

INDIAN OIL CORPORATION LIMITED



IndianOil

EXECUTIVE SUMMARY

of

Environmental Impact Assessment (EIA)

For

Implementation of BGR INDMAX project associated with
BGR crude processing capacity enhancement from 2.35 to 2.7 MMTPA,
DHDT capacity enhancement from 1.2 to 1.8 MMTPA,
CRU-MSQ revamp & Implementation of SDS unit

At

Tehsil Sidli (PT-II), PO.Dhaligaon, District: Chirang, Assam.



ABC Techno Labs

ABC TECHNO LABS INDIA PVT. LTD.

AN ISO 9001:2008, ISO14001:2004 & OHSAS 18001:2007 certified

Environmental Engineering and Consultancy Organization

(NABL Accredited & MoEF Recognised Environment Laboratory)

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EXECUTIVE SUMMARY

1. INTRODUCTION

Bongaigaon Refinery (BGR) is the eighth operating refinery of IOCL, formed upon the amalgamation of Bongaigaon Refinery & Petrochemicals Limited (BRPL) with Indian Oil Corporation Ltd. (IOCL) on March 25, 2009. Bongaigaon refinery is situated at Dhaligaon in Chirang district of Assam, 200 km west of Guwahati.

Bongaigaon Refinery (erstwhile BRPL) was commissioned in year 1979 with crude processing capacity of 1.00 Million Metric Ton Per Annum (MMTPA). The crude processing capacity was further increased to 1.35 MMTPA in 1986. Presently, the Refinery has two Crude Distillation Units (CDU) having total crude processing capacity of 2.35 MMTPA, two Delayed Coker Units (DCU) and a Coke Calcination Unit (CCU). The refinery has implemented Diesel Hydrotreatment (DHDT) project and MS Quality Improvement (MSQ) project in the year 2011. For the first time in India, technology indigenously developed by M/s IOCL (R&D) and Engineers India Limited (EIL) was adopted for these two projects.

As per the declaration of Government of India dated 6th Jan'16, it was proposed to implement BS-VI grade fuel in the entire country w.e.f. 1st April 2020 i.e. by switching over directly from BS-IV grade fuels to BS-VI grade fuel. Thus, it is imperative to upgrade the Refinery for the production of BS-VI grade fuels by inducting suitable new units and revamp of exiting units

2. PROJECT DESCRIPTION

The location of project site is given in the **Figure 1**.

Executive Summary of EIA Report for Implementation of INDMAX project associated with crude processing capacity enhancement from 2.35 to 2.7 MTPA, DHDT capacity enhancement from 1.2 to 1.8 MTPA, CRU-MSQ revamp & implementation of SDS unit by M/s IOCL, Bongaigaon Refinery at Dhaligaon, Dist: Chirang (BTAD), Assam

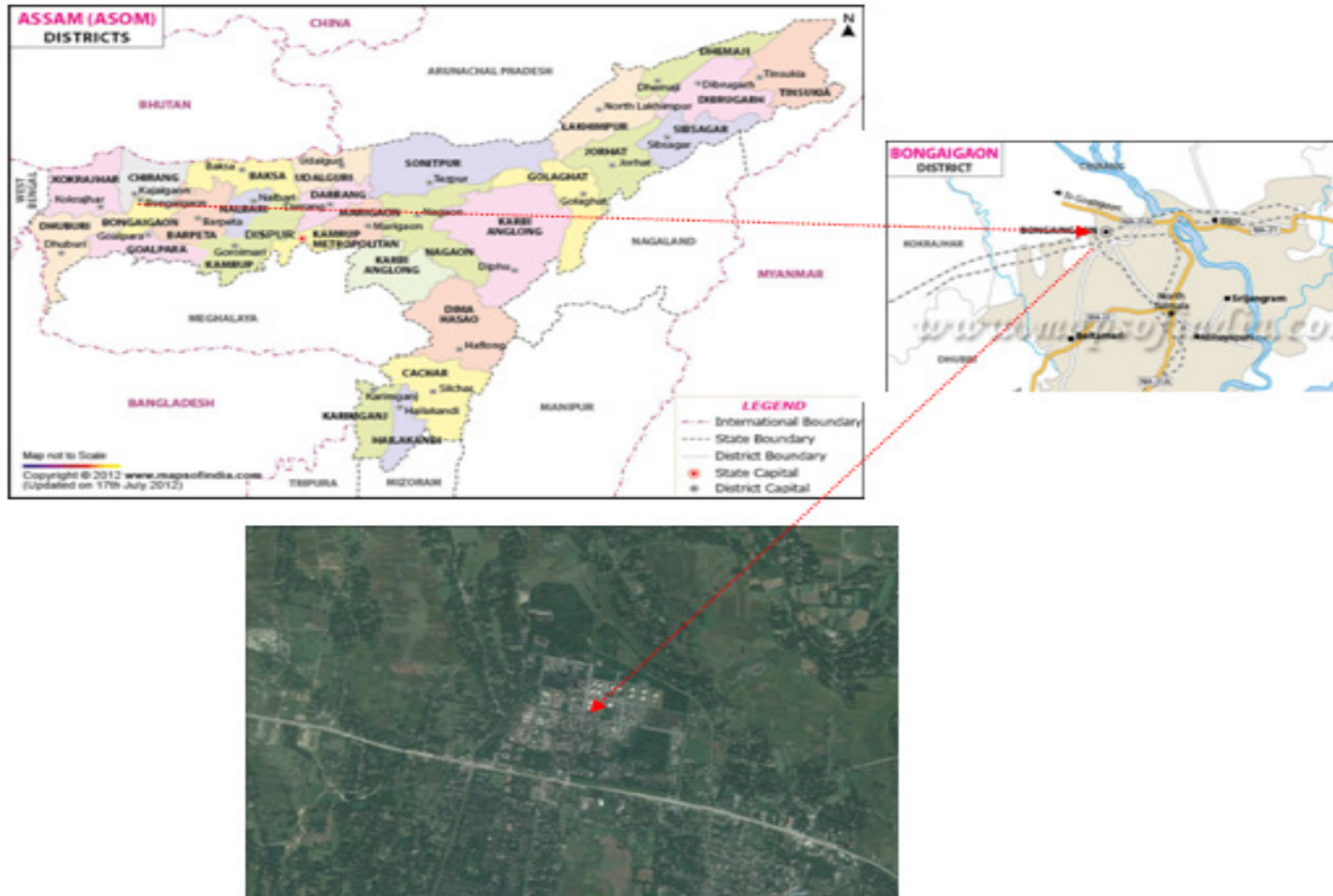


Figure 1: Location Map of the project site

Executive Summary of EIA Report for Implementation of INDMAX project associated with crude processing capacity enhancement from 2.35 to 2.7 MMTPA, DHDT capacity enhancement from 1.2 to 1.8 MMTPA, CRU-MSQ revamp & implementation of SDS unit by M/s IOCL, Bongaigaon Refinery at Dhaligaon, Dist: Chirang (BTAD), Assam

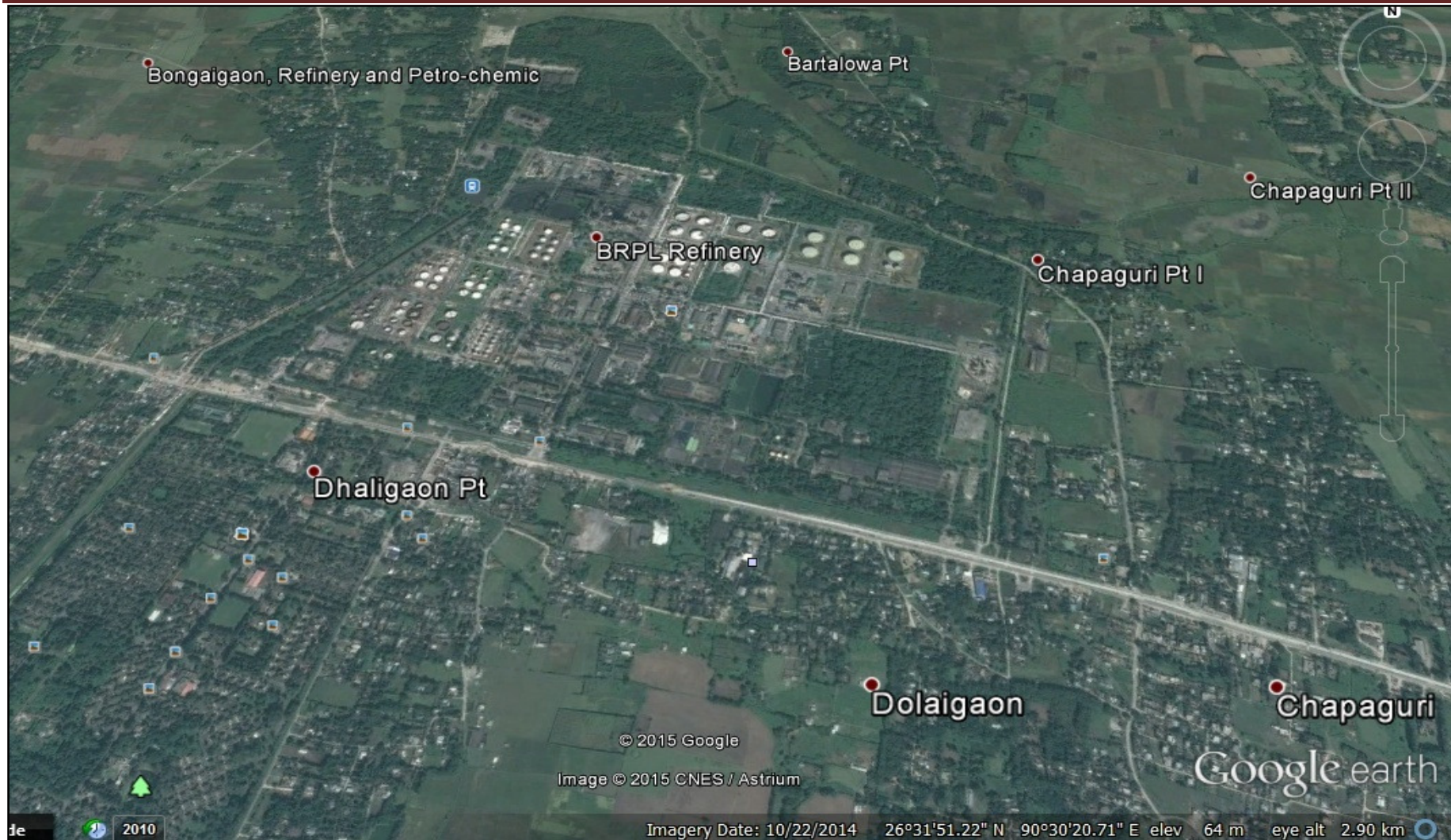


Figure 2: Satellite Image of the site

2.1 ENVIRONMENTAL SETTINGS OF THE SITE

Table 1 : Environmental Settings of the Project Site

Sl. No.	Particulars	Details
1	Latitude	26° 31' 00.81" N
2	Longitude	90° 31' 53.85" E
3	Site Elevation above MSL	63 m
4	Topography	The topography of the district represents mostly plain lands
5	Present land use at the site	Industrial use
6	Nearest National /State highway, District road/Approach road	NH 31C -0.7 km (Approx.)
7	Nearest railway station	New Bongaigaon station
8	Nearest airport	Lokopriya Gopinath Bordoloi International Airport, Guwahati
9	Water body	<p>Lakes: Nayachara Lake (Beel) -7.0km (Approx.) Bhosamari Lake -9.2 km, (Approx.) Paropota Lake -9.5 km, (Approx.) Naodora Lake -9.2 km, (Approx.) Kasorani Lake -9.2 km (Approx.)</p> <p>Rivers : River Aie -6.0 km, (Approx.) River Tunia -4.0km (Approx.) River Kujia -7.0 km (Approx.)</p>
10	Archaeologically important places	Not in 5 km radius from the project site
11	National parks / Wildlife Sanctuaries	Not in 5 km radius from the project site
12	Reserved / Protected Forests	Nakkati Reserved Forest- 7.5 km, (Approx.) Kakoijana Reserved Forest- 9.5 km, (Approx.) Bhumeswar Reserved Forest- 7.8 km (Approx.)
13	Seismicity	Seismic Zone –V
14	Defence Installations	None

3. NEED FOR THE PROJECT

The present crude processing capacity of BGR is 2,350,000 TPA of Assam Crude Oil and Low Sulphur Imported Crude Oil. In view of the Auto-Fuel Policy Vision 2025, the Refineries will be required to supply fuels meeting the BS-IV specification fuels by 1st April 2017 and BS-V/VI specification by 1st April, 2019. The BS-VI fuel will bring down the Nitrogen Oxide emissions by 68% from diesel cars and by 25% from petrol engine cars. Cancer causing

particulate matter emissions from diesel engine cars will also come down by a phenomenal 80 %.

In order to meet the requirement of BS VI Fuel demand, following projects at BGR are proposed for implementation.

- Crude processing capacity enhancement from 2.35 MMTPA to 2.7 MMTPA
- DHDT capacity enhancement from 1,200 TMTPA to 1,800 TMTPA to meet BS-VI HSD specification.
- CRU-MSQ revamp to meet BS-VI MS specification.
- Selective Desulphurisation (SDS) Unit.
- INDMAX Project along with Indmax Gasoline De-Sulphurisation Unit.

3.1 Project Description

Table 2: Salient Features of the Project

Item Description	Details					
Project Proposal	CDU capacity enhancement from 2.35 to 2.7 MMTPA, DHDT revamp by 150% through capacity enhancement of HGU by 25%, CRU revamp by 120% with new NHT unit, MSQ catalyst change and implementation of INDMAX with SRU & Prime G.					
Location	Mouza No.: Sidli Part II, Revenue survey no. 450, Dhaligaon, Dist. Chirang, Assam					
Land Requirement & its break up for land use	S. No.	Particulars	Existing land area (Sq. m.)	Proposed Land Area for Expansion (Sq. m.)	Total Area (Sq. m)	% of Total Area
	1	Plant Area	34,43,826	-	34,43,826	75.18%
	2	Township	1,137,168	-	1,137,168	24.82%
	TOTAL		45,80,994	-	45,80,994	100.0%
Man power requirement	Construction phase: 5,430 nos. Operation phase: 20 nos.					
Power requirement & Source	DHDT: 300 KW INDMAX FCC Unit: 3,620 KW IGHDS: 255 KW SDS Unit: 45 KW Source : GTG & TG					

Water requirement & Source of supply	Sn	Particulars	Source	Requirement³ (m³/hr)	Remarks
	1.	Raw water for CDU-II, DHDT, SDS & CRU-MSQ	-	-	No additional raw water required
	2.	Raw Water for INDMAX	Ground water	40	<ul style="list-style-type: none"> Treated effluent water from TTP will be reused in cooling tower as make up Raw water requirement is for service water only
Wastewater generation, treatment & disposal	The plant has installed a 400 m ³ /hr capacity Tertiary Treatment Plant. The treated effluent water will be reused as make up water for cooling tower and green belt development.				
Air Pollution Sources and Control Measures	Source		Air Pollution Control Measures		
	D.G. Sets used in case of power failure		Adequate height of stack – 3 m from the highest roof of establish as per CPCB norms		
Solid waste generation & Management	Very negligible only about 5 kg solid wastes will also be generated from office and canteen. It will be handled by local bodies.				
Project Cost	Rs. 4185.4 Cr.				

4. BASELINE ENVIRONMENTAL STATUS

4.1. Temperature

The winter season starts from December and continues till the end of February. January is the coolest month. The mean daily maximum temperature during winter season is 24.6 °C (in the month of December) and the mean daily minimum temperature at 11.5 °C (in the month of December). Both the night and day temperatures increase rapidly during the onset of the pre-monsoon season from March to May. During pre-monsoon season, the mean maximum temperature was observed to be 31.5°C in the month of April and the minimum temperature at 15.5°C in the month of March. The mean maximum temperature in the monsoon season was observed to be 31.4°C in the month of June. By the end of August the day temperatures increase slightly, with the mean maximum temperature at 31.7°C in the month of September and the night temperature decreases with the mean minimum temperatures at 9.8°C in the month of January. The min. and max

temperatures recorded in Bongaigaon Refinery (BGR) during the year 2015 were 9⁰C & 39⁰C respectively,

4.2 Rainfall

The district receives heavy rainfall of 3219.1 mm in an average under the influence of south west monsoon. In the year 2015, the max. daily rainfall in BGR was recorded at 326 mm. Humidity is high ranging up to 80-90 % during rainy season. In BGR, the average humidity was recorded as 76.2% and the max. as 100% during the year 2015.

Parameter	Post Monsoon Season
Temperature	
Max (°C)	32.9
Min (°C)	5.1
Relative Humidity	
Max (%)	76 %
Min (%)	64%
Wind Speed	
Max (kmph)	8.3
Min (kmph)	2.3
Mean (kmph)	4.1
Calm Period (%)	32.1
Predominant Wind Flow Direction	Towards E, ENE, NE directions

4.3 Ambient Air Quality

To study the baseline air quality scenario in the study area, six Ambient Air Quality Monitoring (AAQM) stations were selected in the study area in different directions and at different distances from the project site keeping in view of the guidelines of the Ministry of Environment, Forest and Climate Change (MOEF&CC).

The baseline data of air environment was monitored for the below mentioned parameters:

- Particulate Matter (PM_{2.5});
- Particulate Matter (PM₁₀);
- Sulphur dioxide (SO₂);
- Di oxides of Nitrogen (NO₂);
- Ozone (O₃);
- Lead (Pb);
- Carbon Monoxide (CO);
- Ammonia (NH₃);
- Benzene (C₆H₆);
- Benzo (a) Pyrene (BaP);
- Arsenic (As);
- Nickel (Ni),

4.4 Ambient Noise Level

Noise can be defined as an unwanted sound. It interferes with speech and hearing and is intense enough to damage hearing or is otherwise annoying. The definition of noise as unwanted sound implies that it has an adverse effect on human beings and their environment. Noise can also disturb wildlife and ecological system.

To understand the noise environment in the study area, a noise survey was conducted using Sound Level Meter 2031 manufactured by Cygnet Systems. Noise measurements were carried out at the same location where ambient air quality was monitored. The 24-hourly sound levels were measured at each location once during the study period.

4.5 Soil Quality

The proposed projects including Indmax may affect the existing land use pattern in the study area by change in present land use and encouraging more entrepreneurs to go in for the new industries in this region. This in turn may have further impact on the existing basic infrastructure. Therefore the land environment background status in terms of the land use pattern needs to be assessed.

In order to characterize the soil quality within the study area, soil samples have been collected from nine different locations in the study area.

4.6 Ecology

The information of important flora and terrestrial animal groups such as birds, reptiles and mammals were collected by trekking inhabiting area, along the road, nearby forest areas and agricultural fields present in the impact zone. An inventory of the plants and animals has been prepared separately for mammals, reptiles and birds.

4.7 Socio- Economic

Socio-economic environment in the vicinity of any ensuing project is affected by the mode of change that is likely to occur due to the beneficial or adverse effects arising out of the project activity. The impact of such change is dependent upon likely job opportunities economic output immigration strain on the existing basic amenities and overall impact on the quality of environment, which may impair the health status of the people living in that geographical area.

The projection of such assessment calls for collection of the baseline and background information about the socio-economic and demographic environment of the surrounding areas of the proposed site. A study area comprising an area of 10 km radius around the proposed project was chosen for studying the socio-economic characteristics

The study area is well connected by railway route linking NE region with the rest of the country. Three National Highways pass through this district. Sericulture is one of the important agro-based employment generating activities in this region. Climatic conditions are favourable for encouraging sericulture crops like mulberry, Eri, Muga etc. Socio-economic profile of all these villages in terms of demographic characteristics like population,

literacy, occupational structure, and basic infrastructure was collected with the help of Survey of India toposheets and 2011 census data

5. PREDICTION OF IMPACTS AND ITS MITIGATION MEASURES:

5.1 Impacts on Air

During Construction Phase

During the expansion, revamp phase, Activities like cleaning, levelling, grading, construction, metal cutting, and erection of equipments like Columns, Vessel Pumps will be carried out. A certain amount of particulate matter will be generated by truck movements during the construction phase. However, the suspended particulate matter in ambient air as a result of construction activities may be relatively coarse and will be settled within a short distance. Therefore, the impact will be restricted within the close vicinity of the construction activity for short period of time.

During Operation Phase

- During operation there will be NO_x, SO_x stack emissions from INDMAX FCC generator, IGHDS unit, CDU-II, DHDT unit, and CRU unit, plant after expansion, the major SO_x emissions from INDMAX unit will be controlled by installing SDS unit at plant. All the Stack heights will be designed as per CPCB guidelines.
- Fugitive emissions of hydrocarbon may result from unloading hose, faulty bottling, leaking cylinders and minor leaks. Gas leak detectors, and Floating roof storage tanks will be provided at strategic locations to detect concentration of hydrocarbon in the premises.
- DG sets installed at BGR plant, are operated occasionally in case of power failure and these are not regular source of gaseous emissions.
- Tankers/trucks/vehicles have pollution under control (PUC) certificates. Regular maintenance of Diesel tankers/trucks will be ensured.

Mitigation Measures

- Cordoning off construction area by tin sheets & garden net
- Dust suppression measures like water sprinkling as per requirement.
- Use of adequate PPEs by the working personnel.

5.2 Impacts on Water

During Construction Phase

During the construction phase the demand of drinking water and construction water will be meet from existing source. Adequate drinking water, hygiene and sanitation facilities will be provided to the workers

The construction phase may result in minor soil erosion from the plant site, as it will clear of ground flora during plant erection. The run off from the construction site during rainfall may cause some increase in the quantity of suspended solids and turbidity in the runoff in

natural drain. However, this impact will be of temporary nature and may not last as soon as excavated soil established and construction debris is disposed off properly

During Operation Phase

Only 40 m³/hr of water will be required daily for the INDMAX unit. While the CDU-II, DHDT, SDS & CRU-MSQ units will not require any additional water.

- BGR has installed Tertiary Treatment Plant to facilitate reuse of effluent water inside the complex as cooling water and firewater makeup.
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Total water consumption after expansion will be 370 Cum/day and entire quantity of treated effluent will be used for cooling tower make up and irrigation purpose. Thus achieving Zero discharge status

- Waste water from canteen at the Plant will be treated in oil and grease trap followed by septic tank and soak pits
-

Mitigation Measures

- Excavation for foundations of structures/vessels will be carried out during dry season.
- Construction debris will be collected and disposed properly on daily basis.
- Sanitary facilities for workers will be provided.

5.3 Impacts on Noise Environment

During Construction Phase

During construction phase, metal cutting, and erection of equipments like Columns, Vessel Pumps, cold cutting, hammering, vehicle movement, Rotary etc can generate noise, DG sets may be major sources of noise generation during construction phase. Relatively high noise levels will be generated during construction phase.

Mitigation Measures

- Use of ear muff and ear plugs to workers working in high noise area.
- Acoustic enclosures are already fitted with DG sets.

During Operation Phase

Noise generation is expected from piling process and rotating machinery, equipments. The other sources are pumps, compressor, and turbines. DG sets are to be operated only during grid power failure.

Mitigation Measures

- Equipment specification and installation of acoustic enclosure with DG sets ensure low level of noise generation.
- All the Diesel Tankers and trucks are essentially fitted with silencers to control noise generation.
- Planting trees and developing and maintaining green belt area which works as noise barrier.
- Quarterly Noise surveys are conducted and abnormalities are resolved.

Therefore, impact on noise levels of the study area due operations at the BGR plant will be insignificant.

5.4 Impacts on Land and Ecological Environment

During construction phase, around 5,430 workers will be deployed, mostly from local area. The construction activity of proposed plant will not displace any person.

During Operation of proposed Indmax plant, will require only 20 skilled workers for operating and handling the plant. Therefore, large scale immigration will not take place and the impact on demography of the area will be insignificant.

The construction and operation of the plant will have some beneficial impact due to increase in incomes as local unskilled, semiskilled and skilled persons as they will gain some direct and indirect employment. In view of the small manpower and support facility requirements, the beneficial impact likely to be marginal. However, this expansion and revamping is going to impact positively on the production capacity of IOCL, thus by serving larger markets and serving the Indian economy.

Since the immigration of work force during construction and operation of the proposed expansion, revamping and implementation of new technologies at the plant will be likely to be very small, the impact on facilities and cultural aspects are expected to be insignificant.

At the centre of the socio-economic impact lies the question of whether economic development and growth can go hand in hand with environmental protection. The expansion, revamping activity and implementation of new technologies at the BGR plant is not likely to have any negative impact if, the proposed mitigation for environmental management are implemented by the IOCL management. The proposed changes will have definite beneficial impacts, even though marginal, on infrastructures facilities, gross economic product, employment opportunities, socio-economic aspects of the area

6. ENVIRONMENTAL MONITORING PLAN

S. No	Particulars	Monitoring Frequency	Duration of Sampling	Important Monitoring Parameters
1	Ambient Air Quality Monitoring			
a	Project site	Once in a 3 months	24 hour continuously except CO	PM ₁₀ , PM _{2.5} , SO ₂ , NO _x and CO
2	Stack Monitoring			
a	DG set	Once in a 3 months	30 min	SO ₂ , NO _x , SPM, CO, CO ₂ , Temperature, Flow rate and velocity of gas
3	Ambient Noise Level			
a	Near DG set	Once in 3 months	8hr continuously with 1hr interval	Noise level (dB)
4	Ground / Drinking water Quality			
a	Ground water at project site	Once in 3 months	Grab Sampling	Parameters specified under ISO: 10500, 1993
5	Sewage Quality Monitoring			
a	ETP Inlet	Once in a week	Grab Sampling	Physical, Chemical and Biological parameters specified under IS: 2490:1982
b	ETP Outlet			
6	Soil Quality			
a	At the Green Belt area	Once in a year	Samples collected from three different depths viz., 30cm, 60cm and 100cm below the surface.	Parameter for soil quality: pH, Texture, electrical Conductivity, Organic matter, Nitrogen, Phosphate, Calcium, Potassium and Magnesium.
7	Flora and Fauna	Once in a year	-	Number of plants and animal species
8	Health	Regular Check ups	-	All relevant parameters including HIV

7. ADDITIONAL STUDIES

Industrial plants deal with materials, which are generally hazardous in nature by virtue of their intrinsic chemical properties or their temperature or pressure of operation or a combination of these. Fire, explosion, hazardous release or a combination of these are the hazards associated with industrial plants. These have resulted in the development of more comprehensive, systematic and sophisticated methods of safety engineering such as hazard analysis and risk assessment to improve upon the integrity, reliability and safety of industrial plants.

The primary emphasis in safety engineering is to reduce risk to human life and environment. The broad tools attempt to minimize the chances of accidents occurring. Yet, there always exists, no matter how remote, that small probability of a major accident occurring. If the accident involves highly hazardous materials in sufficient large quantities, the consequences may be serious to the plant, to surrounding areas and the populations therein.

Risk Assessment & Hazard Identification

Risk is defined as the unwanted consequences of a particular activity in relation to the likelihood that this may occur. Risk assessment thus comprises of two variables, magnitude of consequences and the probability of occurrence of accident.

The first step in risk assessment is identification of hazards. Hazard is defined as a physical or chemical condition with the potential of accident which can cause damage to people, property or the environment. Hazards are identified by careful review of plant operation and nature of materials used. The various scenarios by which an accident can occur are then determined, concurrently study of both probability and the consequences of an accident is carried out and finally risk assessment is made. If this risk is acceptable then the study is complete. If the risk is unacceptable then the system must be modified and the procedure is restarted.

Scope of Risk Analysis

The scope of risk analysis study includes:

- Identify potential hazard sections of the plant, which are likely to cause damage to the plant, operating staff and the surrounding communities in case of any accident due to the proposed plant facilities.
- Assess overall damage potential of the hazardous events in relation to main plant and environment.
- Assessment of total individual risk.
- Recommended emergency preparedness plan to mitigate the effects of any accident.

Risk Analysis

Risk Analysis of any plant / installation handling hazardous materials includes:

(a) Hazard Identification

- Identify potentially hazardous materials that can cause loss of human life/injury, loss of properties and deteriorate the environment due to loss of containment.
- Identify potential scenarios, which can cause loss of containment and consequent hazards like fire, explosion and toxicity.

(b) Consequence Analysis

- Analysis of magnitude of consequences of different potential hazard scenarios and their effect zones.
- Consequence analysis is a measure of potential hazards and is important for taking precautionary measures for risk reduction as for well as mitigation of effect in case of such accidents happening.
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This report has been prepared by applying the standard techniques of risk assessment and the information provided by IOCL. Based on the Risk Assessment, Disaster Management Plan (DMP) has been prepared.

8. PROJECT BENEFITS

Direct Benefits

The expansion, revamping, installation of INDMAX will aid in manufacturing and

- I. Eliminating the production demand of Black Oil and Naphtha.
- II. It will maximize the production of LPG.
- III. The project will help to manufacture High Speed Diesel (BS-VI).
- IV. High Speed Diesel (HSD) conforming to manufacturing specifications of BS-VI
 - Availability of LPG will discourage deforestation and reduce the use of fire wood & fossil fuels.
 - Improve the quality of life of women engaged in household activities specially in cooking.

Improvement in the Social Infrastructure

The expansion of Plant will create opportunities for direct and indirect employment in the area. This will initiate local economic growth and thereby the potential to enhance quality of life of the local communities. Local population will get benefited due to availability of safer fuels.

Reduction of Emissions

The BS-VI will bring down the Nitrogen Oxide emissions from diesel cars by 68 % and 25% from petrol engine cars. Cancer causing particulate matter emissions from diesel engine cars will also come down by a phenomenal 80 %. Besides, the project would also improve the smoke point of the kerosene stream from the Assam. It will, therefore, help in maintaining cleaner environment due to reduction in emissions.

9. ENVIRONMENT MANAGEMENT PLAN

During operational phase, the area of concern will be stack emissions, liquid effluent and intermittent disposal of spent catalyst (solid waste) from the proposed plant. During operation there will be stack emissions from INDMAX FCC generator, IGHDS unit, CDU-II, DHDT unit, and CRU unit, plant after expansion.

The Environmental Management Plan (EMP) for the proposed projects has to ensure that the residual environmental impacts are minimized by adopting best possible economically viable techniques. The EMP also has to ascertain compliance with all statutory conditions as per No Objection Certificate (NOC) from Pollution Control Board Assam and Ministry of Environment & Forests.

A comprehensive plan has been worked out keeping in view these requirements. The plan encompasses the mitigation in three stages i.e. design, construction and operation of the plant.

The Health Safety and Environmental Management at BGR is carried out by Deputy General Manager (HSE). The DGM (HSE) reports to GM (TS & HSE). The DGM is assisted by Chief Manager and officers etc.

10. CONCLUSION

Based on the environmental assessment, all possible environment aspects have been adequately assessed and necessary control measures have been formulated to meet with statutory requirements, in the preparation of the EIA-EMP. In view of the Auto-Fuel Policy Vision 2025, the Refineries will be required to supply fuels meeting the BS-IV specification fuels by 1st April 2017 and BS-V/VI specification by 1st April, 2019. The BS-VI will bring down the Nitrogen Oxide emissions from diesel cars by 68 % and by 25% from petrol engine cars. Cancer causing particulate matter emissions from diesel engine cars will also come down by a phenomenal 80 %.

Considering that the proposed project of Bongaigaon Refinery will contribute in reducing the pollution and help in environment protection for the cause of society, an Environmental Clearance may be accorded for the proposed project.