.com***

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Compliance Affidavit on behalf of Oil India Ltd..pdf
6360K

IN THE HON'BLE SUPREME COURT OF INDIA

CIVIL APPELLATE JURISDICTION

CIVIL APPEAL NO. 9710-9711 OF 2018

IN THE MATTER OF: -

COAL INDIA LIMITED .....APPELLANT

VERUS

KASHMIRA KAKATI & ORS. ...RESPONDENT

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S.N.	Particulars	Page No.
1.	Compliance Affidavit on behalf of the Respondent No 8, Oil India Limited.	1-14

Filed by

M/s Trust legal
Advocate for Respondent No.8
The Trust Legal House, D-415, Defence Colony, New Delhi,
110024, Mobile No.: 9899545281
Email:Gaichangadvocate@gmail.com

New Delhi

Date: 26.04.2023

Dr. Kumudani Sharma
Head (Legal)
Oil India Limited
Authorised Signatory

1

IN THE HON'BLE SUPREME COURT OF INDIA

CIVIL APPELLATE JURISDICTION

CIVIL APPEAL NO. 9710-9711 OF 2018

IN THE MATTER OF:-

COAL INDIA LIMITED .....APPELLANT

VERUS

KASHMIRA KAKATI & ORS. ...RESPONDENT

COMPLIANCE AFFIDAVIT ON BEHALF OF THE RESPONDENT NO. 8, OIL INDIA LIMITED

MOST RESPECTFULLY SHOWETH –

I, Dr. Kumudani Sharma, Dy. General Manager (Legal), the Authorized Representative of the Respondent No. 8 company, having its Corporate Office at Plot No. 19, Sector 16 A, Film City, Noida – 201301, Uttar Pradesh, and duly authorized vide a General Power of Attorney dated 12.09.2021, do hereby solemnly affirm and submit as under:

1. I submit that I am well acquainted with the facts and circumstances of the present case on the basis of the records thereof maintained by the Respondent No 8 and am as such competent to swear the instant Affidavit.

NOTARY R.V. SINGH Advocate Regn.No.2282 Commission Expire on 24-10-2027 Area-Delhi GOVT. OF INDIA

Dr. Kumudani Sharma
Head (Legal)
Oil India Limited
Authorised Signatory

2. It is most humbly submitted that the present Compliance Affidavit is being filed in view of the Affidavit filed by Respondent No. 2, Ministry of Environment and Forest and in pursuance of directions passed this Hon'ble Court *vide* order dated 09.02.2023 and 16.03.2023 in the captioned matter.

3. At the outset, it is humbly submitted that the historical and geographical background of the Digboi Oil field merits attention of this Hon'ble Court which has also been well accepted by the National Green Tribunal in the Impugned Order dated 08.12.2017 inasmuch as the Impugned Order *inter alia* specifically records that the *Committee noticed natural seepage in drain no. 1 of Digboi Oil Field* which has been accepted by the Tribunal and has not been challenged by any party till date.

4. It is most respectfully submitted that even as per the compliance affidavit filed by the Respondent No. 5 in March 2023, upon verification it has been confirmed that the answering Respondent has complied with the directions of the Pollution Control Board Assam, i.e., the Respondent No. 5.

5. It is humbly submitted that notwithstanding the above and in addition thereof, the Answering Respondents *vide* the present Compliance Affidavit seeks to provide

NOTARY
R.V SINGH
Advocate
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Expire on
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Head (Legal)
Oil India Limited
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its responses qua the findings of the Respondent No. 2 in respect of the directions passed by the National Green Tribunal vide its order dated 08.12.2017. The extract of the relevant direction of the National Green Tribunal concerning the answering Respondent is reproduced below for the sake of convenience of this Hon'ble Court:

> *"Respondent No7 i.e. Oil India Limited to forthwith stop releasing of untreated oil effluent in open sludge pits and seepage areas around oil rigs in the Digboi Oil Field which falls within upper Dihing RF (East Block) and the Dihing – Patkai Elephant Reserve"*

6. It is stated that the Ministry of Environment and Forest & Climate Change conducted an inquiry on the compliance of Hon'ble NGT judgement dated 08.12.2017 and presented its report dated 04.01.2023 in the Compliance Affidavit as filed before this Hon'ble Court. It is most humbly submitted that the findings of the Respondent No. 2 are erroneous and unsubstantiated and fail to bring before this Hon'ble Court the correct representation of the conditions on ground. The findings of the Report of Respondent No. 2 and the responses qua the same are as follows:

6.1. Finding *No. 1:* *Oil is leaking from underground pipelines in the Reserve Forest*

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sites and therefore a sweeping statement of leakage of underground pipeline cannot be placed reliance upon.

6.2. Finding *No. 2: At several places, oily sludge pits of abandoned wells have been found and natural drains pass through these pits.*

i. It merits the attention of this Hon'ble Court that the Digboi Oil field draws from a rich historical background, which plays a significant role in its present circumstances. The concerned Digboi Oil Fields have been in existing since last 100 years. The Crude Oil was discovered in the far east of India at Digboi in 1889 by the erstwhile Assam Railway & Trading Co (AR&T), which subsequently developed the Digboi Oil Field, located within the present day Dihing Patkai Reserve Forest.

ii. The Answering Respondent came into existence, much later in the year 1959 as a Joint Venture Company of Burmah Oil Company and Government of India, having minority share and was subsequently fully nationalized in the year 1981 through the Burmah Oil Company [Acquisition of Shares of OIL India Limited and of the Undertakings in India of Assam Oil

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i. At the outset, it is stated that the Committee constituted by Respondent No. 2 visited only 3 sites, namely Pit No. 512, 513 and 139 in the concerned Digboi region and have prepared the said Report on the basis of those findings alone. It is humbly submitted that there is no leakage or seepage of crude oil through any underground pipelines in the Reserve Forest area.

ii. It merits the attention of this Hon'ble Forum that the concerned premises as inspected by the Committee does not have any crude oil pipeline. Further, it is submitted that the pipelines present are periodically supervised and monitored by the internal HSE (Health, Safety and Environment) department of the answering Respondent. However, in the absence of any specification provided by the Ld. Committee with respect to the block in which the pipeline has been allegedly found to be leaking, the answering Respondent has inspected all its pipelines which have found to be in good condition. Further, it is respectfully submitted that even otherwise the answering Respondent regularly assures that there is no infiltration or leakage of pipeline as this is not only an environmental concern but also a hazard which can lead to an unfortunate incident. In addition, it is also humbly reiterated that Oil Industry Safety Directorate (OISD) also periodically audits the

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Company Limited and the Burmah Oil Company (India Trading) Limited] Act, 1981.

iii. It is most humbly submitted that the Answering Respondent along with the said Oil field have also inherited a few pits containing oily debris located within the Reserved Forest. However, it merits the attention of this Hon'ble Court that the answering Respondent has actively participated and undertaken proactive measures for bio-remediation of the natural phenomenon of oily seepage.

iv. It is humbly submitted and reiterated that the historical and geographical background of the Digboi Oil field merits attention of this Hon'ble Court which has also been well accepted by the National Green Tribunal in the Impugned Order dated 08.12.2017 inasmuch as the Impugned Order *inter alia* specifically records that the *Committee noticed natural seepage in drain no. 1 of Digboi Oil Field* which has been accepted by the Tribunal and has not been challenged by any party till date.

v. It is submitted that even though the oily sludge pits have been noted and accepted as a natural phenomenon by the Hon'ble NGT, the

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answering Respondent has on its own accord undertaken bio-remediation activities in the Digboi Oil Field region. It is brought to the knowledge of this Hon'ble Court that Bioremediation is a process that uses naturally occurring microorganisms to transform harmful substances to nontoxic compounds. Bioremediation exploits this natural process by promoting the growth of microbes that can effectively degrade specific contaminants. Thus, Oilzapper technology utilizes the bioremediation potential of specific microbes that degrades the toxic hydrocarbon compounds leaving behind non-hazardous end products or metabolites and hence no harmful effects. Not only this is environment-friendly technique, but also is highly cost effective when compared to storage of oily waste/oily sludge in sludge pits.

vi. It is humbly submitted that the answering Respondent had undertaken bio-remediation activities in the Digboi Oil Field region under the supervision of Research and Development, HSE and erstwhile Production (Oil) Department.

vii. It merits the attention of this Hon'ble Court that on application of the Bio-

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areas of operation are spread out in large extents hence physical monitoring of the entire fenced area is practically unviable. However, the answering Respondent time and again addresses these concerns, even though the issue of theft is a recurring one.

6.4. *Finding No. 4: <u>More than 800 wells have been drilled since the operation of Burma Oil Company Ltd. Oil India Ltd does not even have the inventories of these abandoned on wells, let alone treatment of these pits.</u>*

i. It is humbly submitted that the oil fields are in operation since 1889 and have changed hands before the present Respondent No. 8 was incorporated in 1959 and inherited the business of the erstwhile company. Post 1959 the present Respondent has been maintaining the records and the same have been subjected to various audits by independent and statutory agencies periodically. It is humbly submitted that there are a total of about 982 wells out of which about 644 are shut-in, about 293 are abandoned and 45 are producing wells.

ii. It is further most humbly submitted that the Respondent No. 8 has been carrying out the task of Bio-remediation of these oily sludges

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remediation and Oil Zapper technology, the answering Respondent has been successful to reduce the Total Petroleum Hydrocarbons (TPH) at the Oily sludges to negligent levels.

6.3. Finding *No. 3: Oil spill have been found in several oil producing wells and Crude Gathering Stations. No fencing had been provided at these well sites.*

i. It is most humbly submitted that the findings of the Committee are unfortunately not supported by any pictures or on ground task reports. It is at the outset clarified that there do not exist any Oil Spills as alleged in the Report. However, it merits the attention of this Hon'ble Court that in a circumstance that an oil spill occurs during operations or any other concern is found in the pipeline, the same is rectified immediately and the site is cleaned and restored, as per the internal SOPs of the answering Respondent.

ii. It is further humbly submitted that the answering Respondent in bona fide had also engaged in iron fencing of well sites, howsoever owing to local miscreants, a number of thefts of such iron fencing has been observed which results in severe inconvenience for the answering Respondent as well. Further the

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way prior to the Judgment passed by the Hon'ble NGT and endeavors to undertake the same in the upcoming future as well. It merits the attention of this Hon'ble Court that contrary to the findings of the Committee not every abandoned well has a pit and the origin of pits has not been document, however the same was not a result of any activities undertaken by the Respondent No. 8 in the concerned region.

iii. It is humbly submitted that Respondent No. 8, after periodically monitoring the pits have identified and steps are taken for rectification as and when oily sludge/seepage is found due to the natural phenomenon of the region. It however, also merits the attention of this Hon'ble Court that despite the bio-remediation work being carried out in the area, the oil seepage has been observed which appears to be a natural seepage and not owing to any action or inaction of the answering Respondent and is recurring in nature.

iv. It is stated that the Office of Divisional Forest Officer, Digboi Division by Letter bearing no. B/NGT/2022/2743-45 dated 16.11.2022 had requested the present Respondent to provide details, including location, number of sites, geo-coordinates, area and map of dumping the

NOTARY R.V. SINGH Advocate Regn.No.2282 Commission Expire on 24-10-2027 Area-Delhi GOVT. OF INDIA

Dr. Kumudani Sharma
Head (Legal)
Oil India Limited

waste with geographical location/ geo coordinates by the Digboi municipality, Indian Oil Corporation Limited and Oil India Limited along with details including location, number of pits, geo-coordinates, area and map of the open sludge pits, oil pits and contaminated water bodies in and around the Dihing Patkai Elephant Reserve. The answering Respondent accordingly in bona fide *vide* reply dated 28.11.2022 had shared the geo-coordinates of the Natural and artificial pits in the Digboi Oil Field along with the Map showing the location of the pits.

6.5. *Finding No. 5: In the three oil sludge remediation sites visited, the remediation has not resulted in complete conversion of oily sludge into biodegradable matter. They do not even maintain the inventories of abandoned oil wells.*

i. It is most humbly stated that as per the findings of the Committee, admittedly, despite the bio-remediation work being carried out in the area, oil seepage has been observed which appears to be a natural seepage and not owing to any action or inaction of the answering Respondent. It merits the attention of this Hon'ble Court that the Answering Respondent has been taking

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remedial measures from July 2010 itself and the entire oil debris have already been treated through Bio remedial measures time to time. It is respectfully submitted that Answering Respondent has bio-remediated all the oil-debris site, mostly inherited from erstwhile Assam Oil Company, and presently, however since the same is a natural phenomenon, the recurrence of the oily sludges has been observed in the Region.

ii. It is further humbly submitted that given the said circumstances, the answering Respondent is yet again undertaking bio-remediation work in the area and shall continue to address the issue, as and when observed.

iii. At the outset it is submitted that the oil fields are in operation since 1889 and have changed hands before the present Respondent No. 8 was incorporated in 1959 and inherited the business of the erstwhile company. Post 1959 the present Respondent has been maintaining the records and the same have been subjected to various audits by independent and statutory agencies periodically.

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6.6. *Finding No. 6: <u>Oil India limited has been unable to stop the release of untreated oil effluent in</u>*

Dr. Kumudani Sharma
Head (Legal)
Oil India Limited

open sludge pits and seepage areas around oil rigs in the Digboi Oil field.

i. It is humbly submitted that as against the finding of the Committee, the judgment passed by the Hon'ble NGT observes that no untreated oil effluent in open sludge pits is being released by Respondent No. 8 and that occurrence of oily sludges as witnessed is owing to natural seepage and not due to any action/ inaction of the answering Respondent.

ii. It is most humbly stated that a bare perusal of the test reports of the pits as visited by the Committee, conducted to examine the soil quality by taking a sample of Oily sludge in proximity of wells as prevalent before and after application of Oil Zapper shows remarkable deduction in presence of Total Petroleum Hydrocarbons (HE-TPH) in the same. It is most humbly stated that evidently the process of Bio-remediation and application of Oil Zapper technology has aided drastic reduction in the amount of Hydrocarbons to negligent levels in the areas adjoining the oil wells.

iii. However, it is most humbly stated that the fresh seepage as observed is possibly due to the natural phenomenon and appropriate action

NOTARY R.V SINGH Advocate Regn.No.2282 Commission Expire on 24-10-2027 Area-Delhi GOVT. OF INDIA

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Head (Legal)
Oil India Limited

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has been taken for bio-remediation activity by the answering Respondent through TERI. As a matter of fact, the experts from TERI had visited the concerned site for analysis of the present circumstances and their proposal on bio-remediation is awaited by the Respondent No. 8.

7. It is stated that the contents of the above affidavit are true and correct to the best of my knowledge and belief and no part of this affidavit is false and nothing material has been concealed therefrom.

DEPONENT

Dr. Kumudani Sharma
Head (Legal)
Oil India Limited
Authorised Signatory

VERIFICATION

I Identify the deponent who has signed in my presence
D110257/2021

Verified at Delhi on 26 APR 2023 day of April 2023 that I, the above name deponent do hereby verify that the contents of the above affidavit are true and correct to the best of my knowledge and belief. No part of this affidavit is false and nothing material has been concealed there form.

NOTARY
R.V SINGH
Advocate
Regn.No.2282
Commission
Expire on
24-10-2027
Area-Delhi
GOVT. OF INDIA

DEPONENT

Dr. Kumudani Sharma
Head (Legal)
Oil India Limited
Authorised Signatory

Solemnly affirmed before me, read over & explained to the deponent

Notary Public, DELHI

26 APR 2023

Government of Assam
Office of the Divisional Forest Officer
Digboi Division: Digboi

Ph.No.03751264433 Email ID: dfodigboi@gmail.com

Letter No. B/NGT/2022/ 2743-45 Dated: 16-11-2022

Annexure -R11

To,

1. The Resident Chief Executive, Oil India Limited, Duliajan
2. The Executive Director, Indian Oil Corporation Limited (AOD), Digboi
3. The Chairman, Digboi Town Committee

Sub:- Civil Appeal 9710-9711/2018, Coal India Ltd.-Vs-Dr. Kashmira Kakati & Ors. in the Supreme Court of India-reg.

Ref:- The Scientist 'E' (Project Elephant), Ministry of Environment, Forests & Climate Change, Govt. of India's letter F. No. 6-16/2021-PE-Part (1) dt. 04/10/2022.

Sir,

In inviting a reference to the subject cited above, I am forwarding herewith a copy of the letter mentioned under reference received from the Scientist 'E' (Project Elephant), Ministry of Environment, Forests & Climate Change, Govt. of India regarding the Civil Appeal No. 9710-9711/2018 (Coal India Ltd.)-Vs-Dr. Kashmira Kakati & Ors.

In this regard, being the respondent of the Civil Appeal, you are requested to kindly provide the requisite information/documents on the point No. (a) & (c) respectively contained in the letter referred above in respect of your establishment for further necessary action.

Your early action in this regard is highly appreciated.

Enclo:- As above.

Yours faithfully

(T.C.Ranjith Ram, IFS)
Divisional Forest Officer
Digboi Division, Digboi

सुरक्षा एवं पर्यावरण विभाग Safety & Environment Deptt. RECEIVED ON Oil India Limited, Duliajan
1453
17/11/22

आवासी मुख्य कार्यपालक का कार्यालय
RCE'S OFFICE
4131
17 NOV 2022
ऑयल इंडिया लिमिटेड, दुलियाजान
OIL INDIA LTD., DULIAJAN

F.No. 6-16/2021-PE-Part(1)
Government of India/ भारत सरकार
Ministry of Environment, Forests & Climate Change/ पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय
(Project Elephant Division/हाथी परियोजना विभाग)
****

6th Floor, Vayu Wing,
Indira Paryavaran Bhawan,
Jor Bagh Road, Aliganj,
New Delhi-110003

Dated 04.10.2022

To,
The Divisional Forest Officer,
Digboi Forest Division &
Dihing Patkai National Park
Forest Department, Assam,

Sub:- Civil Appeal 9710-9711 of 2018, Coal India Limited Vs. Dr Kashmira kakati & Ors in the Supreme Court of India – reg.

Sir,

With reference to the Order dated 10.08.22 in Civil Appeal 9710-9711 of 2018, *Coal India Limited Vs Dr Kashmira Kakati & Ors*, the Supreme Court of India had asked the Ministry of Environment, Forest and Climate Change to conduct an inquiry and furnish a report thereon in compliance of the National Green Tribunal's Order (i.e., Order dated 08.12.2017 in the matter of *Dr Kashmira Kakati Vs Union of India and others (OA 19/2014)*, after taking assistance from Respondent no 3 *(Principal Chief Conservator of Forests and Chief Wildlife Warden)*) and 4 (*Assam State Pollution Control Board*).

a) Details (location, number of sites, geo-coordinates, area, and map) of dumping the waste with geographical location/geo coordinates by the Digboi municipality, Indian Oil Corporation Ltd and Oil India ltd.
b) Division wise elephant census carried out after 2017.
c) Details (location, number of pits, geo-coordinates, area, and map) of open sludge pits oil pits and contaminated water bodies in and around the Dihing Patkai Elephant Reserve.

You are hereby requested to kindly provide the above information within two days.

Yours faithfully,

(Dr. K. Muthamizh Selvan)

Scientist 'E' (Project Elephant)
Email id: km.selvan@gov.in
Telephone No. 011-24695067

Copy to:

Principal Chief Conservator of Forest, Government of Assam.

ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम) पंजीकृत कार्यालय : दुलियाजान, असम
Oil India Limited
(A Government of India Enterprise) Registered Office : Duliajan, Assam
पूर्वी परिसंपत्ति, डिगबोई
EASTERN ASSET, DIGBOI

4048

Annexure -R 12

P.O. : DIGBOI-786171
DIST. : TINSUKIA, ASSAM
e-mail : digboi@oilindia.in

Ref. No. AM/EA/E24/641/2022

Date: 28.11.2022

To,

Divisional Forest Officer

Digboi Division, Digboi

Sub: Civil Appeal 9710-9711/2018, Coal India Ltd.-Vs-Dr. Kashmira Kakati & Ors. in the Supreme Court of India-reg.

Ref: Letter No.: (i) F.No. 6-16/2021-PE-Part (1) dt. 04.10.2022 (copy enclosed).
(ii) B/NGT/2022/2743-45 dt. 16.11.2022 (copy enclosed)

Sir,

With reference to the above-mentioned subject and in response to your letter no.: B/NGT/2022/2743-45, regarding point no. (c) of letter no.: F.No. 6-16/2021-PE-Part (1) please find the attached document containing:

1. Details (Latitude & Longitude) of Natural & Artificial Pits in Digboi Oil Field.

2. Map showing location of pits.

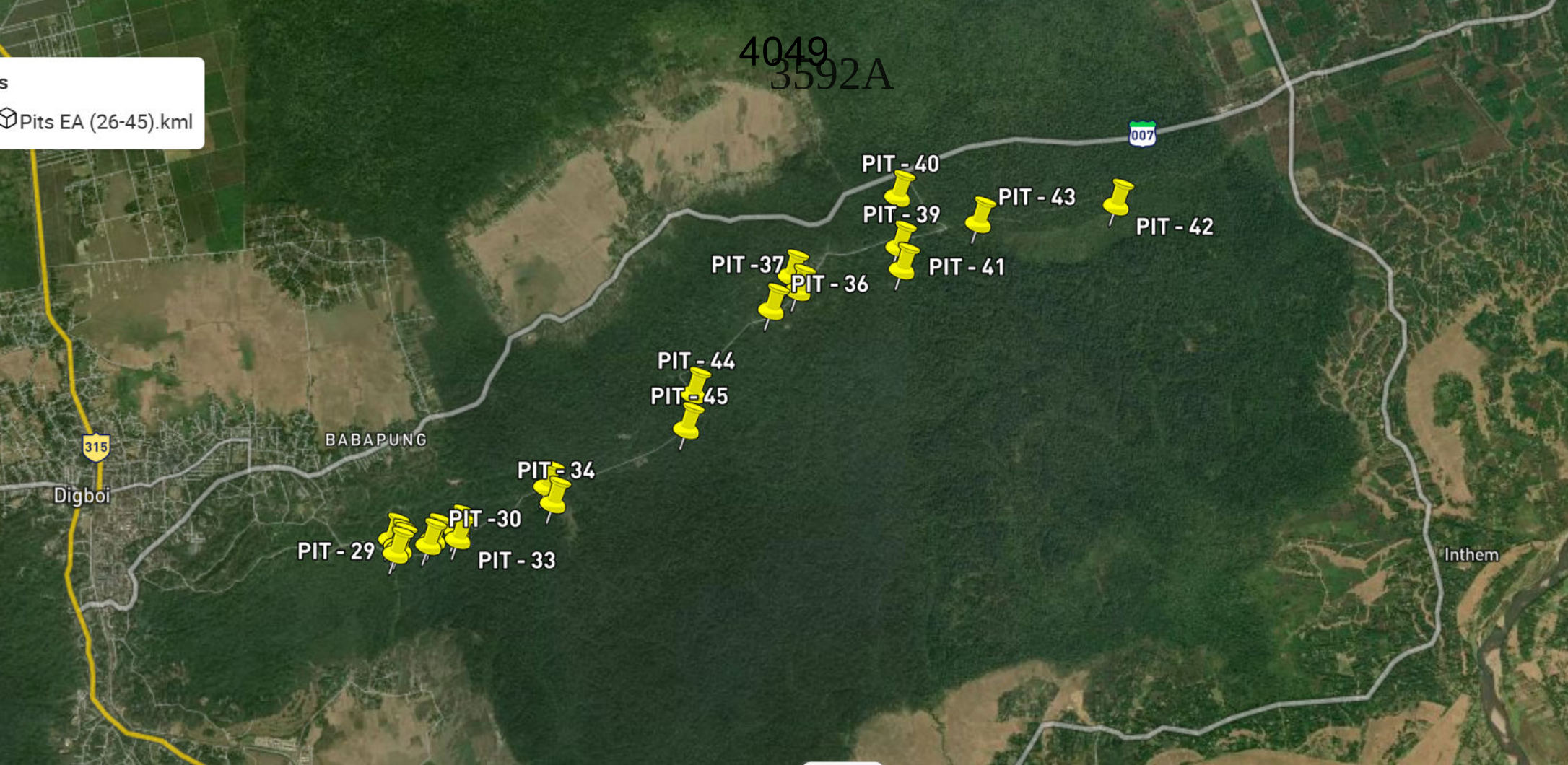
Sanjay Verma

Sanjay Verma
ED (Asset Manager)-EA
Oil India Limited

Asset Manager
Eastern Asset

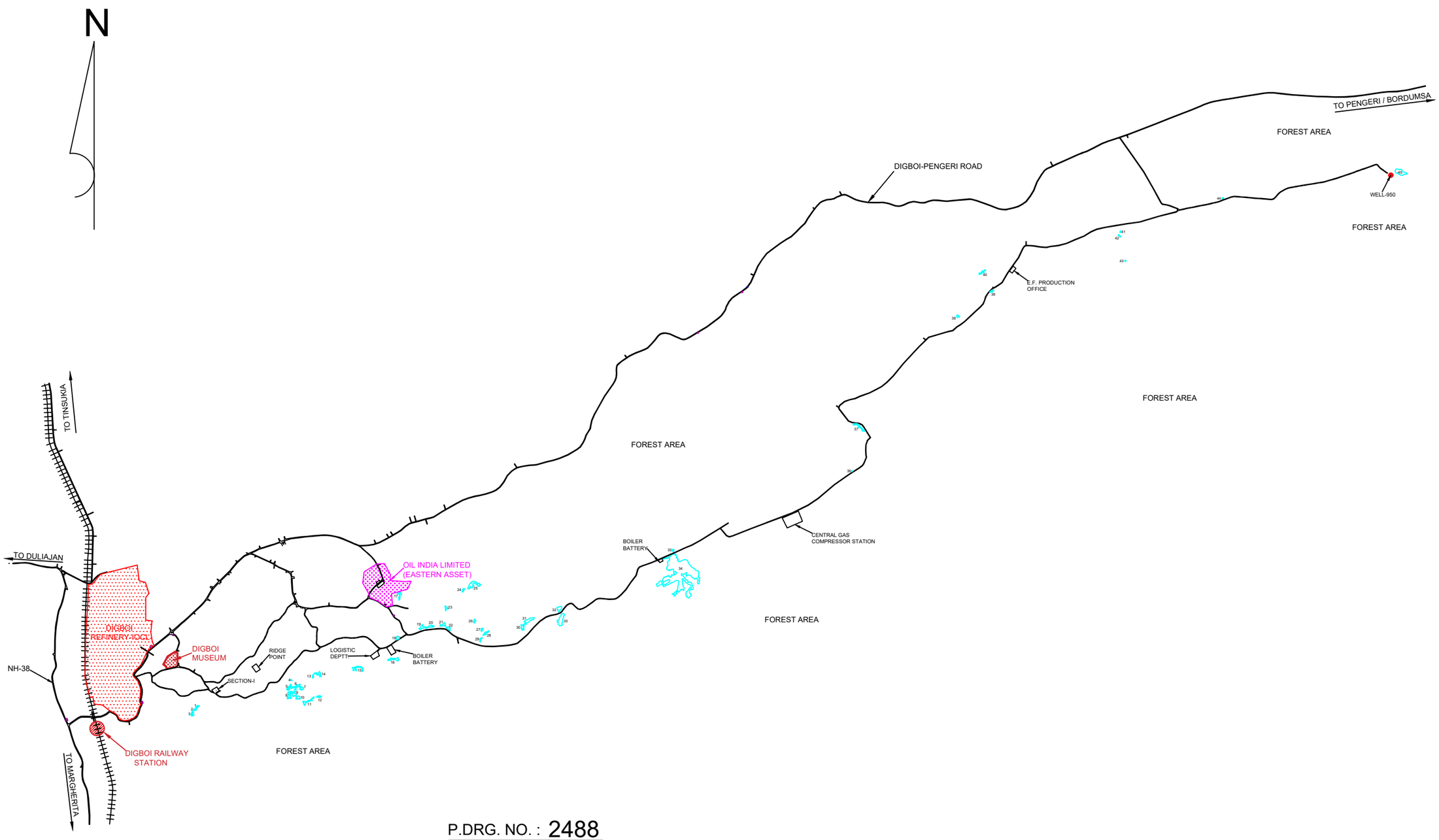
Copy: RCE-OIL
CGM-HSE

Encl.: As above


4049
3592A
Pits EA (26-45).kml
PIT - 40
PIT - 43
PIT - 42
PIT - 39
PIT - 41
PIT -37
PIT - 36
PIT - 44
PIT - 45
PIT - 34
PIT -30
PIT - 29
PIT - 33
BABAPUNG
Digboi
Inthem
315
007

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3592B



P.DRG. NO. : 2488

SUBJECT: MAP SHOWING NATURAL AND ARTIFICIAL PIT AT DIGBOI OIL FIELD UNDER OIL INDIA LIMITED (EASTERN ASSET).

SCALE: 1:12000

Gmail pramod singh <pramod.trustlegal@gmail.com>

Rejoinder to the Reply Affidavit filed by Respondent No.1, MoEF to I.A. No. 533 of 2025.

1 message

garimaraisinghani trustlegal <raisinghanigarima.trustlegal@gmail.com> Sat, Nov 22, 2025 at 6:31 PM
To: "shariqcounsel2005@gmail.com" <shariqcounsel2005@gmail.com>, rajnishprasadaorsc@gmail.com, admin@eldfindia.com, secy-moef@nic.in, cs-assam@nic.in
Cc: PETAL CHANDHOK <petalchandhok@trustlegal.in>, pramod singh <pramod.trustlegal@gmail.com>

Dear Sir,

We write under instructions from and on behalf of Oil India Limited, i.e.the Applicant in I.A. No. 533 of 2025.

The captioned application bearing I.A. No. 533 of 2025 was listed on 08.10.2025 before the Hon'ble National Green Tribunal, Principal Bench and the Hon'ble Tribunal granted us liberty to . file rejoinder to the Reply Affidavit filed by Respondent No.1, MoEF to I.A. No. 533 of 2025.

In view of the same, please find attached herewith rejoinder to the Reply Affidavit filed by Respondent No.1, MoEF to I.A. No. 533 of 2025.

Please note that by way of this instant email, we are effectuating service of the rejoinder to the Reply Affidavit filed by Respondent No.1, MoEF to I.A. No. 533 of 2025.

Regards,

Garima Raisinghani
Advocate | Senior Associate

TRUST LEGAL

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INDIA BUSINESS LAW JOURNAL AWARD WINNING LAW FIRM 2020
INDIA BUSINESS LAW JOURNAL AWARD WINNING LAW FIRM 2021
INDIA BUSINESS LAW JOURNAL AWARD WINNING LAW FIRM 2022
INDIA BUSINESS LAW JOURNAL AWARD WINNING LAW FIRM 2023
INDIA BUSINESS LAW JOURNAL AWARD WINNING LAW FIRM 2024
BENCHMARK LITIGATION
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The Legal 500 ASIA PACIFIC LEADING FIRM 2024

- Trust Legal has been awarded in the category of Environment / ESG by India Business Law Journal 2024, 2023, 2022, 2021 and 2020.
- Trust Legal recognised for its Intellectual Property Rights, Commercial Transactions Litigation Practice by Benchmark Litigation in its 2023 Rankings.
- Trust Legal ranked as Tier 1 Law Firm in Dispute Resolution (City Focus, NCR Region) by Legal 500 Asia Pacific, 2023.
- Trust Legal recognised as a Notable Firm in 'Mergers and Acquisitions' in India by Asia Legal Business, 2022.
- Trust Legal is ranked 37th in the RSG Top 50 India Law Firms, 2019.
- Trust Legal is included in 50 leading commercial law firms in India, India Business Law Journal (2019 and 2015 Editions, Hong Kong).

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Rejoinder to the Reply Affidavit filed by Respondent No.1, MoEF to I.A. No. 533 of 2025..pdf
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