

EXECUTIVE SUMMARY

For

PROPOSED POLY PROPYLENE UNIT (PPU) OF CAPACITY 360KTPA

At

M/s NUMALIGARH REFINERY LIMITED

Village: Pankagrang

Tehsil: Bokakhat

District: Golaghat

State: Assam

By



M/s. NUMALIGARH REFINERY LIMITED, ASSAM

ToR Issued on 15 Jul 2022

(Proposal Number: IA/AS/IND2/280558/2022)

Baseline Monitoring Period – (December 2022 to February 2023)

[Project termed under Schedule 5(c) Category 'A' – Petro-chemical complexes (industries based on processing of petroleum fractions & natural gas and/or reforming to aromatics) as per EIA Notification 2006 and its Amendments]

By

EIA CONSULTANT:



M/s. Hubert Enviro Care Systems (p) Limited

NABET/EIA/2224/SA 0190 dated 06.03.2023 valid till 27.07.2024
NABL Certificate Number: TC-5786 dated 30.04.2022 valid till 29.04.2024

October 2023

Executive Summary

Project Description

Numaligarh Refinery Limited (NRL) is planning to set up a Polypropylene Unit along with its associated facilities at Numaligarh beside the existing refinery in the state of Assam to meet the increasing demand of polypropylene in the North eastern region. Under this NREP project a high severity PFCCU unit with a capacity of 1.955 MMTPA is being implemented. The LPG that will be generated in the high severity mode will contain as significant potential of propylene which can be recovered for value addition.

NRL intends to explore the feasibility of putting up a PP unit in the refinery complex from Polymer grade propylene feed from PFCC unit along with associated utilities and offsite facilities.

The Polypropylene Unit is to be designed as a single train with a capacity of 360,000 TPA of Homo-polymer grades of Polypropylene (PP) product with a target annualized product split discussed elsewhere in the report. The capacity stated is inclusive of off spec (low value) products produced during transition from one grade to another.

M/s Numaligarh Refinery Limited proposes Environmental Clearance for “Proposed Poly Propylene Unit (PPU) Of Capacity 360KTPA” Schedule 5(c) Category ‘A’ – “Petro-chemical complexes (industries based on processing of petroleum fractions & natural gas and/or reforming to aromatics)” as per EIA Notification 2006 and its Amendments.

The Polymer Grade Propylene produced in the PRU section of the PFCC Unit of NREP is further processed in the downstream unit i.e. PP unit to produce Homo-polymer grade Polypropylene product.

Geographical coordinates of the project site

S.No	Latitude	Longitude
1	26°35'7.26"N	93°47'15.39"E
2	26°35'0.04"N	93°46'26.33"E
3	26°35'7.59"N	93°46'26.49"E
4	26°35'11.66"N	93°46'25.09"E
5	26°35'13.63"N	93°46'22.00"E
6	26°35'20.48"N	93°46'24.29"E
7	26°35'22.25"N	93°46'24.46"E
8	26°35'28.72"N	93°46'31.38"E
9	26°35'28.35"N	93°46'34.52"E
10	26°35'27.96"N	93°46'35.81"E
11	26°35'23.39"N	93°46'49.73"E
12	26°35'23.31"N	93°46'52.21"E
13	26°35'25.21"N	93°46'54.53"E
14	26°35'26.24"N	93°46'56.57"E
15	26°35'26.47"N	93°46'58.23"E
16	26°35'25.57"N	93°47'0.76"E
17	26°35'24.69"N	93°47'6.17"E
18	26°35'23.58"N	93°47'11.76"E

Environmental Sensitive Areas

Environmentally Sensitive Areas within 15km from Project Boundary

S.No	Areas	Distance & Direction from project boundary				
1	Monuments	Nil				
2	Waterbodies	S.No	Water Bodies	Distance (~km)	Direction	
		1.	Dhansiri River	0.80	N	
		2.	Kaliani River	1.36	WNW	
		3.	Doygurn River	4.61	ESE	
		4.	Deuri Nadi	6.54	SSW	
		5.	Disai Nadi	9.41	N	
		6.	Dhala Jan	11.55	SSE	
		7.	Brahmaputra River	12.62	NNW	
		8.	Pora Jan	14.50	SSW	
9.	Kaliyani RF	14.50	SSW			
3	State, National boundaries	Nil				
4	Nearest Highway	<ul style="list-style-type: none"> ➤ NH-129(Dimapur-Numaligarh) at a distance of ~1.31km towards SW ➤ SH-1(Kamargaon-Joypur) at a distance of ~3.12 km towards N 				
5	Nearest Railway station	➤ Khumtai Railway Station, ~7.38km , ENE				
6	Defence installations	Nil				
7	Nearest Town	Golaghat, ~16.50km towards ESE				
8	Nearest City	Jorhat, ~39km, ENE				
9	Nearest Airport	Jorhat Airport,~39.57 km, ENE				
10	Nearest Villages	S.No	Villages	Distance	Directions	Populations
		1.	Pankagaon	0.01km	W	250
		2.	Telgaram	0.36km	SSW	2,500
		3.	Rajabari	0.37km	N	557
		4.	Letekujan	0.38km	E	3,000
		5.	Numaligarh Township	1.80km	WNW	1,000

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	Office of the Superintendent Customs Preventive Force Numaligarh	6.62	NW
	Rajabari Gram Panchayat office	11.13	WNW
	Religious Places		
	CSI Church	0.38	SSW
	Borgoria Jame Masjid	0.77	N
	Kanaighat Jama Masjid	1.70	W
	Hanuman Mandir	1.70	W
	Baba Than Lord Shiva Temple	4.45	WNW
	Believers Eastern Church	6.32	W
	Kaliani Baptist Church	6.76	SW
	Khumtai Shiv Temple	6.85	NE
	Mowkhowa Masjid Mosque	10.67	E
	Buddhist Monastery Of Bhitari Kalioni	11.81	S
	Shiva Temple	12.08	WNW
	Industries		
	Numaligarh Refinery	Adjacent to Site	S
	Lattakoojan Tea Estate	2.13	ESE
	Tanay Tea Factory	3.66	S
	NR Tea Factory	3.97	S
	Numaligarh Tea Factory	5.97	NW
	Sirajuli Tea Factory	6.54	SE
	Badulipar Ltd Khumtai Tea Estate Factory	6.87	ENE
	Radhabari Tea Estate	8.58	N
	Bukhial Tea Estate	8.65	S
	Borchapori Tea Factory	9.77	WNW
	Bijulee Tea Estate	11.48	S
	Shyamraipore Tea Factory	12.42	SSE
	Sanjiv Tea Industry Pvt Ltd	12.85	SE
	Aegle Tea Factory	13.65	SE

Project Description

Brief description of project

S.No	Particulars	Details																							
1.	Brief Description about Project	Proposed Poly Propylene Unit (PPU) Of Capacity 360KTPA by M/s Numaligarh Refinery Limited																							
2.	Products with capacities for the proposed project	<p>The Polymer Grade Propylene produced in the PRU section of the PFCC Unit of NREP is further processed in the downstream unit i.e. PP unit to produce Homo-polymer grade Polypropylene product.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>S.No.</th> <th>Name of the Unit</th> <th>Unit Configuration</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Poly propylene unit</td> <td>360 KTPA</td> </tr> </tbody> </table> <p>Proposed Products</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Name of the Product</th> <th>Proposed Quantity (KTPA)</th> <th>Mode of storage</th> <th>Storage capacity</th> </tr> </thead> <tbody> <tr> <td>Raffia Grade</td> <td>190</td> <td>Bags in Ware house</td> <td rowspan="4">Inpellet form & is stored in ware house before dispatch. The ware house will be sized corresponding to twenty one (21) days of storage requirement corresponding to 100% through put of the unit</td> </tr> <tr> <td>Non-Woven Spun Bond Grade</td> <td>90</td> <td>Bags in Ware house</td> </tr> <tr> <td>Non-Woven Melt Blown Grade</td> <td>25</td> <td>Bags in Ware house</td> </tr> <tr> <td>Injection Moulding Homo-polymer Grade</td> <td>55</td> <td>Bags in Ware house</td> </tr> </tbody> </table>	S.No.	Name of the Unit	Unit Configuration	1	Poly propylene unit	360 KTPA	Name of the Product	Proposed Quantity (KTPA)	Mode of storage	Storage capacity	Raffia Grade	190	Bags in Ware house	Inpellet form & is stored in ware house before dispatch. The ware house will be sized corresponding to twenty one (21) days of storage requirement corresponding to 100% through put of the unit	Non-Woven Spun Bond Grade	90	Bags in Ware house	Non-Woven Melt Blown Grade	25	Bags in Ware house	Injection Moulding Homo-polymer Grade	55	Bags in Ware house
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3.	Plot area	The total Plot no. 11 area is 600 Bigha (8, 02,681.92 sq.m) (80.27 Ha). Out of which Total plot area required for the PP Unit and its associated facility is 348093sq.m (34.8 Ha). The plant area is 232821sq.m (23.28Ha) and Greenbelt area is 115272 sq.m (11.52 Ha) i.e, (33.1 % of total area) at Plot No.11 located at North side of the Numaligarh Refinery. The remaining 454588.92 sq.m (45.45 Ha) will be utilized for future project activities.																							
4.	% of green belt provided	Green belt area is 115272 sq.m i.e, 11.52 Ha (33.1 % of total area).																							
5.	Land use change required	For NREP, a total of 11 plots were identified requiring NDZ clearance, out of which Forest Department, Govt. of Assam had recommended 9 plots including Plot no.11 (Rajabari TE). However, out of the 9 plots, 8 plots of Land were shortlisted by NRL for NREP related activities. Now, the proposed PP unit will be installed in Plot no.11 which comes under NDZ zone and the site has been under the 9 recommended plots by Forest Dept. of Assam and has been recommended for Project activities.																							
6.	Sources of Air & Noise Pollution	Source of air pollution- Process emission (discontinuous), Off-gas - Purge Gas Recovery (continuous) , Extruder Vacuum Unit (continuous), Emg D.G. sets &Transportation emission- Trucks-70																							

		nos./day Source of noise pollution –D.G. sets, compressors																							
7.	Estimated Project Cost (INR)	7231 Crores* <i>Note:*In Form-1 it is mentioned as 4735Cr and it has been revised as 7231Cr.</i>																							
8.	EMP Cost (INR)	Capital cost- 402.36 lakhs Recurring cost-85 lakhs																							
9.	CER Cost (INR)	36.155 Crores																							
10.	Manpower (No)	<table border="1"> <thead> <tr> <th colspan="2">Description</th> <th>Construction Phase</th> <th>Operation Phase</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Proposed</td> <td>Permanent</td> <td>0</td> <td>17</td> </tr> <tr> <td>Contract</td> <td>1750</td> <td>36</td> </tr> <tr> <td colspan="2">Total (A)</td> <td>1750</td> <td>53</td> </tr> <tr> <td colspan="2">Period of employment in days (B)</td> <td>1080</td> <td>365</td> </tr> <tr> <td colspan="2">Total Man-days(A*B)</td> <td>1080*1750=18,90,000</td> <td>19,345</td> </tr> </tbody> </table>	Description		Construction Phase	Operation Phase	Proposed	Permanent	0	17	Contract	1750	36	Total (A)		1750	53	Period of employment in days (B)		1080	365	Total Man-days(A*B)		1080*1750=18,90,000	19,345
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Solid waste Management

Solid waste generation in construction phase

S. No	Description	Proposed Quantity (Kg/day)	Method of Disposal
1	Organic	472.5	Municipal Bins
2	Inorganic	315	Disposed to PCB authorized recyclers
Total		787.5	

Solid waste generation in operation phase

S. No	Description	Proposed (Kg/day)	Method of Disposal
1	Organic	14.31	Municipal Bins
2	Inorganic	9.54	Disposed to PCB authorized recyclers
Total		23.85	

Hazardous waste Management

Hazardous waste materials will be properly disposed as per the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules 2016; Hazardous waste authorization will be obtained. The process effluent generation from PPU unit is very negligible and the same will not have any impact on NREP ETP effluent and subsequent sludge generation. However, note that estimated sludge generation from NREP ETP will be 30 m3/hr-oily and (chemical) and 20 m3/hr (bio sludge).

List of Hazardous waste generated are given in **Chapter 2, Section 2.7.2.21** of the EIA report.

Wastewater generation and Management

Wastewater Management

Description	Proposed(m ³ /hr)	Disposal Method & Facility Details (m ³ /hr)
Effluent generation		
Cooling tower blowdown	50	Cooling tower blowdown from PP unit will be diverted to RO plant (Design: 600 m3/hr) under existing NREP ETP Package.
Process effluent	0.23	PP process effluent to be treated in existing NREP

Description	Proposed(m ³ /hr)	Disposal Method & Facility Details (m ³ /hr)
		ETP (Design: 450 m ³ /hr and normal flow is 360 m ³ /hr
Sub-Total	50.23	
Sewage	0.212	Diverted to existing NREP ETP for treatment
Total waste water generation	50.442	

Decommissioning or Rehabilitation of a Completed Project

One of the important components in the process of environmental impact assessment is identification of significant impacts as it leads to other elements such as quantification and evaluation of impacts. Any change in environment whether adverse or beneficial, wholly or partially, resulting from impacting activity is called Environmental Impact. Each individual activity with respect to each environmental parameter will have its own impact potential. Proposed project activities will be carried out in such a way so that potential adverse/negative impacts are avoided, wherever possible. While for remaining impacts which are inevitable, practicable mitigation measures will be recommended to minimize the adverse impacts.

The prediction of impacts helps to develop and implement mitigation measures/environment management plan in such a way that the developmental activity will minimize the deterioration of environmental quality

Production Capacity

The Polymer Grade Propylene produced in the PRU section of the PFCC Unit of NREP is further processed in the downstream unit i.e. PP unit to produce Homo-polymer grade Polypropylene product.

Production Capacity

S.No.	Name of the Unit	Unit Configuration
1	Poly propylene unit	360 KTPA

Proposed Products

Production Products

Name of the Product	Proposed Quantity (KTPA)	Mode of storage	Storage capacity
Raffia Grade	190	Bags in Ware house	Inpellet form & is stored in ware house before dispatch. The ware house will be sized corresponding to twenty one (21) days of storage requirement corresponding to 100% through put of the unit
Non-Woven Spun Bond Grade	90	Bags in Ware house	
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Injection Moulding Homo-polymer Grade	55	Bags in Ware house	

Description of the Environment

The baseline environmental studies were carried out during **December 2022 to February 2023**

S. No	Parameters	Observation
1.	Temperature	Max Temperature : 29 ⁰ C Min Temperature : 8 ⁰ C Avg Temperature : 20.95 ⁰ C
2.	Average Relative Humidity	74.24%
3.	Average Wind Speed	1.27 m/s
4.	Predominant Wind Direction	East

Air environment

Ambient Air Quality (AAQ) was measured at Eight (08) locations in the study area

Parameter	Minimum & Maximum baseline Concentration Range	Units	NAAQ Standards	Remarks
	Study area			
PM ₁₀	58.34 to 72.58	µg/m ³	100	Meets National Ambient Air Quality Standards.
PM _{2.5}	26.49 to 41.63	µg/m ³	60	
SO ₂	9.90 to 19.38	µg/m ³	80	
NO ₂	19.14 to 28.57	µg/m ³	80	

Noise Environment

Noise level monitoring at all the proposed well locations in and around 10 km radius from the block boundary shows that at most of the locations the noise levels are well within the permissible limit as prescribed by CPCB.

Parameter	Range of Noise Levels dB (A)				Remarks
	Day	Standard	Night	Standard	
Study area [Industrial]	52.2	75	45.2	70	Noise levels meets the CPCB Limits
Study area [Residential]	47.9 - 53.9	55	40.2 - 42.2	45	

Soil Environment

Soil samples were collected from different location so as to cover all the block where production is proposed. In total 8 locations were selected in each block of PML .The summary of analysis is given below:

Parameter	Units	Study area Observation
pH	-	4.25 to 4.48
Phosphorous	mg/kg	8.9 to 10.5
Potassium	mg/kg	106.9 to 126.2
Conductivity	µmhos/cm	542.0 to 873.0
Nitrogen	mg/kg	213.7 to 252.4

Surface water Environment

Surface water samples were collected from the 8 location based on the availability of the water in water bodies. The results of surface water analysis were compared with the **IS2296:1992**. Based on the values, the best use of the water can be determined.

Parameter	Units	Study area Observation	Remarks
pH	-	6.89 - 7.68	Meets IS 2296:1992 Surface water standards
Total hardness	mg/l	77 - 126	
TDS	mg/l	151 - 205	
BOD	mg/l	BLQ (LOQ 1.0) -3.0	
COD	mg/l	8.0 - 24.0	

Ground water quality

8 samples were collected from different sources within the study area and some important parameters including heavy metal analysis was carried out for depicting the baseline status of the study area.

Parameter	Units	Study area	Remarks
pH	-	6.88 - 7.87	Meets IS 10500:2012 drinking water standards
TDS	mg/l	166 - 220	
Fluoride	mg/l	0.21 - 0.28	
Hardness	mg/l	81 - 105	

Anticipated Environmental Impacts and mitigation measures

Air environment

For this PP unit, only Emergency DG will be proposed and operated only during power failure. In addition to the above, the additional Process emission (discontinuous), Off-gas - Purge Gas Recovery (continuous), Extruder Vacuum Unit (continuous), due to PPU will be routed to existing Flare in NREP and Vent Streams of proposed PP unit to Atmosphere is given below:

Emissions to Flare

Source of Emission	Name	Mode of Operation	Frequency	Flow Rate approx. [Nm ³ / h]	Flow Rate approx. [kg / h]	Temperature BL [°C]	Pressure at BL [Kg/cm ² (g)]	Composition
1P39-R-1171, Propylene Treater (COS, Arsine, Phosphine)	Regeneration Gas	Discontinuous during bed replacement only	Once / 3 yrs.	(Note 1)		ambient	counter pressure flare system	Nitrogen with traces of Hydrocarbons (Propylene), COS, Arsine, Phosphine

Source of Emission	Name	Mode of Operation	Frequency	Flow Rate approx. [Nm ³ / h]	Flow Rate approx. [kg / h]	Temperature BL [°C]	Pressure at BL [Kg/cm ² (g)]	Composition
1P39-R-1172A/B, Propylene Treater (H ₂ O, Oxygenates, Methanol)	Regeneration Gas	Discontinuous for regeneration only	Once / 17 days For 60 hrs (Note 1)	4319 (Note 1)	-	35 - 250	counter pressure flare system	Nitrogen with traces of Hydrocarbons (Propylene), H ₂ O, Oxygenates, Methanol
1P39-R-1173A/B, Propylene Treater (CO)	Regeneration Gas	Discontinuous for regeneration only	Once / 180 days For 28 hrs (Note 1)	1400 (Note 1)	-	35 - 200	counter pressure flare system	Nitrogen with traces of Hydrocarbons (Propylene), CO
1P39-R-1174, Propylene Treater (MAPD, Acetylene)	Regeneration Gas	Discontinuous during bed replacement only	Once / 5 yrs.	(Note 1)	-	ambient	counter pressure flare system	Nitrogen with traces of Hydrocarbons (Propylene), MAPD, Acetylene
1P39-VV-1131, Propylene Seal Gas Drum	Liquid Drain	Discontinuous	NNF	NNF	-	ambient	counter pressure flare system	Hydrocarbons (propylene)
1P39-VV-1331, White Oil Preparation Vessel	Off-Gas	Discontinuous during filling of Preparation Vessel	Once / week for 1 to 3 hr	< 1	-	ambient	counter pressure flare system	Nitrogen with traces of White Oil
1P39-R-1571, Hydrogen Treater (CO, CO ₂)	Regeneration Gas	Discontinuous during bed replacement only	Once / 5 yrs.	(Note 1)	-	ambient	counter pressure flare system	Nitrogen with traces of Hydrogen, CO, CO ₂
1P39-R-1572A/B, Hydrogen Dryer (H ₂ O)	Regeneration Gas	Discontinuous for regeneration only	Once / 19 days For 24 hrs (Note 1)	26 (Note 1)	-	35 - 235	counter pressure flare system	Nitrogen with traces of Hydrogen, H ₂ O

Source of Emission	Name	Mode of Operation	Frequency	Flow Rate approx. [Nm ³ / h]	Flow Rate approx. [kg / h]	Temperature BL [°C]	Pressure at BL [Kg/cm ² (g)]	Composition
Nitrogen Treater O2 Removal (N2 Purification Package for TEA system)	Regeneration Gas	Discontinuous during bed replacement only	Once / 3 yrs.	(Note 1)	-	ambient	counter pressure flare system	Nitrogen
Nitrogen H2O Dryer (N2 Purification Package for TEA system)	Regeneration Gas	Discontinuous for regeneration only	Once / 7 days For 30 hrs (Note 1)	113 (Note 1)	-	35 - 288	counter pressure flare system	Nitrogen
1P39-BL-1681, Regeneration Recycle N2 Blower	Nitrogen	Discontinuous for regeneration only	NNF	NNF	-	120	counter pressure flare system	Nitrogen
1P39-VV-1733, Waste White Oil Tank	Off-Gas	Discontinuous during filling of tank	Once / year up to few minutes	< 1	-	ambient.	counter-pressure flare system	Nitrogen with traces of White Oil, Isopropanol.
1P39-VV-1931, Silane Holding Tank	Off-gas	Discontinuous during filling of holding tank	5 times / year- for 30 min	1.5	-	ambient.	counter pressure flare system	Nitrogen with traces of Silane
1P39-RB-3121, Reactor via S/D cyclone 1P39-CY-3173	Vent gas	Discontinuous	emergency shutdown	-	50,000 for 25 min. (Peak for 5 min.)	80	counter pressure flare system	Propylene, Propane, Hydrogen
1P39-VV-3134, Powder K. O. Drum	Vent gas	Discontinuous	(Note 2)	-	75 (Note 2)	20 - 60	counter pressure flare system	Hydrocarbons, Nitrogen, traces of PP fines

Source of Emission	Name	Mode of Operation	Frequency	Flow Rate approx. [Nm ³ / h]	Flow Rate approx. [kg / h]	Temperature BL [°C]	Pressure at BL [Kg/cm ² (g)]	Composition
1P39-VV-3131, RG Compressor Suction Drum	Liquid Drain	discontinuous	NNF	-	NNF Before start-up	70	counter pressure flare system	Propylene, Propane, Hydrogen
1P39-VV-3433A/B, Purge Silos	Purge Gas	Discontinuous (In case of 1P39-Z-6581 shutdown)	Continuously during membrane unit shutdown	-	1339	73	counter-pressure flare system	Nitrogen, Propylene, Propane, Hydrogen, Ethane
1P39-VV-3432, Powder Drop out pot	Vent gas	Discontinuous	Once / month for 30 min (Note 3)	-	<5 (Note 3)	50	counter pressure flare system	Hydrocarbons, Nitrogen, traces of PP fines
1P39-Z-6081, Carrier Gas Compressor suction	Carrier Gas	Discontinuous (In case of 1P39-Z-6081 shutdown)	Continuously during CG compressor emergency shutdown	-	11,251	121	counter pressure flare system	Propylene, Ethane, Propane, Nitrogen, Hydrogen
1P39-EE-6057, Carrier Gas Cooler	Carrier Gas	Discontinuous	NNF	-	NNF	70	counter pressure flare system	Propylene, Ethane, Propane, Nitrogen, Hydrogen
1P39-Z-6581, Purge Gas Recovery (Membrane Unit)	Off-gas	Continuou s	8000 h / year	-	128	20	counter pressure flare system	Nitrogen, with traces of methane, ethane, Propylene, Propane
1P39-Z-6681, Extruder Vacuum Unit	Off-gas	Continuou s	8000 h / year	-	20 - 66	50	counter pressure flare system	Nitrogen, Methane, Water, Hydrocarbons, Organics (acetone, tert. butanol)

Source of Emission	Name	Mode of Operation	Frequency	Flow Rate approx. [Nm ³ / h]	Flow Rate approx. [kg / h]	Temperature BL [°C]	Pressure at BL [Kg/cm ² (g)]	Composition
1P39-VV-9331 Flare K.O. Drum	Vent Gas	discontinuous	-	<1	-	60	counter pressure flare system	Hydrocarbon, N ₂ , PP fines (Traces)

Notes:

(1) Dependent on dryer & treater requirements for regeneration.

(2) Dependent on filter maintenance (e.g., twice per year) & powder sampling frequency (e.g., once per hour)

(3) Used for special PP grades only; depends on BOPP production

(*) The values and data in this table are estimates only, actual values and data may differ, depending on the equipment used and the operation methods

Vent Streams to Atmosphere at safe location

Source of Emission	Name	Mode of Operation	Frequency / Time	Flow Rate approx. [Nm ³ / h]	Composition	Concentration
1P39-R-1173A/B, Propylene Treater (CO)	Off-gas	Discontinuous for catalyst oxidation only	Once / 3 years For 24 hrs (Note 1)	1475 (Note 1)	Nitrogen	-
TEAL Container unloading (Via TEA Vent Pot 1P39-VV-1731)	Off-gas	discontinuous during filling of holding tank	24 times per year (max.) for 30 min.	10	Nitrogen with traces of White oil	Max. 50 mg/Nm ³
1P39-VV-2131, Peroxide Holding Tank	Off-gas	continuous	8000 h / year	0.5	Nitrogen with traces of Peroxide	max 120 mg/Nm ³
1P39-VV-2231, Additive Feed Hopper Vent Pot	Vent	Continuous	8000 h / year	< 1	Nitrogen with Traces of White Oil	max. 10 mg/Nm ³
1P39-ZFA-2292, Additive Vent Fan	Vent	Discontinuous during filling of Solid Additives	5 times / day for 1 bags of 500 kg	500 (By vendor)	Air with Stabilizer Powder	max. 10 mg/Nm ³

Source of Emission	Name	Mode of Operation	Frequency / Time	Flow Rate approx. [Nm ³ / h]	Composition	Concentration
1P39-ZWF-2291, GMS Additive loss in weight feeder	Vent	Continuous	8000 h / year	< 1	Nitrogen Stabilizer Powder (Traces)	max. 10 mg/Nm ³
1P39-ZWF-2290A/B, Talcum / Silica Additive loss in weight feeder	Vent	Continuous	8000 h / year	< 1	Nitrogen Stabilizer Powder (Traces)	max. 10 mg/Nm ³
1P39-ZWF-22890A/B, Additive loss in weight feeder	Vent	Continuous	8000 h / year	< 1	Nitrogen Stabilizer Powder (Traces)	max. 10 mg/Nm ³
1P39-VV-3033, Catalyst Vent Pot	Vent	Discontinuous	1 time /day for 30 min	10	Nitrogen with Traces of White Oil	max. 10 mg/Nm ³
1P39-ZGN-3684, Extruder Feed Vent Filter	Vent	Continuous	8000 h / year	67	Nitrogen with propylene Polypropylene dust / Stabilizer powder	max. 100 mg/Nm ³ HC max. 10 mg/Nm ³ particles
1P39-ZFA-3789, Drying Air Exhaust Fan	Off-gas	Continuous	8000 h / year	18700 (By Extrusion package vendor)	Air with moisture and traces of Hydrocarbons	max. 50 mg / Nm ³ H ₂ O max. 10 mg / Nm ³ HC
1P39-Z-6681, Extruder Vacuum Unit	Off-gas	discontinuous (in case of Oxygen detection in off-gas line to flare)	NNF. for approx. 2 hr until the oxygen level is reduced	20 – 66 kg/h	Nitrogen with moisture and organics	4 mol% H ₂ O 15 mol% organics
1P39-ZGN-7185A/B, Silo Exhaust Filter	Vent	Continuous	8,000 h / year	12400 (By Conveying Package vendor)	Air with polypropylene dust	max. 150 mg/Nm ³ HC max. 17 mg/Nm ³ particles

Source of Emission	Name	Mode of Operation	Frequency / Time	Flow Rate approx. [Nm ³ / h]	Composition	Concentration
1P39-ZCY-7583, Elutriator Cyclone	Vent	Continuous	8,000 h / year	7100 (By Conveying Package vendor)	Air with polypropylene dust	max. 150 mg/Nm ³ HC max. 17 mg/Nm ³ particles

Notes:

(1) Dependent on dryer & treater requirements for regeneration.

(*) The values and data in this table are estimates only, actual values and data may differ, depending on the equipment used and the operation methods.

Most of the continuous streams to vent are actually purge gases comprising of Nitrogen with traces of hydrocarbon having minimal flowrate.

Flare Stack is not a part of PP unit scope of work. This is considered under NREP only.

- Provision of stack of sufficient height as required by per CPCB's guidelines for the proposed DG sets.
- 01 no. CAAQMS will be proposed for PP unit. NRL already having 02 CAAQMS and one more will come as a part of NREP. NRL already having 3 manual monitoring station within 10 km range and 01 in Kaziranga National Park
- Monitoring of fugitive emissions from NRL with the help of VOC (Volatile Organic Carbon), LDAR (Leak Detection and Repair) program will be done annually with the help of an external agency. Thus observed leaks will be identified and rectified.

Noise environment

- The major noise generating equipment like Compressors, pumps etc. will be enclosed in an acoustic enclosure designed for an insertion loss of 25 dB (A) and silencers to other equipment etc.
- Acoustic design with sound proof glass paneling will be provided for critical operator cabins / control rooms of individual modules as well as central control facilities.
- Periodic maintenance of the equipment to be used in the developmental works will be carried out. Worn out parts will be replaced and rotating parts will be lubricated to minimize noise emissions.
- Implementation of greenbelt for noise attenuation will be undertaken: shrub plantation; landscaping with horticulture; and Tree plantation at vehicle parking areas and along approach roads.
- Low vibration generating machines/equipment will be selected to meet international standards and foundations will be so designed to minimize vibrations and secured properly.
- Vibration dampers will be provided around the source of generation.

Water & Wastewater Management:

Only effluent generation of 50.23 m³/hr and sewage of 0.212 m³/hr will be generated due to this proposed project and treated in the existing NREP ETP.

Description	Proposed(m ³ /hr)	Disposal Method & Facility Details (m ³ /hr)
Effluent generation		
Cooling tower blowdown	50	Cooling tower blowdown from PP unit will be diverted to RO plant (Design: 600 m ³ /hr) under existing NREP ETP Package.
Process effluent	0.23	PP process effluent to be treated in existing NREP ETP (Design: 450 m ³ /hr and normal flow is 360 m ³ /hr)
Sub-Total	50.23	
Sewage	0.212	Diverted to existing NREP ETP for treatment
Total waste water generation	50.442	

The sewage generated will be routed to the existing NREP ETP for further treatment.. The processeffluent from PP unit will be routed to NREP ETP for treatment.The treated effluent from NREP ETP is planned to be reused in cooling tower, fire water and Horticulture (greenbelt).

- Recycling/reusing/recovering materials where possible and thereby neglecting or reducing the disposal requirements.
- Separation of construction material for reuses either to be used on onsite filling or can be used as public fill.
- Training the staff in waste minimizing practices.
- Chemical waste should be stored in a locked area so as to avoid leaching of harmful chemicals in the soil or nearby water bodies (If any).

Details of Liquid Effluent from the proposed project

Source	Name	Mode of Operation	Frequency	Quantity	Composition	Treatment (OSBL)
1P39-VV1632, Nitrogen Regeneration Recycle K.O. Vessel	Waste Water	discontinuous	1 time per year	Approx. 0.6 m ³ (Note 1)	Condensed moisture during regeneration	Sewer
1P39-Z-3681, Extruder Pelletizer	Waste Water	Discontinuous	during start-up during emptying	max. 1 m ³ / Start-up max. 40 m ³ for 1 min. (by Extrusion package vendor)	Clean water with polypropylene pellets and powder (fines)	Separation of solids in waste water basin (designed with separator)

Source	Name	Mode of Operation	Frequency	Quantity	Composition	Treatment (OSBL)
1P39-ZVV-3783, Pellet Water Tank	Wastewater	Discontinuous	during start-up during emptying of tank (maintenance)	max. 1 m ³ / Start-up max. 25 m ³ during emptying of tank (by Extrusion package vendor)	Demin. Water with PP Solids	Separation of Solids
1P39-VV-6631, Phase Separator	Wastewater	Continuous	8,000 h / year	max 0.23 m ³ /h	Water; pH = 6-9 Typical average value COD (chemical oxygen demand) < 500 BOD (5 day) < 350 TOC < 600 mg/l Typical organic content - Acetone (~10%) - Isopropanol (~20%) - Terbutanol (~70%)	Separation of insoluble Organic Compounds
Waste Water Collection Pit	Waste Water / Rain Water	discontinuous / continuous			Water; pH = 6-9	Separation of insoluble Organic Compounds

Solid waste Management

During construction phase:

S. No	Description	Proposed Quantity (Kg/day)	Method of Disposal
1	Organic	472.5	Municipal Bins
2	Inorganic	315	Disposed to PCB authorized recyclers
Total		787.5	

During operation phase:

S. No	Description	Proposed (Kg/day)	Method of Disposal
1	Organic	14.31	Municipal Bins
2	Inorganic	9.54	Disposed to PCB authorized recyclers
Total		23.85	

Hazardous waste Management

The process effluent generation from PPU unit is very negligible and the same will not have any impact on NREP ETP effluent and subsequent sludge generation. However, note that estimated sludge generation from NREP ETP will be 30 m³/hr-oily and (chemical)and 20 m³/hr (bio sludge).In addition, spent oil/ Used oil which will be generated from the emergency DG will be minimal which will be disposed to authorized recyclers.

Other Hazardous waste generated

Source	Name	Mode of Operation	Frequency	Quantity approx.	Composition	Treatment (OSBL)
IP39-R-1171, Propylene Treater (Arsine, Phosphine, COS)	Spent Adsorbents (Ceramic balls)	Replacement	once / 3-5 years (Note 1)	18,600 kgs (2,120 kg) (Note 1)	Clariant Actisorb®401 or equal (Note 1)	Secured Landfill/Disposal to recyclers
IP39-R-1172A/B Propylene Treater (H ₂ O, Oxygenates, MeOH)	Spent Adsorbents (Ceramic balls)	Replacement	once / 3-5 years (Note 1)	2 x 31,752 kgs (2 x 6,000 kgs) (Note 1)	Porocel Dynocel650 or equal (Note 1)	Secured Landfill/Disposal to recyclers
IP39-R-1173A/B Propylene Treater (CO)	Spent Adsorbents (Ceramic balls)	Replacement	once / 3-5 years (Note 1)	2 x 5,040 kgs (2 x 1,420 kgs) (Note 1)	Clariant Actisorb®310 or equal (Note 1)	Secured Landfill/Disposal to recyclers
IP39-R-1174 Propylene Treater (MAPD, Acetylene)	Spent Adsorbents (Ceramic balls)	Replacement	once / 3-5 years (Note 1)	3,312 kgs (1,060 kgs) (Note 1)	Clariant Polymax®303 or equal (Note 1)	Secured Landfill/Disposal to recyclers
IP39-R-1571 Hydrogen Treater (CO, CO ₂)	Spent Adsorbents (Ceramic balls)	Replacement	once / 3-5 years (Note 1)	80 kgs (18 kgs) (Note 1)	Clariant Meth®150 or equal (Note 1)	Secured Landfill/Disposal to recyclers
IP39-R-1572A/B Hydrogen Treater (H ₂ O)	Spent Adsorbents (Ceramic balls)	Replacement	once / 3-5 years (Note 1)	2 x 120 kgs (2 x 26 kgs) (Note 1)	BASF – 4A Mol. Sieve or equal (Note 1)	Secured Landfill/Disposal to recyclers
IP39-Z-1683 Nitrogen Treater (O ₂ Removal)	Spent Adsorbents (Ceramic balls)	Replacement	once / 3-5 years (Note 1)	630 kgs (76 kgs) (Note 1)	Clariant Polymax®301 or equal (Note 1)	Secured Landfill/Disposal to recyclers
IP39-Z-1683 Nitrogen Treater (H ₂ O Removal)	Spent Adsorbents (Ceramic balls)	Replacement	once / 3-5 years (Note 1)	2 x 500 kgs (2 x 200 kgs) (Note 1)	Porocel Dynocel 641S or equal (Note 1)	Secured Landfill/Disposal to recyclers
IP39-Z-6581 Purge Gas Dryer (H ₂ O Removal)	Spent Adsorbents	Replacement	by Membrane unit vendor	by Membrane unit vendor	Drying agent (molecular sieve)	Secured Landfill/Disposal to recyclers
IP39-MGN-1175A/B Propylene Filter	Spent Filter Cartridge	Replacement of Filter Elements	once / 2 years	5 kg (each Filter)	Filter Elements (PP) & treater filling particles	Secured Landfill/Disposal to recyclers
IP39-MGN-1371A/B White Oil Filter	Spent Filter Cartridge	Replacement of Filter Elements	once / 2 years	2 kg (each Filter)	Filter Elements (PP)	Secured Landfill/Disposal to recyclers

Source	Name	Mode of Operation	Frequency	Quantity approx.	Composition	Treatment (OSBL)
IP39-MGN-1575A/B, Hydrogen Filter	Spent Filter Cartridge	Replacement of Filter Elements	once / 2 years	2 kg (each Filter)	Filter Elements (PP) & treater filling particles	Secured Landfill/Disposal to recyclers
IP39-MGN-1671A/B, LP Nitrogen Filter	Spent Filter Cartridge	Replacement of Filter Elements	once / 2 years	5 kg (each Filter)	Filter Elements (PP)	Secured Landfill/Disposal to recyclers
IP39-MGN-1672A/B, Regeneration Recycle N2 Filter	Spent Filter Cartridge	Replacement of Filter Elements	once / 2 years	5 kg (each Filter)	Filter Elements (PP) & treater filling particles	Secured Landfill/Disposal to recyclers
IP39-MGN-1971A/B, Silane Filter	Spent Filter Cartridge	Replacement of Filter Elements	once / 2 years	2 kg (each Filter)	Filter Elements (PP)	Secured Landfill/Disposal to recyclers
IP39-ZGN-2282, Additive Vent Filter	Spent Filter Bags	Replacement of Filter Elements	once / 2 years	5 kg (each Filter)	Filter Elements (PP)	Secured Landfill/Disposal to recyclers
IP39-MGN-3175A/B, RG Filter	Spent Filter Bags	Replacement of Filter Elements	≤ 2 times/year	10 kg (each Filter) 2335 kg (by vendor)	Filter Elements (PP) & PP Solids	Secured Landfill/Disposal to recyclers
IP 9-VV-3132, Powder Collector (via IP39-CY-3173)	PP Powder	Upset Conditions	≤ 6 times/year	45 kg	PP Solids	Secured Landfill/Disposal to recyclers
IP39-VV-334, Powder K.O. Drum	PP Powder	Upset Conditions	once / year	60 kg	PP Solids	Secured Landfill/Disposal to recyclers
IP39-VV-3432, Drop Out Pot (for special products only)	PP Powder	Special operation	once / month	50 kg	PP Solids	Secured Landfill/Disposal to recyclers
IP39-MGN-3471, Carrier Gas Filter	Spent Filter Bags	Replacement of Filter Elements	once / year	150 kg each	PP Filter Bags & PP Solids	Secured Landfill/Disposal to recyclers
IP39-MGN-3472A/B, Purge Silo Filter	Spent Filter Bags	Replacement of Filter Elements	once / year	60 kg each	PP Filter Bags & PP Solids	Secured Landfill/Disposal to recyclers
IP39-ZEX-3682, Extruder / Pelletizer	Start-up Material	Discontinuous	Cold Start-up Warm Start-up	2,520 kg for 7 min. 1,080 kg for 3 min.	PP (Melt)	Secured Landfill/Disposal to recyclers
IP39-ZGN-3684, Extruder Feed Vent Filter	Spent Filter Bags	Replacement of Filter Elements	once / year	40 kg (by vendor)	PP Filter Bags & PP Solids	Secured Landfill/Disposal to recyclers
IP39-ZVV-3783, Pellet Water Tank	PP Dust	Discontinuous	once / month	36 kg	PP (Fines)	Secured Landfill/Disposal to recyclers (Note 2)

Source	Name	Mode of Operation	Frequency	Quantity approx.	Composition	Treatment (OSBL)
1P39-ZSR-3784, Pellet Water Start-Up Screen	PP Pellets	Discontinuous Start-Up of Extruder	-	600 kg per event	PP	Secured Landfill/Disposal to recyclers (Note 2)
1P39-ZSR-3784, Pre-Separation Sieve	PP Pellets & Agglomerates	Discontinuous, Extruder start-up	once / week	11 kg each	PP (agglomerates)	Secured Landfill/Disposal to recyclers (Note 2)
1P39-ZCL-3787, Pellet Classifier	PP Pellets & Agglomerates	Discontinuous, Under-/Oversized Pellets	once / week	5 kg each 37 kg each	PP Pellets undersized PP Pellets oversized	Secured Landfill/Disposal to recyclers (Note 2)
Conveying Air Compress. Suction / Discharge Filter 1P39-ZGN-7086A/B 1P39-ZGN-7088A/B 1P39-ZGN-7087A/B 1P39-ZGN-7089A/B 1P39-ZGN-7094A/B 1P39-ZGN-7095A/B 1P39-ZGN-7096A/B 1P39-ZGN-7097A/B	Spent Filter Bags	Replacement of Filter Elements	every 6 months years (Note 1)	25 kg each (Note 1)	PP Filter Bags & PP Solids	Secured Landfill/Disposal to recyclers
1P39-ZGN-7185A/B, Silo Exhaust Filter	Spent Filter Bags	Replacement of Filter Elements	every 6 months years (Note 1)	25 kg each (Note 1)	PP Filter Bags & PP Solids	Secured Landfill/Disposal to recyclers
1P39-ZGN-7584A/B, Elutriator Blower Filter	Spent Filter Bags	Replacement of Filter Elements	once / year	(Note 1)	PP Filter Bags	Secured Landfill/Disposal to recyclers
1P39-ZCY-7583, Elutriator Cyclone	PP Fines	Continuous	8,000 h / year	0.5 kg/h (by vendor)	PP (Fines)	Secured Landfill/Disposal to recyclers
Wastes from Sampling (e.g., 1P39-VV-3133 Powder Sampling Pot)	PP Powder & Pellets	Discontinuous	once / day	60 kg (Note 3)	PP (Pellets and Powder)	Secured Landfill/Disposal to recyclers (Note 2)
Packaging Material of Additives	Bags	Discontinuous	once / day	approx. 20 kg	Paper, PP/PE	Disposal to recyclers
Packaging Material of Bagging section	Bags	Discontinuous	once / day	approx. 20 kg	Paper, PP/PE	Disposal to recyclers

Source	Name	Mode of Operation	Frequency	Quantity approx.	Composition	Treatment (OSBL)
1P39-VV-1733, Waste White Oil Tank	Waste White Oil	Discontinuous emptying of tank	1 time per year	approx. 660 kg	White Oil, Isopropanol, Alcoholate	Disposal to Recycler
1P39-VV-2231, Additive Feed Hopper Vent Pot	Waste White Oil	Discontinuous	1 time per year	60 l	White Oil	Disposal to Recycler
1P39-VV-3033, Catalyst Vent Pot	Waste White Oil	Discontinuous	1 time per year	80 l	White Oil	Disposal to Recycler
1P39-VV-6631, Phase Separator	Oily Waste	Discontinuous	30 times per year	max. 80 kg	Mixed Organic Components. Heating Value approx. 41000 kJ / kg	Bioremediation/ Disposal to Recycler
Gear Boxes of Machinery	Waste Lube Oil	Discontinuous	1 time per year	approx. 5 t	Lubrication Oils (100%)	Disposal to recyclers

Notes:

(1) *Dependent on requirements.*

(2) *PP pellets & PP blocks from extruder start-up can be sold to special converters.*

(3) *Dependent on Sampling frequency.*

(* *The values and data in this table are estimates only; actual values and data may differ during detailed engineering, depending on the equipment used and the operation methods.*

Biological environment

There are no National Parks/ Wildlife sanctuaries within 10 km radius from the site.

There are Schedule-I- Species in study area i.e.,

Mammal: Slow Loris (Nycticebus bengalensis), Leopard (Panthera pardus), Asiatic Elephant (Elephas maximus)

The proponent has proposed a sum of Rs.8, 20,000/-for the “Schedule – I species conservation plan

Socio economic

There will be temporary employment for manpower required during construction phase available from local communities. Overall socioeconomic effect of construction phase will be positive due to direct and indirect employment opportunity for the local population.

Environmental Management Plan

The detailed breakup of Expenditure on Environmental measures:

Budget for Expenditure on Environmental measures.

S.No	Equipment	Capital cost (Lakhs)	Recurring Cost (Lakhs) per Annum
1	Air Environment		
1.1	Additional Plantation Activities (Trees and Shrubs)	207.36	50

1.2	Air quality monitoring	100	20
2	Noise Environment		
2.1	Additional Plantation Activities	Included in 1.1	Included in 1.1
2.2	Audiometric tests	5	2
3	Water Environment		
3.1	Rain water Harvesting pits	50	3
3.2	Storm Water Management	20	-
4	Land Environment		
4.1	Additional Plantation Activities	Included in 1.1	Included in 1.1
4.2	Solid waste management	20	10
5	Biological environment		
5.1	Additional plantation activities	Included in 1.1	Included in 1.1
Total INR		402.36	85

Risk Assessment

Risk Assessment is performed for the instrument leaks and failure for different scenarios.

Project benefits

Polypropylene (PP) is very versatile product and can be used for injection moulding, fibre, film, and other extrusion processes. It is used in a wide range of market segments including packaging, consumer products, automotive, textile and building and construction. The followings are the benefits of the proposed PP project:

- Value addition of propylene content of LPG for production of high value polypropylene (PP)
- This project will meet the domestic PP demand, reduce import and reduce outgoing of foreign currency.
- Employment generation
- Increase petrochemicals domestic market share
- Helps in achieving the dream of “AatamNirbhar Bharat” by having self-sufficient production of PP and further value addition to make the finished products, which are specifically made from Polypropylene (PP).
- In view of expected growth in demand for petrochemicals products in India and to remain competitive in the market with products self sufficiency
- Major applications are in the medical industry, fashion and sports industry, automotive industry and consumer products industry (housewares, toys, luggage etc.)

Improvements in the physical infrastructure:

No major physical infrastructural change or improvement has been envisaged due to establishment of the proposed project. All the required infrastructural facilities such as township, hospital, school etc. are readily available in Golaghat to support the establishment of proposed project.

Improvement in social infrastructure

Economic infrastructure is essential for improving the productive capacity of the nation. But social infrastructure is also required to improve the quality of human resources. It consists of services like education, medical facilities, sanitation, housing, drinking water supply etc. these altogether constitute

the social infrastructure of an economy. Various CSR activities will be done by NRL every year to satisfy the basic requirements of the social infrastructure.

Employment Potential – skilled; semi-skilled and unskilled

The project will provide employment potential for construction Labour during implementation phase. During operational phase, this project will also generate Direct & Indirect employment in the form of contractors, workers, transporters, marketing and ancillary facilities and general utility services.

Corporate Environment Responsibility

The company is aware of the obligations towards the Environment and to fulfill the social obligations. As per OM F. No: 22-65/2017-IA.III dated 1st May 2018 M/s. NRL will Allocate 0.5% of the project cost (7231Crores) towards CER i.e. 0.5% of 7231Crores = 36.155Crores.

After completion of public hearing, CER budget allocation will be made in the Action Plan to address the issues raising during public hearings