

ENVIRONMENTAL IMPACT ASSESSMENT/ ENVIRONMENTAL MANAGEMENT PLAN

For

**EXPANSION OF PAPER PRODUCTION FROM 1000 TPM TO
4500 TPM USING RECYCLED PAPER AND SUN-DRY
BOARD MANUFACTURING FROM 40 TPM TO 100 TPM
USING SECONDARY FIBRE WITHIN THE EXISTING
FACILITY**

At

Plot No. NH-27(previously called as NH-31), Jagannathpur,
Bidhannagar, District Darjeeling,
West Bengal.

Land/Plot Area: 44248.32 m² (4.42 Ha)

[Proposal No: IA/WB/IND/279922/2022]

[TOR Letter No.: IA-J-11011/234/2022-IA-II(IND-I) dated 20.07.2022]

[Study Period: 1st March 2022 to 31st May 2022]

[Schedule 5 (i) Category “B” –Treated as Category “A” as General Condition is
applicable as per EIA notification 2006 and its amendment thereof]

BY

SAPPHIRE PAPERS MILL PVT. LTD.

APPLICANT	CONSULTANTS
M/s Sapphire Papers Mill Pvt. Ltd. Plot No. NH – 31, Jagannathpur Bidhannagar, Darjeeling, West Bengal – 734426 E-mail: info@sapphirepapers.com Tel No: +91 919800043601	Eco Chem Sales & Services Office floor, Ashoka Pavilion 'A' New Civil Road, Surat, 395001 NABET/EIA/2023/RA 0181 E-mail: eco@ecoshripad.com Tel No: +912612236223

NOV – 2022

Doc. No: 2022_ECSS_ EIA11_2200006

NABET CERTIFICATE



QUALITY COUNCIL OF INDIA
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**National Accreditation Board
for Education and Training**



Certificate of Accreditation

Eco Chem Sales and Services

Office Floor, Ashoka Pavillion - A, Opp. Kapadia Health Club, New Civil Road, Surat- 395001,

The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals – Opencast only.	1	1 (a) (i)	A
	Mining of minerals including opencast and underground			B
2	Offshore and onshore oil and gas exploration, development & production	2	1 (b)	A
3	Thermal power plants	4	1 (d)	B
4	Mineral beneficiation	7	2(b)	B
5	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	A
6	Cements plants	9	3 (b)	A
7	Chlor-alkali industry	13	4 (d)	A
8	Chemical fertilizers	16	5 (a)	A
9	Pesticides industry and pesticide specific intermediates (excluding formulations)	17	5 (b)	A
10	Petro-chemical complexes	18	5 (c)	A
11	Manmade fibers manufacturing	19	5 (d)	B
12	Petrochemical based processing	20	5 (e)	A
13	Synthetic organic chemicals industry	21	5 (f)	A
14	Distilleries	22	5 (g)	A
15	Pulp & paper industry	24	5 (i)	A
16	Sugar Industry	25	5 (j)	B
17	Oil & gas transportation pipeline	27	6 (a)	A
18	Air ports	29	7 (a)	A
19	Industrial estates/ parks/ complexes/ Areas	31	7 (c)	A
20	Common hazardous waste treatment, storage and disposal facilities (TSDFs)	32	7 (d)	A
21	Bio-medical waste treatment facilities	32A	7 (da)	B
22	Ports, harbours, break waters and dredging	33	7 (e)	A
23	Highways	34	7 (f)	A
24	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
25	Common Municipal Solid Waste Management Facility (CMSWMF)	37	7 (i)	B
26	Building and construction projects	38	8 (a)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SAAC minutes dated Feb. 04, 2022 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/22/2287 dated Mar. 28, 2022. The accreditation needs to be renewed before the expiry date by Eco Chems Sales and Services, Surat following due process of assessment.

Sr. Director, NABET
Dated: Mar. 28, 2022

Certificate No.
NABET/EIA/2023/SA 0156

Valid up to
Mar. 15, 2023

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.



DECLARATION OF CONSULTANT

Declaration by Experts contributing to the EIA report for Proposed Expansion Project for Manufacturing of Paper from waste paper based mills, located at Plot No. NH-27 (previously called as NH-31), Jagannathpur, Bidhannagar, District Darjeeling, West Bengal by Sapphire Papers Mill Private Limited. Schedule 5 (i) - Paper manufacturing industry without pulp manufacturing (Category-“B” – treated as category “A” as per EIA Notification 2006 and its Amendment thereof due to applicability of General Condition as Bihar state Boundary is within 5 km radius.).

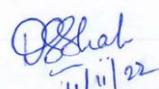
I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

EIA Coordinator	:	Mrs. Dipti Patel
Signature	:	
Date	:	10/11/2022
Period of involvement	:	Mar 2022 – Nov 2022
Contact information	:	dipti.patel@ecoshripad.com

Functional Area Experts

S. No.	Functional areas	Name of Expert	Involvement (period and task**)	Signature and Date
1.	AP	Mrs. Rekha Shah	Mar 2022 – Nov 2022 Site visits followed by selection of monitoring locations, supervision of air quality monitoring, identification of probable impacts of different air emission from the plants / facilities proposed, suggesting most suitable control device and contribution to EIA documentation.	
2.	WP	Mrs. Rekha Shah	Mar 2022 – Nov 2022 Site visit & supervision & checking of sampling locations for surface water & ground water samples & their analysis results, water use auditing, water balance, water budgeting, water conservation and developing scheme for reuse of water, identification of impacts, finalization of mitigation measures and contribution to EIA documentation.	
3.	SHW	Mrs. Rekha Shah	Mar 2022 – Nov 2022 Identification of waste generated from the site, confirming adequacy of mitigation measures for management of hazardous waste and contribution to EIA documentation.	
4.	SE	Mr. Ghanshyam Patel	Mar 2022 – Nov 2022 Conducting baseline socio-economic surveys through interviews / questionnaire from the surrounding area / villages of the proposed project, impact identification and mitigation measures for incorporating to EIA documentation.	
5.	EB	Mrs. Dipti Patel	Mar 2022 – Nov 2022 Site visit and conduct of ecological survey and preparation of status report for rare endangered and threatened species of animals and plants and also species protected under national laws, assessment of the impacts of proposed project activities on the biological environment and contribution to EIA	

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

S. No.	Functional areas	Name of Expert	Involvement (period and task**)	Signature and Date
			documentation.	
6.	HG	Mrs. Rekha Shah	Mar 2022 – Nov 2022 Understanding and representing groundwater conditions, supervision of groundwater sampling locations, finalization of survey findings, identification of impacts, suggestion of mitigation measures and contribution to the EIA documentation.	
7.	GEO	Mr. Ravikant Sharma	Not involved as functional area is rationalized as per QCI Scheme for Accreditation Verson 3.	--
8.	SC	Dr. B. K. Patel	Not involved as functional area is rationalized as per QCI Scheme for Accreditation Verson 3.	--
9.	AQ	Mr. Dhaval Shah	Mar 2022 – Nov 2022 Evaluation of meteorological data with collected secondary data, modeling and prediction, identification of impacts, finalization of mitigation measures and contribution to EIA documentation.	 4/11/22
10.	NV	Mrs. Dipti Patel	Mar 2022 – Nov 2022 Checking of noise sampling results, analysis of data, identification of impacts and mitigation measures, and contribution to EIA documentation.	 4/11
11.	LU	Mr. Joshua Anand	Mar 2022 – May 2022 Generation and analysis of data related to landuse pattern. Development of landuse maps of study area using ArcGIS / related tools, site visit for ground truth survey, finalization of landuse maps, contribution to EIA documentation.	
12.	RH	Mr. Vinay Patil	Mar 2022 – Nov 2022 Identification of hazards and hazardous substances preparation of impacts diagrams & mitigation measures, preparation of disaster management plan, contribution to EIA documentation.	 04/11/22

Declaration by the Head of the Accredited Consultant Organization/ authorized person I, Rekha S. Shah, hereby, confirm that the above mentioned experts prepared the EIA report for **Proposed Expansion Project for Manufacturing of Paper from waste paper based mills, located at Plot No. NH-27(previously called as NH-31), Jagannathpur, Bidhannagar, District Darjeeling, West Bengal by Sapphire Papers Mill Private Limited.** I also confirm that EC has gone through the report, and the consultant organization shall be fully accountable for any mis-leading information mentioned in this statement.

It is certified that No unethical practices including plagiarism have been carried out and external data / text has not been used without proper acknowledgement, while preparing this EIA report.

Signature		
Name	:	Rekha S. Shah
Designation	:	CEO
Name of the EIA Consultant Organization	:	ECO CHEM SALES & SERVICES Office Floor, Ashoka Pavillion – A, Opp. Kapadia Health Club, Surat 395001 (GJ)
NABET Certificate No. & Issue Date	:	NABET/EIA/2023/RA 0181, Valid upto February 03 rd , 2023

CERTIFICATE OF PLAGIARISM CHECK

Title of EIA Report:	M/s Sapphire Papers Mill Private Limited. Proposed Expansion Project for Manufacturing of Paper from waste paper based mills, located at Plot No. NH-27 (previously called as NH-31), Jagannathpur, Bidhannagar, District Darjeeling, West Bengal.
Name of Accredited Organization:	Eco Chem Sales & Services
Unique Identification Number:	Company registration number: GUJ/SRT/(10)/15590
Name of EIA Co-ordinator (EC):	Mr. Dipti Patel
Name of the Software:	Plagiarism Checker X
Date of Check:	04.11.2022
Time of Check:	04:40 PM

Declaration by the Head of the accredited consultant organization / authorized person

I hereby certify that this EIA Report has been evaluated using in-house software viz., Plagiarism Checker X version 7.0.5. The report produced has been analyzed by the system and based on it, I certify that the EIA report produced in accordance with good scientific practice.

Date and Sign of EIA Coordinator:



Name:

Mr. Dipti Patel

Designation:

EIA Coordinator

Date and Sign of Head of Accredited Organization:



Name of the EIA Consultant Organization:

Eco Chem Sales & Services

NABET Certificate No. & issue Date:

NABET/EIA/2023/SA 0156,
Valid up to 15th March, 2023

UNDERTAKING BY CONSULTANT



Date: 04/11/2022

To,
The Member Secretary - IA Division (Industry: I),
Ministry of Environment, Forest and Climate Change,
Indira Paryavaran Bhawan,
Aliganj, Jor Bagh Road,
New Delhi -110 003.

Subject: Undertaking on the compliance of Terms of Reference (No. IA-J-11011/234/2022-IA-II(IND-I) dated 20/07/2022) issued by MoEFCC, New Delhi for Expansion of Paper production from 1000 TPM to 4500 TPM using Recycled paper and Sun- Dry Board manufacturing from 40 TPM to 100 TPM using secondary fiber within the existing Facility at No 2565, 4257, 4260, 4261, 4262, 4263, 4265, 4327, 4328, 4329, 4330, 4338, 4326, 4334, 4331, 4333, 4322, 4336, 4337, 4339, NH – 31, Jagannathpur, Bidhannagar, Darjeeling, WestBengal – 734426 by Sapphire Papers Mill Pvt. Ltd.

Ref.: OM vide letter No: J-11013/41/2006-IA.II (I), dtd. 04/08/2009.

Respected Sir,

We hereby give you an undertaking that the Terms of Reference (ToR) issued by the MoEFCC, New Delhi for carrying out Environmental Impact Assessment (EIA) & Environmental Management Plan (EMP) studies for Expansion Project for Paper production from 1000 TPM to 4500 TPM using Recycled paper and Sun- Dry Board manufacturing from 40 TPM to 100 TPM using secondary fiber at above said location have been addressed and incorporated in the EIA & EMP report submitted to MoEFCC, New Delhi.

Yours Sincerely,

(CEO)

UNDERTAKING BY PROJECT PROPONENT



SAPPHIRE PAPERS MILL (P) LTD.

3rd Floor, Leelashri Building, Subhash Market,

G.M Road, Siliguri-734001, Ph. No-0353-2431040

Email-info@sapphirepapers.com, CIN No. U21099WB2004PTC100681

Date: 04/11/2022

To,
The Member Secretary - IA Division (Industry: I),
Ministry of Environment, Forest and Climate Change,
Indira ParyavaranBhawan,
Aliganj, JorBagh Road,
New Delhi -110 003.

Sub. : Undertaking for ownership of Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) and other documents of our Expansion Project for Paper production from 1000 TPM to 4500 TPM using Recycled paper and Sun- Dry Board manufacturing from 40 TPM to 100 TPM using secondary fiber within the existing Facility at No 2565, 4257, 4260, 4261, 4262, 4263, 4265, 4327, 4328, 4329, 4330, 4338, 4326, 4334, 4331, 4333, 4322, 4336, 4337, 4339, NH – 31, Jagannathpur, Bidhannagar, Darjeeling, WestBengal – 734426.

Ref.: MoEF&CC OM vide letter No: J-11013/41/2006-IA.II (I), dated: 05/10/2011.

Dear Sir,

We hereby give you an undertaking for owning the contents and information provided in EIA/ EMP report submitted to MoEFCC, New Delhi for Environmental Clearance of Expansion Project for Paper production from 1000 TPM to 4500 TPM using Recycled paper and Sun- Dry Board manufacturing from 40 TPM to 100 TPM using secondary fiber within the existing Facility at No 2565, 4257, 4260, 4261, 4262, 4263, 4265, 4327, 4328, 4329, 4330, 4338, 4326, 4334, 4331, 4333, 4322, 4336, 4337, 4339, NH – 31, Jagannathpur, Bidhannagar, Darjeeling, WestBengal – 734426.

Yours Sincerely,
Sapphire Papers Mill Pvt. Ltd.

(Authorized Signatory)

Factory Address :- N.H.-31, Jagannathpur, Bidhan Nagar, Dist. Darjeeling (W. Bengal, Phone- 98000-45240)

LIST OF ABBRIVATIONS

EIA	:	Environment Impact Assessment
EMP	:	Environment Management Plan
EC	:	Environmental Clearance
EHS	:	Environment Health & Safety
MoEF&CC	:	Ministry of Environment, Forests & Climate Change
ToR	:	Terms of Reference
GPCB	:	Gujarat Pollution Control Board
CPCB	:	Central Pollution Control Board
TPA	:	Ton per Annum
TPH	:	Ton per hour
CER	:	Corporate Environment Responsibility
ETP	:	Effluent Treatment Plant
CPP	:	Captive Power Plant
LOS	:	Level of service
IUCN	:	International Union for Conservation of Nature
PCC	:	Plain cement concrete
GLC	:	Ground Level Concentration
PPE	:	Personel Protective Equipment
SOP	:	Standard Operating Procedure
PUC	:	Pollution Under Control
ESP	:	Electrostatic Precipitator
KLD	:	Kilolitre per day
DAF	:	Dissolved Air Flootation
EMS	:	Environment Management System
EMC	:	Environmental Management Cell
TDS	:	Total Dissolved Solids
BOD	:	Biological Oxygen Demand
COD	:	Chemical Oxygen Demand
NAAQS	:	National Ambient Air Quality Standards
PM	:	Particular matter
APHA	:	American Public Health Association
CEC	:	Cation Exchange Capacity
SAR	:	Sodium adsorption ratio

EXECUTIVE SUMMARY

1. Project Name and Location

- ⇒ **Name:** Expansion of Paper production from 1000 TPM to 4500 TPM using Recycled paper and Sun-Dry Board manufacturing from 40 TPM to 100 TPM using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.
- ⇒ **Location:** Plot No 2565, 4257, 4260, 4261, 4262, 4263, 4265, 4327, 4328, 4329, 4330, 4338, 4326, 4334, 4331, 4333, 4322, 4336, 4337, 4339, NH – 27 (previously called as NH-31), Jagannathpur, Bidhannagar, Darjeeling, WestBengal – 734426.

2. Products & Capacities. If expansion proposal then existing products with capacities and reference to early EC.

- ⇒ Presently unit is manufacturing 1000 TPM of paper and 40 TPM Sun-Dry Board. After proposed expansion unit will be manufactured 4500 TPM of paper and 100 TPM Sun-Dry Board.
- ⇒ EC was not applicable to existing unit as it was established in 2005 before EIA notification 2006, Now as per EIA Notification 2006 and its amendments the existing and proposed expansion products (*i.e.* Pulp & Paper Industries) are covered under the Category-5 (i) – Category “B” – treated as category “A” due to applicability of General Condition as Bihar state Boundary is within 5 km radius. Hence, Environmental clearance is required to obtain from MoEFCC, New Delhi.
- ⇒ The unit has valid CTO for existing operation vide order No. C156/WPB/SRO/Dar/S-191-2006(Sr-Co-r/17/0512, dated 18.08.2017, valid upto 31.10.2022.

3. Requirement of Land, Raw Material, Water, Power, Fuel with Source of supply (quantitative)

S. No.	Particular	Description			Remark/Source
		Existing	Proposed	Total	
1	Land	44248.32 m ²	-	44248.32 m ²	*Additional land 11765.72 m ² will be required for proposed expansion which will be utilized from the vacant land 22290.43 m ² .
2	Capital Cost	52.00 Cr.	31.00 Cr.	83.00 Cr.	-
3	Manpower	104	26	130	-
4	Utility				
i	Boiler	6TPH	10	10 TPH	* Existing Boiler of 6 TPH will be kept as standby after proposed expansion.
ii	Electricity	1300 kVA	1200 kVA	2500 kVA	West Bengal State Electricity Distribution Company Limited.

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

iii.	Coal	400 kg/h	1200 kg/h	1600 kg/h	Indian coal -Through open market
	Rice Husk	600 kg/h	1700 kg/h	2300 kg/h	Local sources
	Diesel (HSD)	6 LPH	-	6 LPH	As and when required
vi	Steam	60 TPD	180 TPD	240 TPD	Proposed to install 10 TPH boiler.
vii	Fresh Water Requirement	256 KLD	484.6 KLD	740.6 KLD	The fresh water is/will be sourced from ground water.

4. Process Description in brief, specifically indication the gaseous emission, liquid effluent and solid/hazardous waste

Process description is given in Chapter 2 as Section No. 2.7.

Gaseous Emission

Flue gas emission

- ⇒ At present, the unit is having Existing Boiler with 6 TPH which will be kept as standby after expansion for emergency use. Provided Mechanical dust collector, Bag filter and 35 m of chimney height for controlling pollutant.
- ⇒ Emission will be from proposed 10 TPH boiler. Bag filter and 35 m of chimney height will be provided for controlling pollutant.

Process gas emission

- ⇒ There is/will be no process emission from existing and proposed project.

Liquid Effluent

- ⇒ After proposed expansion generated wastewater will be treated in ETP and around 452 KLD treated water will be recycled back in to manufacturing process, 50 KLD will be utilized for quenching on road, rice and ash and remaining 336.2 KLD wastewater will be utilized for irrigation.
- ⇒ Domestic waste water generation 6.2 KLD will be sent to septic tank/soak pit system.

Solid and Hazardous Waste After proposed expansion

S. No.	Type/Name of Hazardous waste	Category and Schedule as per HW Rules.	Quantity (MT/Annum)			Disposal Method
			Existing	Additional	Total	
1.	Used oil	Sch:I/5.1	0.25	1.75	2.0	Will be sent to Authorized/ registered recycler.

Solid Waste Generation

2.	Rice husk ash	-	1095	2920	4015	Similar to existing practice, will be given to brick manufacturers.
3.	Fly ash	-	1095	3285	4380	Similar to existing

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

	generation (worst case scenario @ 100 % coal consumption)					practice, will be sent to fly ash brick Manufacturers.
4.	ETP primary clarifier sludge	-	730	1095	1825	Will be used for sundry board manufacturing within the facility.
5.	Sludge from SFT	-	-	5110	5110	Will be used fuel in boilers.
6.	Plastic	-	219	693.5	912.5	Will be disposed through authorized recyclers.
7.	Metal pins from RCF processing process	-	14.6	40.15	54.75	Will be disposed through authorized recyclers.

5. Measures for mitigating the impact on the environment and mode of discharge or disposal

- ⇒ After proposed expansion treated water is/will be reused and remaining treated water will utilized for land disposal/ gardening/ irrigation.
- ⇒ Domestic wastewater generation will be sent to septic tank followed by soakpit.
- ⇒ Solid/Hazardous is/will be disposed as per hazardous waste rules 2016.

Flue gas emission:

- ⇒ The unit has provided MDC and Bag filter for coal fired boiler.

Process gas emission:

- ⇒ There is/will be no process emission from existing and proposed project.

6. Capital Cost of the Project, Estimated time of completion

- ⇒ The total project cost after proposed expansion will be Rs. 83.00 Crores, including existing investment of Rs.52.00 Crores.
- ⇒ The project will take approximately 12 months after receiving Environmental Clearance (EC) for procuring all the statutory clearances from WBPCB.

7. Site selected for the project- Natural of land – Agricultural (Single/double crop), barren, Govt/Private land, status of is acquisition, nearby (in 2-3 km) water body, population, with in 10 km other industries, forest. Eco-sensitive zones, accessibility.

- ⇒ The proposed activity will be accommodated in the existing facility which is a private land. Land is already in possession with project proponent.
- ⇒ Inter-State Boundary - Bihar at 1.08 km in WSW.
- ⇒ Water body within 10 km radius of project site - River Mahananda (At 1.94 km in SE), Teesta canal (At 7.44 km in E) and Bhimbhar Sayedabad Pukur pond (At 4.45 in NNE).
- ⇒ Nearby Major Industries – Raghunath Fertilisers Pvt. Ltd. , Himalayan tea factory, Bajrang tea factory, R.D. Tea factory, Manokamna tea industries Pvt. Ltd. and Dalmia Tea

factory.

8. Baseline environmental data – Air quality, Surface and Ground water quality, Soil characteristic, Flora and Fauna, Socio-Economic condition of the nearby population.

Ambient air quality monitoring

S. No	Criteria Pollutants	Unit	Maximum Value	Minimum Value	Prescribed standard
1.	PM10	µg/m ³	87.0	51.0	100
2.	PM2.5	µg/m ³	48.8	25.9	60
3.	SO ₂	µg/m ³	18.3	7.8	80
4.	NO _x	µg/m ³	25.2	12.0	80
5.	CO	mg/m ³	--	--	2.0

All the results of ambient air quality parameters have been found within the limit as per NAAQS standards. Based on comparison study of results for tested parameters with NAAQS, it is interpreted that current ambient air quality of studied locations is well within the NAAQS limits and it can be considered satisfactory based on AQI index calculated. This interpretation is considered based on the results found for particular locations during the specific study period. Due to the usage of the solid fuel in the boiler, there might be the chances of the incremental change in the current ambient air quality. The industry should adopt adequate mitigation measures to control the air emissions i.e. flue gas emissions and fugitive emissions.

Noise Monitoring

Sr. No	Parameter	Unit	Maximum Value	Minimum Value
1.	Ld (Day)	dB(a)	68.6	55.1
2.	Ln(Night)	db(a)	63.2	44.9

Out of total 8 nos. of locations for noise monitoring 4 nos. of locations are monitored in the industry premises and 4 nos. of locations are monitored in surrounding villages within 3-4 km radius from the project site. Noise level in all the locations are within the standard norms prescribed by MoEF&CC. Noise level measured at villages is mainly due to vehicular movements of local people located within and nearby the villages. The nearby village surrounding to the project site is about 1 km away from the project site and results of the same are found within the prescribed norms during the baseline survey. Due to the project activities, there might be chances of incremental value in the noise levels due to increase in vehicular movement & plant activities. The interpretation can be considered based on the baseline survey conducted during the study period.

Soil Quality and Characteristics

Sr. No	Parameter	Unit	Maximum Value	Minimum Value
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Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

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1.	pH	-	7.8	6.5
2.	electrical Conductivity	dS/m	1.03	0.79
3.	Exchangeable Sodium	meq/100g m	3.89	2.32
4.	Exchangeable Potassium	meq/100g m	11.18	7.52
5.	Total Magnesium	mg/100g	37.81	17.82
6.	Total Nitrogen percentage	%	0.088	0.069

Based on soil analysis data it is concluded that surface soils are acidic to neutral in reaction, majority samples are non-saline except one and non-sodic. The soils are rich in nitrogen, very high in available phosphorus and available potassium status. The levels of total Fe, Cu, Cr, B and Zn are within the safe limits. However, for successful greenbelt development liberal quantity of organic manure (25 tons/ha) and half the recommended doses of N, P and K fertilizers should be applied. The soil should be periodically monitored for EC, pH and ESP. In the proposed project, there will be utilization of the treated wastewater generated from the process in the gardening purpose within the plant premises only. It is suggested that the treated water should be used for gardening purpose only after conforming the guideline of treated effluent discharge for gardening/ irrigation purpose.

Ground water

Sr. No	Parameter	Unit	Maximum Value	Minimum Value	Desirable Limit	Permissible Limit
1.	pH	-	7.66	7.45	6.5-8.5	No Relaxation
2.	tds	mg/L	166	58	500	2000
3.	Total hardness	mg/L	102	28	200	600
4.	Chloride	mg/L	54	6	250	1000
5.	Total Alkalinity	mg/L	92	27	200	600
6.	Iron	mg/L	0.16	0.08	0.3	No Relaxation

Based on comparison study of test results and summary report with drinking water norms, it is interpreted that the ground water sample collected from all the locations can be used in drinking as well as all domestic purposes and irrigation as all results meet with the desirable limit for drinking water as per IS: 10500 :2012. It

is suggested that, No untreated wastewater shall be discharged on land at any condition and treated water after confirming all the irrigation standard shall be used for irrigation purpose.

Surface Water

Sr. No	Parameter	Unit	Maximum Value	Minimum Value	Permissible Limit
1.	ph	-	7.78	7.02	6.5-8.5
2.	TDS	mg/L	510	36	2000
3.	DO	mg/L	5.0	4.6	-
4.	COD	mg/L	14	4	-
5.	BOD	mg/L	7	3	-

Based on test result data comparison study with CPCB standard for inland surface water classification, it is interpreted that surface water quality of all locations meet with the criteria D and E except the samples from Budharugaon pond and Mahananda river, it means these water sources can be used for propagation of wild life, fisheries and Irrigation, industrial utilization for cooling, etc. The surface water samples are collected from all the locations presence of COD & BOD is found in the samples, which indicated the presence of organic matter in the surface water body. The DO level of all surface water sampling locations are found >4.0 mg/L, DO level >4.0 mg/L is considered suitable for the survival of aquatic life and <4.0 mg/L is not considered suitable for aquatic life survival. The samples collected from the Budharugaon pond and Mahanada river meets with the criteria "C", it means it can be used in drinking purpose after conventional treatment with disinfection. It is suggested that no wastewater or treated water shall be discharged to the any surface water body.

Ecology and Biodiversity

As per the land use statistics around 35.52 % & 11.39 % of the study area is covered with crop land and fallow Land respectively. Main crops in the study area are consisting of food grains such as rice, maize, wheat etc. Some farmers also grow the vegetables like cucumber, Brinjal, cabbage, cauliflower etc. The study area is dominated by floral species i.e kalo siris, neem & kadam. Among the enumerated flora in the study area, none of them were assigned any threat category by Red data book of Indian Plants and none can be assigned the status of endemic plant of this region. None of the sighted floral species can be assigned endemic species category of the study area. Common faunal species has been noted during the primary survey. Common house crow, common drongo, tailor bird, jungle myna, rose ringed parakeet, indian spotted dove and cattle egret are the dominated avifaunal species in the study area. Most of the Avi faunal species reported are under the Schedule IV as per Wild Life Protection Act 1972 except white rumped vulture., which falls under the Schedule-I species. Among the schedule-II species, Jungle cat, masked palm civet, small indian civet, grey mangoose, golden jackal, red fox under mammals category and cobra, russel's viper, rat snake under the reptiles category were found, which is provided protection as per Schedule-II of Wild life protection act, (1972). Conservation plan

for such protected species should be submitted to concerned forest depart of the region.

Socio economic

All the respondents across all socio-economic groups, age, gender and locations have expressed their views about the location. According to them, all villages are having basic infrastructural facilities but some villages need to be improved in some areas like, sanitation, road, etc. For sanitation, village panchayats can use Swachh Bharat Mission scheme. It will improve quality of life by increasing their employment opportunities and also by bringing about a positive change, like; employment, developmental activities, indirect employment, etc., while some are not having any idea about the upcoming project and its impacts. Most of the villages are having educational institutes up to secondary and higher secondary schools. Students need to commute to the main hub in nearby vicinity for further studies. The study area consisting majority of the area as an agricultural land and primary profession of the people in the study area. People's willingness and ability to be employed in the production activities need to be given importance. The respondents have suggested measures which need to be taken up for welfare of the people. The project needs to undertake various activities in education, infrastructure development, and health and environment area as a part of Corporate Social Responsibility (CSR) and Corporate Environment Responsibility (CER).

9. Identification of hazardous in handling processing and storage of hazardous material and safety system provided to mitigate the risk.

After identifying hazards in handling processing and storage of hazardous material Qualitative risk has been done. Mitigation measures like periodical training on fire drill, conducting emergency response drill on yearly basis, training drivers for transportation of goods, providing fire extinguishers *etc.* shall be maintained for the smooth operation.

10. Likely impact of the project on Air, Water, Land, Flora-fauna nearby population.

Looking to the overall project justification, process, pollution potential and pollution prevention measures/technologies installed by proponent, environmental management activities of proponent; it has been concluded that the proposed project would not have any considerable impacts on environment as well as socio-economic and ecological conditions of the project area.

11. Emergency preparedness plan in case of natural or in plant emergencies.

On- Site and Off- Site emergency plan has been prepared by including Safety committee along with their roles and responsibilities, mutual aids arrangements, roles and responsibilities of stake holders including stake holders, *etc.*

12. Issues raised during public hearing (if applicable) and response given.

⇒ Will be incorporated after Public hearing.

13. Occupational Health Measures

⇒ Personnel protective equipment such as safety shoes, safety goggles, hand gloves, gum boots, safety helmet, and breathing apparatus set kit will be given to all workers and

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

staff. Additional PPEs will be readily available at the workplace.

- ⇒ Medical surveillance for the workers working in risk zone is/will be carried out regularly.
- ⇒ Safety awareness programs will be conducted.

14. Post Project Monitoring Plan

- ⇒ Post project environmental monitoring is/will be done as per MoEFCC/CPCB/WBPCB guidelines by following recommended/standard method approved by MoEFCC/CPCB.
- ⇒ 5.00 Lakhs/annum budget has been allotted environment monitoring.

TOR COMPLIANCE

S. No.	ToR Point	Reply	Citation
A.	STANDARD TERMS OF REFERENCE		
1.	Executive Summary	Incorporated with the report.	viii-xv
2.	Introduction		
	i. Details of the EIA Consultant including NABET accreditation.	Eco Chem Sales & Services is a NABET accredited consultant, having NABET/EIA/2023/SA 0156 is valid up to 15th March 2023.	Page i.
	ii. Information about the project proponent.	The company is promoted by Four Directors. The unit is operated by technocrats having more than 15-17 years of experience in manufacturing and marketing of pulp and paper industries.	Section 1.3.2, Page 2.
	iii. Importance and benefits of the project.	Details are incorporated in EIA/EMP report.	Section 1.4.3, Page 5.
3.	Project Description		
	i. Cost of project and time of completion.	<ul style="list-style-type: none"> • Total Cost of the project after proposed expansion (Existing: 52.00 Crore + 31.00 Crore) is 83.00 Crore. • The project will take approximately 12 months after receiving Environmental Clearance (EC) for procuring all the statutory clearances from GPCB. 	Section 2.5.8, Page 19 and Section 2.11, Page 32.
	ii. Products with capacities for the proposed project.	<ul style="list-style-type: none"> • The proponent proposes to expand the existing capacity of Writing and Printing Paper/Newsprint/Kraft Packaging Paper from 1000 TPM to 4500 TPM and Sundry Board from 40 TPM to 100 TPM. 	Section 2.6.1, Page 20.
	iii. If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.	<ul style="list-style-type: none"> • EC was not applicable to existing unit as it was established in 2005 before EIA notification 2006, Now As per the EIA notification of Ministry of Environment and Forests, Govt of 	Section 1.3.1, Page 2.

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S. No.	ToR Point	Reply	Citation
		<p>India (MoEF&CC) dated 14th September 2006 and its amendments the existing and proposed expansion products (<i>i.e.</i> Pulp & Paper Industries) are covered under the Category-5 (i) – Category “B” – treated as category “A” due to applicability of General Condition as Bihar state Boundary is within 5 km radius. Hence, Environmental clearance is required to obtain from MoEFCC, New Delhi.</p> <ul style="list-style-type: none"> The unit has a valid CTO dated 11.08.2017 vide memo No. C156/WPB/SRO/Dar/S-191-2006(Sr-Co-r/17/0512, valid upto 31.10.2022. 	
iv.	List of raw materials required and their source along with mode of transportation.	Waste Paper and other chemicals is and will be sourced from Uttarakhand, Amritsar & Kolkata and transported by trucks.	Section 2.6.2, Page 21
v.	Other chemicals and materials required with quantities and storage capacities.	Soap stone powder- 25 TPM, Alkyl Ketone Dimer - 54 TPM, Other miscellaneous chemicals - 127 TPM	Section 2.6.2, Page 21
vi.	Details of Emission, effluents, hazardous waste generation and their management.	<ul style="list-style-type: none"> Flue gas emission from 10 TPH Boiler will be controlled by Bag filter. Generated wastewater will be treated in ETP and around 452 KLD treated water will be recycled back in to manufacturing process, 50 KLD will be utilized for quenching on road, rice and ash and remaining 336.2 KLD wastewater will be utilized for irrigation. Waste is/will be stored on impervious floor having roof and boundary wall. Management of generated wastes will be done as per HW (Management, Handling and Trans boundary Movement) Rules, 2016. 	Section 2.8.1-2.8.3, Page 27-29
vii.	Requirement of water, power, with source of supply, status of	<ul style="list-style-type: none"> Total water requirement after expansion will be 	Section 2.5.5, 2.5.3,

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S. No.	ToR Point	Reply	Citation
	approval, water balance diagram, man-power requirement (regular and contract).	22340.6 KLD (Fresh: 740.6 KLD and Recycled: 21600 KLD), which will be met through existing borewell. SPMPPL has permission to withdraw 600 KLD of ground water. An application has been submitted for obtaining additional water from State Water Investigation Directorate, Kolkata. <ul style="list-style-type: none"> • 2500 KVA Power will be sourced WBSEDCL. • Total 130 numbers of employees after proposed expansion. 	2.5.2 and 2.5.7 on page 18 and 19.
viii.	Process description along with major equipments and machineries, process flow sheet (quantative) from raw material to products to be provided	Project Proponent proposes to adopt successful best process technology for process. The company will be using modern machine and equipment's with emphasis on waste minimization techniques.	Section 2.7 on page 21.
ix.	Hazard identification and details of proposed safety systems.	Process related Hazard, Physical Hazard and Chemical Hazard is incorporated.	Section 7.3 on Page 148-161.
x.	Expansion/modernization proposals:		
	<i>Copy of all the Environmental Clearance(s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012 on the status of compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing existing operation of the project from SPCB shall be attached with the EIA-EMP report.</i>	EC was not applicable to existing unit before 2006 as unit was established in 2005.	--
	<i>In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall</i>	The unit has valid CC&A for existing operation vide memo No. C156/WPB/SRO/Dar/S-191-2006(Sr-Co-r/17/0512, dated 11.08.2017, valid	Annexure 3

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S. No.	ToR Point	Reply	Citation																																																			
	<i>be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shall be submitted.</i>	upto 31.10.2022. Certified Compliance is in process and will be submitted in final EIA report.																																																				
4.	Site Details																																																					
i.	Location of the project site covering village, Taluka/Tehsil, District and State, Justification for selecting the site, whether other sites were considered.	Location and justification of the Project Site is incorporated.	Figure 1.1 and Section 2.4.1, Page 5 and 12.																																																			
ii.	A toposheet of the study area of radius of 10km and site location on 1:50,000/1:25,000 scale on an A3/A2 sheet. (including all eco-sensitive areas and environmentally sensitive places).	A toposheet of the study area of radius of 10km is incorporated.	Figure 3.1, Page 35.																																																			
iii.	Details w.r.t. option analysis for selection of site	Details w.r.t. option analysis for selection of site is incorporated.	Chapter 5, Page 141.																																																			
iv.	Co-ordinates (lat-long) of all four corners of the site.	<table border="1"> <thead> <tr> <th>Corner</th> <th>Latitude</th> <th>Longitude</th> </tr> </thead> <tbody> <tr><td>A</td><td>26°28'55.81"N</td><td>88°14'15.28"E</td></tr> <tr><td>B</td><td>26°28'53.28"N</td><td>88°14'27.25"E</td></tr> <tr><td>C</td><td>26°28'53.71"N</td><td>88°14'27.36"E</td></tr> <tr><td>D</td><td>26°28'53.77"N</td><td>88°14'27.18"E</td></tr> <tr><td>E</td><td>26°28'57.18"N</td><td>88°14'28.19"E</td></tr> <tr><td>F</td><td>26°28'57.15"N</td><td>88°14'28.37"E</td></tr> <tr><td>G</td><td>26°28'59.30"N</td><td>88°14'29.10"E</td></tr> <tr><td>H</td><td>26°28'58.70"N</td><td>88°14'31.60"E</td></tr> <tr><td>I</td><td>26°28'56.68"N</td><td>88°14'30.87"E</td></tr> <tr><td>J</td><td>26°28'56.72"N</td><td>88°14'30.63"E</td></tr> <tr><td>K</td><td>26°28'54.00"N</td><td>88°14'29.62"E</td></tr> <tr><td>L</td><td>26°28'51.85"N</td><td>88°14'29.41"E</td></tr> <tr><td>M</td><td>26°28'51.85"N</td><td>88°14'28.53"E</td></tr> <tr><td>N</td><td>26°28'51.03"N</td><td>88°14'28.41"E</td></tr> <tr><td>O</td><td>26°28'52.41"N</td><td>88°14'26.65"E</td></tr> <tr><td>P</td><td>26°28'52.71"N</td><td>88°14'25.20"E</td></tr> </tbody> </table>	Corner	Latitude	Longitude	A	26°28'55.81"N	88°14'15.28"E	B	26°28'53.28"N	88°14'27.25"E	C	26°28'53.71"N	88°14'27.36"E	D	26°28'53.77"N	88°14'27.18"E	E	26°28'57.18"N	88°14'28.19"E	F	26°28'57.15"N	88°14'28.37"E	G	26°28'59.30"N	88°14'29.10"E	H	26°28'58.70"N	88°14'31.60"E	I	26°28'56.68"N	88°14'30.87"E	J	26°28'56.72"N	88°14'30.63"E	K	26°28'54.00"N	88°14'29.62"E	L	26°28'51.85"N	88°14'29.41"E	M	26°28'51.85"N	88°14'28.53"E	N	26°28'51.03"N	88°14'28.41"E	O	26°28'52.41"N	88°14'26.65"E	P	26°28'52.71"N	88°14'25.20"E	--
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S. No.	ToR Point	Reply			Citation
		Q	26°28'52.06"N	88°14'24.80"E	
		R	26°28'52.41"N	88°14'23.75"E	
		S	26°28'51.60"N	88°14'23.33"E	
		T	26°28'51.50"N	88°14'22.42"E	
		U	26°28'51.05"N	88°14'22.22"E	
		V	26°28'51.21"N	88°14'20.36"E	
		W	26°28'50.96"N	88°14'19.87"E	
		X	26°28'51.98"N	88°14'16.06"E	
		Y	26°28'54.78"N	88°14'16.98"E	
		Z	26°28'55.07"N	88°14'15.19"E	
		Centre	26°28'52.76"N	88°14'22.24"E	
	v.	Google map-Earth downloaded of the project site.	Short and long view of google map of project site is incorporated.		Figure 2.2 and 2.3 on Page 13.
	vi.	Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.	Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. is incorporated.		Figure 2.4, page 17.
	vii.	Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular.	A Photographs of the existing is incorporated.		Figure 2.1 Page 12
	viii.	Landuse break-up of total land of the project site (identified and acquired), government/ private - agricultural, forest, wasteland, water bodies, settlements, etc shall be included. (not required for industrial area).	Land use breakup is been incorporated.		Section 2.5.1, Page 15.
	ix.	A list of major industries with name and type within study area (10km radius) shall be incorporated. Land use details of the study area.	<ul style="list-style-type: none"> • Raghunath Fertilisers Pvt. Ltd at 0.35 km in S • Himalayan Tea Factory at 0.43 km in S • Bajrang Tea Factory at 0.70 km in SE • R.D. Tea Factory at 0.73 km in NW • Manokamna tea industries Pvt. Ltd. at 3.09in N 		--

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S. No.	ToR Point	Reply	Citation
		<ul style="list-style-type: none"> Dalmia Tea Factory at 3.32 km in N 	
x.	Geological features and Geo-hydrological status of the study area shall be included.	Geological features and Geo-hydrological status of the study area.	Section 3.7 & 3.8 page 56 & 59.
xi.	Details of Drainage of the project upto 5km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided. (mega green field projects).	Project site is at 1.94 km from the River Mahananda. Flood is relatively scarce in Darjeeling district.	--
xii.	Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.	The land having area is 44248.32 m ² has been already in possession of Sapphire Papers Mill Pvt. Ltd. Additional land 11765.72 m ² will be required for proposed expansion which will be utilized from the vacant land 22290.43 m ² .	--
xiii.	R&R details in respect of land in line with state Government policy.	Not Applicable.	--
5.	Forest and wildlife related issues (if applicable):		
i.	Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department. (if applicable).	Not Applicable.	--
ii.	Landuse map based on High resolution satellite imagery (GPS) of the proposed site delineating the forestland (in case of projects involving forest land more than 40 ha).	Not Applicable.	--
iii.	Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted.	Not Applicable.	--
iv.	The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden-	Not Applicable.	--

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S. No.	ToR Point	Reply	Citation
	thereon.		
v.	Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of Schedule I fauna, if any exists in the study area.	Not Applicable.	--
vi.	Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife.	Not Applicable.	--
6.	Environmental Status		
i.	Determination of atmospheric inversion level at the project site and site-specific micrometeorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.	Temperature – 15 °C to 34.7 °C Relative Humidity - 38% to 89% Wind Speed- 0 to 15.4 km/hr Rainfall- 0.6 to 135.6	Section 3.3, page 37
ii.	AAQ data (except monsoon) at 8 locations for PM10, PM2.5, SO2, NOX, CO and other parameters relevant to the project shall be collected. The monitoring stations shall be based CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.	8 Nos. of AAQ sampling has been done. All the results of ambient air quality parameters have been found within the limit as per NAAQS standards.	Section 3.4, page 45.
iii.	Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQQM Notification of Nov. 2009 along with - min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.	Raw data of all AAQ measurement has been incorporated.	Section 3.4, page 45.
iv.	Surface water quality of nearby River (100m upstream and downstream of discharge point) and other surface drains at eight locations as per CPCB/MoEF&CC guidelines.	Based on test result data comparison study with CPCB standard for inland surface water classification, it is interpreted that surface water quality meet with the criteria D and E except the samples from Budharugaon pond and Mahananda river, it means these water sources can be used for Irrigation, industrial utilization for cooling, etc.	Section 3.11.7, Page 71.
v.	Whether the site falls near to polluted stretch of river	No.	--

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S. No.	ToR Point	Reply	Citation
	identified by the CPCB/ MoEF&CC, if yes give details.		
vi.	Ground water monitoring at minimum at 8 locations shall be included.	The ground water samples were collected from 8 nos. of location to assess the quality of ground water within the study region.	Section 3.11.4, Page 66.
vii.	Noise levels monitoring at 8 locations within the study area.	Noise level monitoring was carried out with the help of sound level meter at 8 different locations fall under commercial, industrial and Silence zone	Section 3.5, Page 50.
viii.	Soil Characteristic as per CPCB guidelines.	The soils are categorized as sandy clay loam to clay based on different soil separates (sand, silt and clay). Soils have moderate water holding capacity (35.77 to 43.65 %) and porosity (39.51 to 56.16 %). The drainage is likely to be good though texture is clay loam to clay on account of high organic matter.	Section 3.10, Page 64.
ix.	Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.	Traffic study of the area is been incorporated.	Section 3.6, Page 55.
x.	Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule-I I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.	The land use statistics around 35.52 % & 11.39 % of the study area is covered with crop land and fallow Land respectively. Main crops in the study area are consisting of food grains such as rice, maize, wheat etc. Some farmers also grow the vegetables like cucumber, Brinjal, cabbage, cauliflower etc. The study area is dominated by floral species i.e kalo siris, neem & kadam. Most of the Avi faunal species reported are under the Schedule IV as per Wild Life Protection Act 1972 except white rumped vulture., which falls under the Schedule-I species. Among the schedule-II species, Jungle cat, masked palm civet, small indian civet, grey mangoose, golden jackal, red fox under mammals category and cobra, russel's	Section 3.12, Page 77.

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S. No.	ToR Point	Reply	Citation
		viper, rat snake under the reptiles category were found, which is provided protection as per Schedule-II of Wild life protection act, (1972)	
	xi. Socio-economic status of the study area.	Socio-economic status of the study area has been incorporated.	Section 3.13, Page 99.
7.	Impact and Environment Management Plan		
	i. Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain, the AQIP Modelling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modelling shall also be provided. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.	Maximum incremental GLC of pollutant is incorporated in EIA/EMP report.	Section 4.3.2, Page 125.
	ii. Water Quality modelling - in case of discharge in water body	Not Applicable.	--
	iii. Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor cum- rail transport shall be examined.	The LOS value from the project will be the almost same as before <i>i.e.</i> “C” “Good” for the National highway falling in the study area. So, the additional load on the carrying capacity of the concern roads is not likely to have any significant adverse effect.	Section 4.3.2, Page 126.
	iv. A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) Rules.	Details of Effluent Treatment Plant and characteristics of treated effluent are incorporated in EIA/EMP report.	Section 10.3.2, Page 176.
	v. Details of stack emission and action plan for control of	Details of Stack emission and its control	Section 2.8.1, Page

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S. No.	ToR Point	Reply	Citation
	emissions to meet standards.	measures are incorporated.	27.
vi.	Measures for fugitive emission control	Measures for fugitive emission control are incorporated	Section 10.3.1, Page 174.
vii.	Details of hazardous waste generation and their storage, utilization and management. Copies of MOU regarding utilization of solid and hazardous waste in cement plant shall also be included. EMP shall include the concept of waste-minimization, recycle/ reuse/ recover techniques, Energy conservation, and natural resource conservation.	Storage and handling of Non-hazardous solid waste and Hazardous waste; adequate storage area with pacca flooring has been/will be provided. All the waste shall be disposed as per Hazardous waste disposal Rules 2016. Details of disposal of solid/hazardous waste are incorporated in EIA/EMP report.	Section 10.3.4, Page 180.
viii.	Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.	Fly ash will be sent to Brick making Industry. MoU between Sapphire Papers Mill Pvt. Ltd. and Vaishnodevi is attached.	Annexure 6
ix.	Action plan for the green belt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.	The unit has already developed 5000.84 m ² green belt area in the premises and Unit will be developed additional 9954 m ² green belt area in the plant premises to meet the criteria of 33% of Greenbelt of total plot area. Considering 90% survival rate approx. 1650 Nos. of trees and 2000 Nos. of shrubs will be planted within the next two years.	Section 10.3.5, Page 181.
x.	Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources.	Detailed Action plan for rain water harvesting at project site is incorporated.	Section 10.6.1, Page 188.
xi.	Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.	Rs. 5.00 Crores as capital cost and 417.36 Lakhs/annum as recurring cost/annum for	Section 10.7, Page 189.

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S. No.	ToR Point	Reply	Citation
		environmental pollution control measures has been provided.	
	xii. Action plan for post-project environmental monitoring shall be submitted.	Detailed Action plan for post-project environmental monitoring is incorporated.	Section 6.1, Page 144.
	xiii. Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster management plan should be linked with District Disaster Management Plan.	Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan is incorporated.	Section 743, Page 161.
8.	Occupational health		
	i. Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers	Detailed plan and fund allocation for occupational health & safety are incorporated.	Section 10.3.6, Page 185.
	ii. Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre placement and periodical examinations give the details of the same. Details regarding last month analyzed data of above mentioned parameters as per age, sex, duration of exposure and department wise.	Regular Health check-up of workers has been carried out and will be continued after proposed expansion. Health check-up reports of workers are attached.	Annexure 9
	iii. Details of existing Occupational & Safety Hazards. What are the exposure levels of hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved,	There is no use of solvent in the paper production project hence chemical occupational hazard are negligible. More over we are doing ambient air monitoring regularly and their results are within permissible limits.	-
	iv. Annual report of health status of workers with special reference to Occupational Health and Safety.	Regular Health check-up of workers has been carried out and will be continued after proposed expansion. Health check-up reports of workers are attached	Annexure 9
9.	Corporate Environment Policy		
	i. Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed	Sapphire Papers Mill Pvt. Ltd. has well developed Environment Policy approved by its Board of	Annexure 7

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

S. No.	ToR Point	Reply	Citation
	in the EIA report.	Directors.	
	ii. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.	The company has prescribed Environment policy for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms /conditions.	--
	iii. What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.	The hierarchical system of the company is described with figure in EIA/EMP.	Figure 10.3, Page 192.
	iv. Does the company have system of reporting of non compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report	The company has developed a Hierarchal system for reporting of non-compliances / violations of environmental norms to the higher management.	Section 10.8, Page 190.
10.	Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.	The necessary infrastructure facilities like drinking water and sanitation will be provided to the construction workers and truck drivers within the project site.	--
11.	Enterprise Social Commitment (ESC)		
	i. Adequate funds (at least 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.	The proponent has allocated a budget of Rs. 31.00 Lakhs i.e. 1% of the expansion cost of Rs. 31.00 crore to be spent within a period of 3 years.	Section 10.9, Page 192.
12.	ii. Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the	Received Closure order with Disconnection of Electricity having memo no 635(1) - WPB/SRO/Dar/S-191-2006 (Part-III) dated 10/10/2020. Received closureorder has been suspended with restoration of electricity having memo no 849(01)-WPB/SRO/Dar/S-191-	Annexure 8a & 8b.

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S. No.	ToR Point	Reply	Citation
	notice(s) and present status of the case.	2006(Part-III) dated 17/02/2020.	
13.	'A tabular chart with index for point wise compliance of above TOR.	Complied	Page xiv.
B.	SPECIFIC TERMS OF REFERENCE FOR EIA STUDIES FOR PULP & PAPER INDUSTRY EXCLUDING MANUFACTURING OF PAPER FROM WASTE PAPER AND MANUFACTURE OF PAPER FROM READY PULP WITHOUT BLEACHING		
i.	For major Pulp and Paper Units, a 3-D view i.e. DEM (Digital Elevation Model) for the area in 10 km radius from the proposal site.	Study area Map has been incorporated.	Figure 3.1, Page 35
ii.	MRL details of project site and RL of nearby sources of water shall be indicated.	Ground water is/ will be extracted for the proposed expansion project. Proposed Rain water system to maintain ground water table.	--
iii.	A note on pulp washing system capable of handling wood pulp shall be included.	Not Applicable	--
iv.	Manufacturing process details for the existing and proposed plant shall be included. Chapter on Pulping & Bleaching shall include: no black liquor spillage in the area of pulp mill; no use of elemental chlorine for bleaching in mill; installation of hypo preparation plant; no use of potcher washing and use of counter current or horizontal belt washers. Chapter on Chemical Recovery shall include: no spillage of foam in chemical recovery plant, no discharge of foul condensate generated from MEE directly to ETP; control of suspended particulate matter emissions from the stack of fluidized bed recovery boiler and ESP in lime kiln.	Manufacturing process details has been incorporated	Section 2.7, Page 21.
v.	Studies shall be conducted and a chapter shall be included to show that Soda pulping process can be employed for Eucalyptus/Casuarina to produce low kappa (bleachable) grade of pulp.	Not Applicable	--
vi.	Commitment that only elemental Chlorine-free technology will be used for the manufacture of paper and existing plant without chemical recovery plant will be closed within 2 years	Undertaking committing that only elemental Chlorine-free technology will be used for the manufacture of paper. Moreover existing plant is	Annexure 11

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

S. No.	ToR Point	Reply	Citation
	of issue of environment clearance.	also using elemental Chlorine-free technology for paper manufacturing.	
vii.	A commitment that no extra bleaching chemicals (more than being used now) will be employed and AOx will remain within limits as per CREP for used based mills.	Undertaking committing that no extra bleaching chemicals will be used. AOx will remain within limits as per CREP for used based mills.	Annexure 11 & 10
viii.	Plan for reduction of water consumption.	<ul style="list-style-type: none"> • 2382 KLD will be recycled back in process. 20 KLD will be recycled coal wetting/ash quenching. 411 KLD of waste water will be sent to CETP after secondary treatment in existing ETP. • Bleaching and decolourization of pulp will be accrued out with the help of oxidative and reductive deinking agents like Sodium Hydroxide, Sodium silicate, Hydrogen Peroxide. Unit will not at all using chlorine based bleaching compounds. • Evaporation losses from the Boiler is/ will be minimized by energy efficient coolers/condensers and evaporators. 	--

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S. No.		Document Name
1.		Standard ToR Letter
2.		CTE dated 30.03.2005
3.	a.	Existing CCA 25.08.2022
4.		Layout Plan
5.		Borewell water permission
6.		Fly Ash MoU
7.		Environment Policy
8.	a.	Restoration of Electricity order
	b.	Closure Order & Report
9.		Health Reports
10.		CREP Compliance
11.		Comitment Undertaking for Chlorine free etc.
12.		Conservation Plan for Schedule -I
13.		Land Document

1 INTRODUCTION

1.1 PRELUDE

The worldwide Paper industry is experiencing steady growth, supported primarily by the constantly rising demand for paper for both writing/printing and packaging applications. The paper can be obtained primarily as a forest product modified further in a paper mill. Forests are the source of sustainability and survival for a large populace as well as the most precious renewable resources contributing towards the economic development. The increased demand for forest products, fast population growth, urbanization, a higher rate of economic growth and trade liberalization are exerting greater pressure on these resources. Hence, a reliable and environmentally viable alternative for this is the waste paper based paper production. India is self-sufficient in terms of raw materials, technology and strong scientific background as well as the long proven expertise in producing quality paper products.

The Government of India, as per its policy has given emphasis on Sustainable Development as a part of any developmental activity. Along with industrial growth, environmental protection is an integrated criterion for this concept. In line with this policy, Ministry of Environment, Forests and Climate Change (MoEF&CC) New Delhi has defined 'Environmental Clearance' (EC) framework under the Environmental Protection Act, 1986. As per the EIA Notification - 2006, prior EC is required for establishing/expanding the industry/development projects.

M/s Sapphire Papers Mill Private Limited (hereinafter referred to as 'SPMPL') is located in Bidhannagar, District Darjeeling, West Bengal falling under Large Scale Category manufacturing products for which the company had obtained Consent To Establish and Operate from West Bengal Pollution Control Board.

1.2 PURPOSE OF THE REPORT

The purpose of this report is to identify, predict and evaluate the environmental impacts for Expansion Project for Manufacturing of Paper from Waste Paper at Plot No 2565, 4257, 4260, 4261, 4262, 4263, 4265, 4327, 4328, 4329, 4330, 4338, 4326, 4334, 4331, 4333, 4322, 4336, 4337, 4339, NH – 27 (previously called as NH-31), Jagannathpur, Bidhannagar, Darjeeling, West Bengal – 734426. Our Project Site is located in Bidhannagar, District Darjeeling, West Bengal and Bidhannagar is not falling under CPA/SPA/OPA as per NGT order, dated: 10.07.2019.

As per the EIA notification of Ministry of Environment and Forests, Govt of India (MoEF&CC) dated 14th September 2006 and its amendments the existing and proposed expansion products (*i.e.* Pulp & Paper Industries) are covered under the Category-5 (i) – Category "B" – treated as category "A" due to applicability of General Condition as Bihar state Boundary is within 5 km radius. Hence, Environmental clearance is required to obtain from MoEFCC, New Delhi.

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In line with the said notification, TOR application was filed to MoEFCC, New Delhi. Received Standard ToR from MoEFCC, New Delhi. EIA report has been prepared based on the TOR conditions stipulated by MoEFCC vide letter No. IA-J-11011/234/2022-IA-II(IND-I) dated 20th July 2022. A copy of TOR is enclosed as Annexure 1. Public hearing will be conducted for this expansion as per TOR approved by MoEFCC.

1.3 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

1.3.1 Identification of the Project

M/s Sapphire Papers Mill Private Limited proposes to enhance the production capacity of Writing and Printing Paper/Newsprint/Kraft Packaging Paper from 1000 TPM to 4500 TPM and Sundry Board from 40 TPM to 100 TPM. The proposed expansion will be carried out using the state of art technology, adopting modernized machineries and equipment and novel process technologies, with waste minimization techniques.

EC was not applicable to existing unit as it was establish in 2005 before EIA notification 2006. The Unit had obtained CTE in 2005 having vide memo no. 11085-2N-517/2004 dated 30.03.2005. CTE copy attached as Annexure 2.

The unit has a valid CTO dated 25.08.2022 vide memo No. C181/WPB/SRO/Dar/S-191-2006 & Consent letter No. CO113387, valid upto 31.10.2027. CTO Copy attached as Annexure 3.

1.3.2 Identification of the Project Proponent

The company is promoted by Four Directors. List of directors with name, residential address and designation is provided in below table:

List of Directors

No	Full Name	Present residential address & Phone Number	Mobile No.
1.	Sanjay Golecha	Dhruvatara, Sukanta Sarani, New Milan Pally, Ward no.25, Siliguri-734005.	9434019925
2.	Shashi Jain	UTR- 080304, The residency, HIG, Uttorayon, Gaurcharan, Siliguri-734010	9800005242
3.	Shrenique Golecha	Dhruvatara, Sukanta Sarani, New Milan Pally, Ward no.25, Siliguri-734010	8101187384
4.	Bamdeb Saha	1 no Dabgram Colony, Surya Nagar, Michael madhusudhan street, P.o Rabindra Sarani, Ward no.23, Siliguri-734006	9734443344

The Company has vast resources in terms of assets, technical expertise and technology, Research and Development, plants and state of the art machinery, well equipped laboratories, excellent infrastructure and utilities including water, own power generation (steam), steam generation, communication, D.M. Plants, Effluent Treatment Plants, transportation etc. at all manufacturing locations. The Group has excellent marketing

network including highly effective sales team, end users, distributors, storage facility and fast delivery capabilities.

1.4 BRIEF DESCRIPTION OF PROJECT

1.4.1 Nature, Size and Location of the Project

The proposed project is of expansion in production capacity and modernization of existing process of writing & printing papers, newspaper printing papers, kraft packaging paper, sundry board within the plant premises. The management of the company proposes to modernize its machineries and increase its efficiency levels by adding new units/machineries and supporting infrastructure within the existing facility. It would result in increase in the company's production capacity from 1000 TPM to 4500 TPM. The company is presently running at 100% of its existing capacity and is unable to meet demand of its customers and Government agencies.

The proposed expansion project site lies on 26°28'52.76"N Latitude & 88°14'22.24"E Longitude. M/s Sapphire Papers Mill Private Limited is located at Bidhannagar, District Darjeeling, West Bengal which is 37 km away from Siliguri City. The location map of the proposed project is given below as Figure No: 1.1.

Latitudes and Longitudes of the proposed expansion project are as under:

Table 1.1: Project Co-ordinate

Corner	Latitude	Longitude
A	26°28'55.81"N	88°14'15.28"E
B	26°28'53.28"N	88°14'27.25"E
C	26°28'53.71"N	88°14'27.36"E
D	26°28'53.77"N	88°14'27.18"E
E	26°28'57.18"N	88°14'28.19"E
F	26°28'57.15"N	88°14'28.37"E
G	26°28'59.30"N	88°14'29.10"E
H	26°28'58.70"N	88°14'31.60"E
I	26°28'56.68"N	88°14'30.87"E
J	26°28'56.72"N	88°14'30.63"E
K	26°28'54.00"N	88°14'29.62"E
L	26°28'51.85"N	88°14'29.41"E
M	26°28'51.85"N	88°14'28.53"E
N	26°28'51.03"N	88°14'28.41"E
O	26°28'52.41"N	88°14'26.65"E
P	26°28'52.71"N	88°14'25.20"E
Q	26°28'52.06"N	88°14'24.80"E
R	26°28'52.41"N	88°14'23.75"E
S	26°28'51.60"N	88°14'23.33"E
T	26°28'51.50"N	88°14'22.42"E
U	26°28'51.05"N	88°14'22.22"E
V	26°28'51.21"N	88°14'20.36"E
W	26°28'50.96"N	88°14'19.87"E
X	26°28'51.98"N	88°14'16.06"E
Y	26°28'54.78"N	88°14'16.98"E
Z	26°28'55.07"N	88°14'15.19"E

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Centre	26°28'52.76"N	88°14'22.24"E
--------	---------------	---------------

1.4.2 Connectivity

Road: The project site is accessible via National Highway no. 27 (previously called as NH-31) i.e. Kolkata - Siliguri highway which is adjacent (~0.03 Km) to Project site in W direction.

Railway: The nearest railway stations are Dhumdangi and Piprithan which are ~ 5.70 km in E direction and ~ 11.30 km in W direction. New Jalpaiguri Railway Station which is located at a distance of 8 Kms from Siliguri and approx. 30 km from project site boundary in NE direction. It is well connected to Mumbai and Delhi and many cities of the state like Dhupguri, Kishanganj, Katihar, Malda, Bhagalpur and Kolkata etc.

Airway: The nearest airport is Bagdogra International Airport, western part of the city Siliguri which is located at ~ 22.9 km in NNE direction.

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

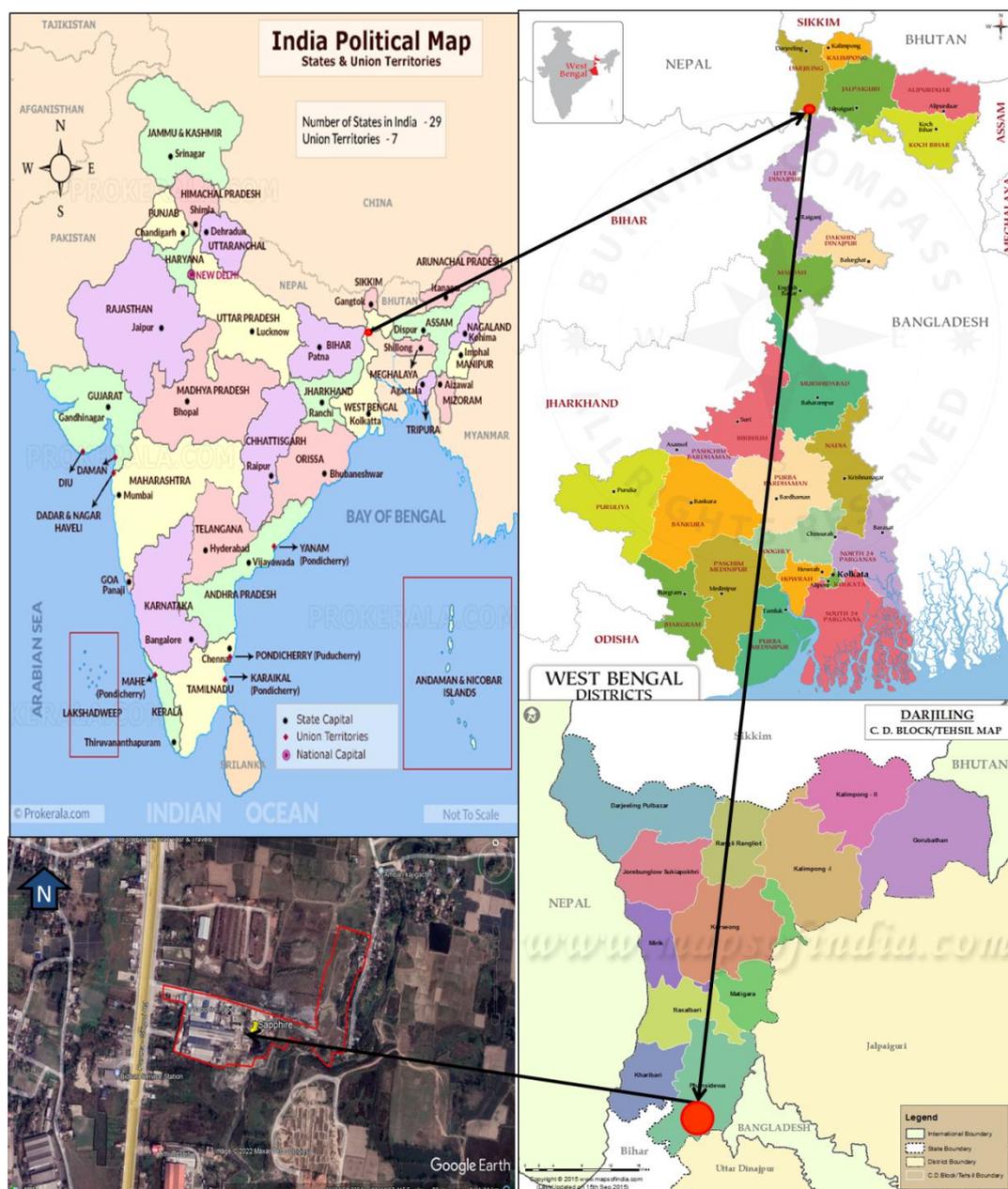


Figure 1.1: Location Map of Proposed Area

1.4.3 Importance to the Country and Region

Demand –Supply Gap

The Writing Printing Paper is used for stationary purpose, printing note books of all sizes and similar other applications. The Newsprint Paper is used for printing of daily newspaper and used by different print media especially.

Since our products are approved by quality conscious users which are multinational companies. We can cater to the ever increasing demand in India as well as in the Export Market.

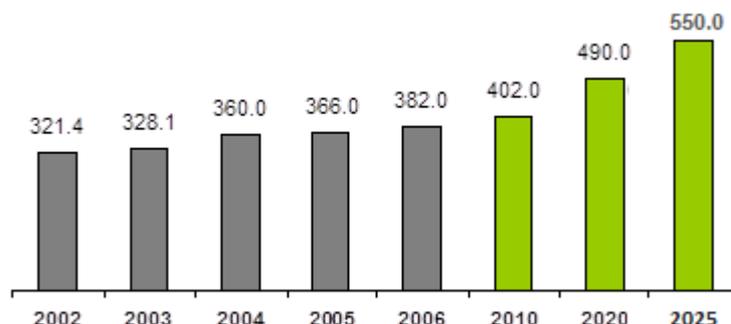
After globalization of Indian market, demand for quality packaging paper is increasing but quality paper manufacturing is not growing as per the demand. Hence, the company shall fill up this gap by proposing a new paper industry.

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

The annual global paper and paperboard production was approximately 382.0 million tonnes in 2006. It increased to 402.0 million tonnes in 2010 and is expected to increase to 490.0 million tonnes by 2020 and 550.0 million tonnes by 2025.

The global pulp and paper industry consists of about 5000 industrial pulp and paper mills, and an equal number of very small companies.

Paper and Paperboard Production – Global Market, 2002-25



Presently, Sapphire is the only Writing and Printing Paper manufacturer (from waste paper) in the region of North Eastern Region. The Demand of entire North Eastern Region is much higher than what the company is able to serve at present.

Thus, the demand is fulfilled by purchasing goods from other states which provide similar quality at comparatively higher cost. The company is presently working at its 100% capacity. 80% of its capacity is used to manufacture writing & printing paper. There exists an un-served demand of company's products, which can be fulfilled once the new project is implemented.

It is pertinent to note that presently, the demand supply gap of the region is being met from the states of Tamil Nadu, Uttar Pradesh, Madhya Pradesh, Punjab, etc. Presently, there is no Newsprint manufacturer from waste paper in entire North East India. This unit is first unit of its kind to manufacture Newsprint from waste paper. To fulfil that demand company proposed expansion.

Imports vs. Indigenous production

The business is fragmented with over 750 paper mills, of which only 50 mills have a power of 50,000 TPA or more. The present demand is estimated at 13.1 million tonnes with domestic production of 11.4 million tonnes, export of 0.5 million tonnes and import of 2.2 million tonnes. The demand is projected to boost to 23.5 million tonnes by 2024-25. The demand drivers include rising income levels, growing per capita expenditure, a likely pick-up from the education sector, requirement of better quality packaging of FMCG products marketed through organized retail and increasing preference for ready-to-eat foods. Most of the materials used for manufacturing paper are derived from the forests. The growing consciousness for preservation of forests and maintenance of ecological balance and biodiversity during the last few years has encouraged use of recycled waste paper for paper manufacturing. Another challenge faced is technology obsolescence. Outdated technology has resulted in low production efficiency as compared to global standards.

Export Possibility

The company has the possibility to export their product in Nepal, Bhutan; Asian Expressway under construction is opening avenues for export to Thailand as well as Bangladesh.

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We already have a working relationship with the following customers of Nepal and Bhutan:

S. No.	Customers	Location
1.	Suswani Trading	Nepal
2.	Kuensel Corp	Thimphu, Bhutan

Domestic / export Markets

The Writing Printing Paper is used for stationary purpose, printing note books of all sizes and similar other applications. The Newsprint Paper is used for printing of daily newspaper and used by different print media especially. These are having very good demand in domestic as well as international markets. The company will now be focusing more on Government Tenders as there is a huge demand in this sector. The company at present, is unable to fulfil this demand due to limited plant capacity.

1.5 REGULATORY FRAMEWORK AND ENVIRONMENTAL CLEARANCE

- Factories Act, 1948
- Factory Licence
- The custom Act, 1962
- The Water (Prevention and Control of Pollution) Act, 1974 and Rules, 1975, as amended to date.
- The Environment (Protection) Act, 1986 and Rules, 1986, as amended to date
- Environment (Protection) Rules, 1991 as amended to date
- The Air (Prevention and Control of Pollution) Act, 1981 and Rules, 1982, as amended to date.
- The Noise Pollution (Regulation and Control) Rules, 2000 as amended to date.
- Solid/Hazardous and Other Wastes (Management and Trans-boundary Movement) Amendment Rules, 2016 as amended to date
- Indian boiler act amendment 2015
- Environment Impact Assessment Notification and Amendments, 2006, 2015.
- Environmental Standards Notification and Amendments, 1993
- Public Liability Insurance Act, 1991 and Rules, 1991, 1992, 1993.
- The Motor Vehicles Act, 1988 & The Central Motor Vehicle rules, 1989
- E-waste (Management and Handling) Rules, 2011 as amended to date
- Electrical Installation Under Electricity Rules, 2005 as amended to date
- The Bureau of Indian Standards Act, 1986
- Consent to Establish and Operate

1.6 SCOPE AND OBJECTIVES OF THE STUDY

Detailed EIA/EMP report has been prepared in line with approved ToR issued by MoEFCC vide letter No. IA-J-11011/234/2022-IA-II(IND-I) dated 20th July 2022. The EIA Study for the proposed expansion project is limited to the project site and study area of 10 km surrounding the project site. As per the guideline of Ministry of Environment Forests & Climate Change (MoEF&CC) the scope of study includes detailed characteristics of

environmental components viz. Air, Noise, Water, Land, Biological and Socio-economic for one season. For the purpose of environmental assessment, the villages in the surrounding areas have been surveyed and relevant data has been collected.

1.7 STRUCTURE OF EIA REPORT

The generic structure of the EIA report as per the guideline provided by MoEF&CC is illustrated in the following tabulated format.

Table 1.2 Structure of EIA report

S. No.	EIA Structure	Contents
1.	Introduction	<ul style="list-style-type: none"> ▪ Purpose of the Report ▪ Identification of project and project proponent ▪ Brief description of nature, size, location of the project and its importance to the country, region. ▪ Scope of the study – details of regulatory scoping carried out (As per terms of reference).
2.	Project Description	<ul style="list-style-type: none"> ▪ Type of project ▪ Need for the project ▪ Site Selection Criteria ▪ Location details showing location, project boundary and project site layout. ▪ Size or magnitude of operation ▪ Project description including drawings showing project layout, components of project etc. ▪ Technology and process description, ▪ Schematic representations of the feasibility drawings which give information important for EIA purpose. ▪ Description of mitigation measures incorporated into the project to meet environmental standards, environmental operating conditions, or other EIA requirements. ▪ Proposed schedule for implementation,
3.	Description of the Environment	<ul style="list-style-type: none"> ▪ Study area, period, components and methodology. ▪ Establishment of baseline for valued environmental components, as identified in the scope. ▪ Study Period: 1st Mar 2022 to 31st May 2022 ▪ Base maps of all environmental components.
4.	Anticipated Environmental Impacts and Mitigation Measures	<ul style="list-style-type: none"> ▪ Details of Investigated Environmental impacts due to project location, possible accidents, project design, project construction, regular operations. ▪ Measures for minimizing and / or offsetting adverse impacts identified. ▪ Assessment of significance of impacts (Criteria for determining significance, Assigning significance), ▪ Impact scores and Mitigation measures ▪ Air quality modeling

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S. No.	EIA Structure	Contents
		<ul style="list-style-type: none"> ▪ Air Quality Index
5.	Analysis of Alternatives (Technology and Site)	<ul style="list-style-type: none"> ▪ Analysis of Alternatives and Other Technology ▪ Selection of alternative
6.	Environmental Monitoring Program	<ul style="list-style-type: none"> ▪ Technical aspects of environmental monitoring for the effectiveness of mitigation measures (including measurement methodologies, frequency, location, data analysis, reporting schedules, emergency procedures, detailed budget and procurement schedules)
7.	Additional Studies	<ul style="list-style-type: none"> ▪ Risk Assessment ▪ Disaster management Plan
8.	Project Benefits	<ul style="list-style-type: none"> ▪ Physical Benefits ▪ Ecological Benefits ▪ Social Benefits ▪ Other tangible Benefits
9.	Environmental Cost Benefit Analysis	<ul style="list-style-type: none"> ▪ Not applicable as it is not recommended on scoping stage and project is located in notified industrial area.
10.	Environment Management Plan	<ul style="list-style-type: none"> ▪ Description of the administrative aspects of ensuring that mitigation measures are implemented and their effectiveness monitored, after approval of the Clearance. The Chapter consists of: <ul style="list-style-type: none"> - Mitigation Measures for Impacts - Pollution Prevention Plan - Greenbelt Development Plan - Waste Management Plan - Environment Management Cell - Budgetary Provisions for EMS
11.	Summary and Conclusion	<ul style="list-style-type: none"> ▪ Overall justification for implementation of the project,
12.	Disclosure of Consultant Engaged	<ul style="list-style-type: none"> ▪ The names of the Consultants engaged with their brief resume and nature of consultancy rendered.

1.8 SUMMARY

M/s Sapphire Papers Mill Private Limited is a large Scale manufacturing unit of Printing/ Writing/ News/ Print Paper from Waste Paper Based Mills located at Plot No. No 2565, 4257, 4260, 4261, 4262, 4263, 4265, 4327, 4328, 4329, 4330, 4338, 4326, 4334, 4331, 4333, 4322, 4336, 4337, 4339, NH – 27 (previously called as NH-31), Jagannathpur, Bidhannagar, Darjeeling, WestBengal – 734426. M/s Sapphire Papers Mill Private Limited proposes to enhance the production capacity of Writing and Printing Paper/Newsprint/Kraft Packaging Paper from 1000 TPM to 4500 TPM and Sundry Board from 40 TPM to 100 TPM. The existing and proposed expansion products (*i.e.* Pulp & Paper Industries) are covered under the Category-5 (i) – Category “B” – treated as category “A” due to applicability of General

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Condition as Bihar state Boundary is within 5 km radius. EIA/EMP report has been prepared in line with approved TOR conditions stipulated by MoEFCC vide letter No. IA-J-11011/234/2022-IA-II(IND-I) dated 20th July 2022. The EIA document has been prepared as per the generic structure of the EIA report and as per the guidelines provided by MoEF & CC.

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2 PROJECT DESCRIPTION

2.1 GENERAL

This chapter described the type, need, location, size or magnitude of the project, operational activities, technology to be used and other related activities. It also provides a condensed description of the aspects which are likely to cause environmental effects to the surrounding environment and mitigation measures provided to meet environmental standards. Capital investment provided for environmental management plan to achieve the statutory norms.

2.2 TYPE OF PROJECT

SPMPL is located in Jagannathpur, Bidhannagar, District Darjeeling, West Bengal, falling under Large Scale Category involved in manufacturing of paper for which the company had obtained Consent to Operate from West Bengal Pollution Control Board Board which is valid upto 31.10.2022. The company proposes to enhance the capacity of existing products Writing and Printing Paper/Newsprint/Kraft Packaging Paper and Sundry Board. Existing project cost is Rs. 52.00 Crore. Proposed expansion Project Cost is Rs. 31.00 Crore. Total cost after proposed expansion will be Rs. 83.00 Crore.

2.3 NEED OF THE PROJECT

As India is a developing country, Writing & Printing, Newsprint paper's demand is increasing day by day and recycled based paper manufacturing production will also conserve the environment by saving trees. This paper is also bio-degradable; perhaps it may be one of the best substitutes of plastic bags in the future. Therefore, it may be helpful to save the environment and conserve natural resources by use of waste paper instead of wood.

The proposed project provides a Potential Growth opportunity for the on-going business of the company. The company is engaged in the business of manufacturing of Paper Industries. The project would also help the company to support the Indian economy in the following way:

- Growth in Export Revenue and thereby increasing the inflow of foreign currency which is much needed by our country.
- Our products are well accepted by international users and can substitute the international speciality Grades. Thus the Domestic Industry can replace the imported papers used by them with ours and there by curtail the outflow of foreign currency spent on papers imported by them.
- Potential increase in Job opportunities for the Local surroundings.
- Boost to the Local service providers and the overall improvement in the economic activities like Local raw materials Suppliers, Transporters, contractors, clearing and forwarding agents and other allied suppliers.
- Moreover, Sapphire is the only mill in the region, producing finest quality of writing-printing paper, used mainly in Note Books, Text Books etc.
- The literacy rate in the region is increasing multifold, which will need higher quantity of good paper, the other demand drivers and growth triggers have come from a combination of factors such as rising income levels, growing per capita expenditure, rapid urbanisation and a larger proportion of earning population which is expected to

lead consumption and there is enormous potential for the paper industry in the region.

2.4 PROJECT LOCATION

The proposed expansion will be carried out in Plot No. 2565, 4257, 4260, 4261, 4262, 4263, 4265, 4327, 4328, 4329, 4330, 4338, 4326, 4334, 4331, 4333, 4322, 4336, 4337, 4339, NH – 31, Jagannathpur, Bidhannagar, Darjeeling, West Bengal – 734426. The company had obtained Consent to Establish and Operate from West Bengal Pollution Control Board for existing unit. The total project cost has a budget of Rs. 83.00 Crore including the existing cost. Existing total land area of the project is 44248.32 m². Additional land 11765.72 m² will be required for proposed expansion which will be utilized from the vacant land 22290.43 m² of the existing total land area. Land Documents of the plots is attached as Annexure 13.

The proposed expansion project site lies on 26°28'52.76"N Latitude & 88°14'22.24"E Longitude. Proposed project is located adjacent to the National Highway No. 31 i.e. Kolkata - Siliguri highway. Short view and Long view of Google Earth is depicted as Figure 2.1 and 2.2 respectively.

The SPMPL. has an Plant and processing area, Storage area, utilities area, etc. The existing facilities will be used for proposed expansion by developing additional storage area, utilities area and other required area for the project.



Figure 2.1 - Photographs of Site

2.4.1 Site Selection Criteria

Site selection was guided by many factors like availability of infrastructures, land, water sources, fuel, transportation, power etc.

Specific site selection criteria consider for the project is given below:

- The land for the expansion is already in the possession of project proponent as expansion to be executed in the existing premises.
- The existing project site is well connected by road to National Highway No. 27 (0.03 km).
- Easy availability of manpower for the expansion project.
- All the existing infrastructures are available for the proposed expansion.

In addition to the above, the following factors within the study area (10 km) have also been

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considered:

- There is no National Park or Wild Life Sanctuary.
- There are no metropolitan cities.
- There are no ecologically sensitive areas.

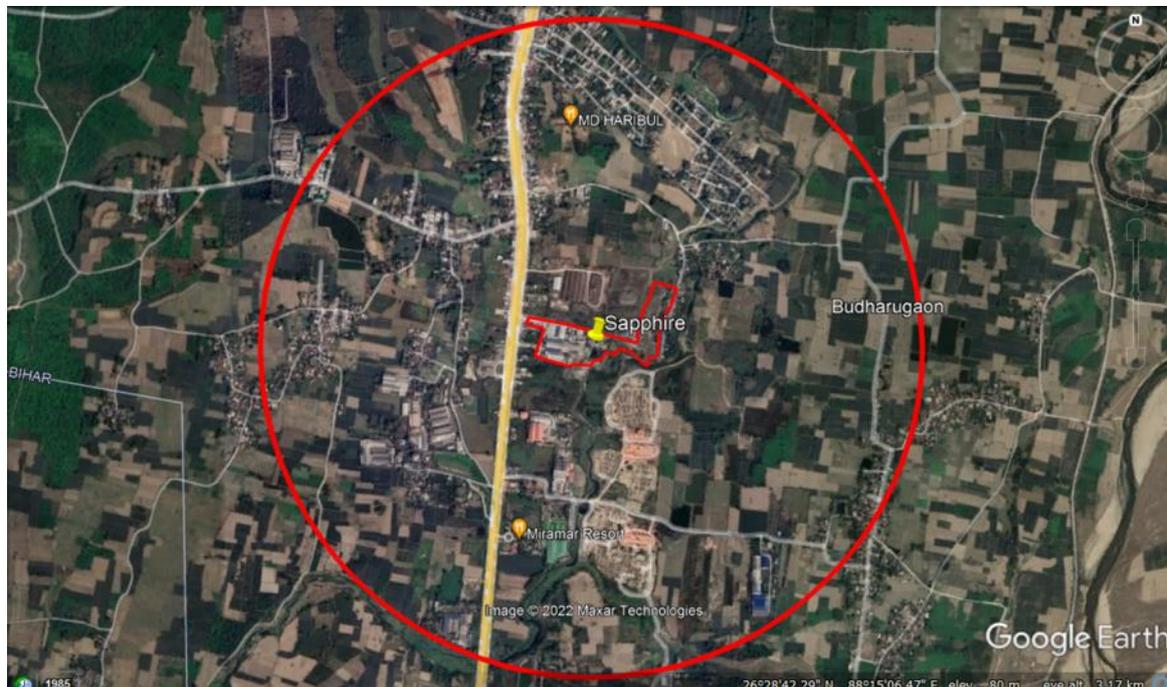


Figure 2.2: Google Earth Image (Short View)

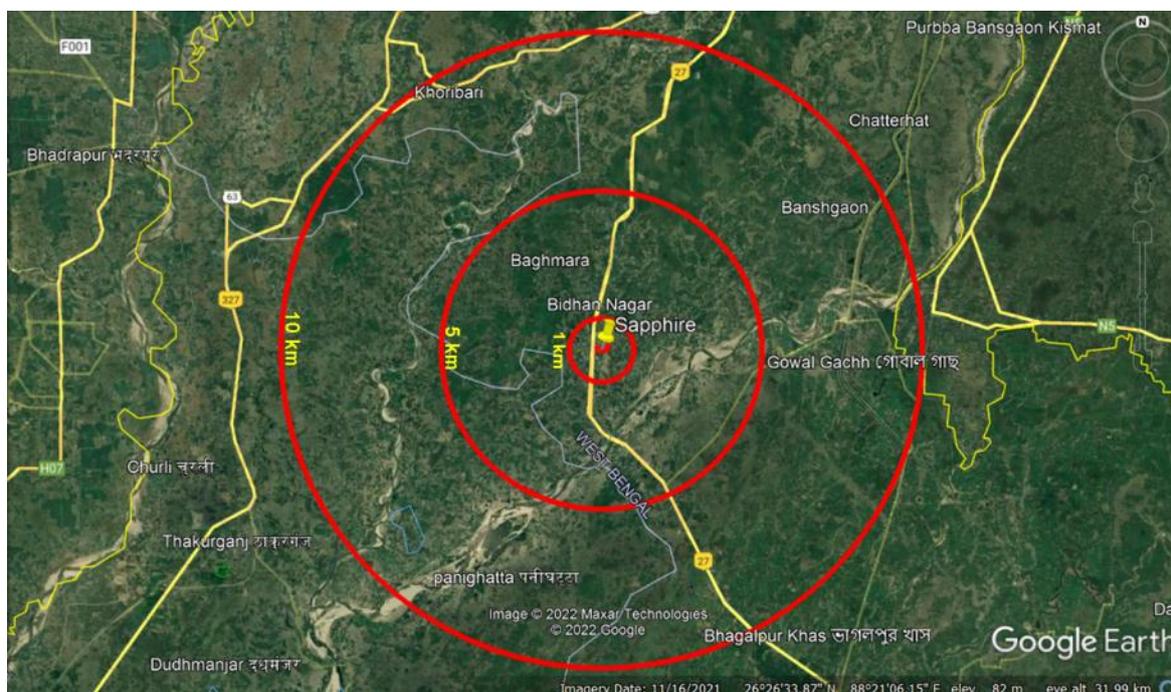


Figure 2.3: Google Earth Image (Long View)

2.4.2 Salient Features Study Area

The salient features of the project site are mentioned in below table:

S. No.	Particulars	Details
1.	Elevation of project site	77-79 m
2.	Topography of the plant site	Flat terrain
3.	Nearest Village	Budharugaon – 1.00 km. (E)
4.	Nearest City	Bidhannagar – 1.10 km. (N)
5.	River/ canal/ pond	<ul style="list-style-type: none"> • River Mahananda – 1.94 km. (SE) • Bhimbhar Sayedabad Pukur Pond – 4.45 km (NNE) • Teesta Canal – 7.44 km. (E) • Gobra River – 11.6 km. (ESE) • Dahuk River – 11.75 km. (S) • Mechi River – 13.13 km. (W)
6.	State Boundary	Bihar state – 1.08 km (WSW)
7.	International Boundary	<ul style="list-style-type: none"> • Bangladesh – 9.1 km. (E), • Nepal – 13.0 km. (W)
8.	Defence area	Military area – 27.3 km. (NNE)
9.	Religious units	<ul style="list-style-type: none"> • Krishna Mandir – 8.4 km. (ENE) • Kali Mandir Thakurganj – 12.5 km. (WSW)
10.	Schools	<ul style="list-style-type: none"> • Muligunj High School – 0.9 km. (N) • Santoshani High School – 1.27 km. (N) • MG Higher Secondary School – 4.9 km. (SSE) • Bidhan Nagar Kurban Ali High School – 1.82 km. (NNE)
11.	Ecologically sensitive area such as National Park, Wild life, Biosphere Reserve within 10 km radius from project site.	No Ecologically sensitive area such as National Park, Wild life, Biosphere Reserve present within 10 km radius from the project site.
12.	Sites of Historical/ Archaeological Importance	None within 10 km radial periphery

Note: All the above-mentioned distances are the aerial distances from the project site.

2.4.3 Climatic Conditions from secondary sources

Secondary data for weather conditions in the region is available. For 30 years i.e. from 1981-2010, published by Indian Meteorological Department. Jalpaiguri (station code: 42399) is the nearest IMD Station from proposed project site located at an aerial distance of ~20.0 Km in West direction.

➤ **Temperature**

- In winter season, mean daily maximum temperature was recorded between 24– 26.7 °C. The extreme highest 35.4°C was recorded on 31st January 1987 and 25th February 1987. Mean daily minimum temperature was recorded between 10.4 – 12.8 °C. The extreme lowest 2.2°C was recorded on 03rd February 1905.
- In summer season, mean daily maximum temperature was recorded between 30.1 – 32.5°C. The extreme highest 40.4°C was recorded on 20th May 1987. Mean daily minimum temperature was recorded between 16.6 – 23.1°C. The extreme lowest 7.8°C was recorded on 1st March, 1906.
- In the post monsoon, mean daily maximum temperature was recorded between 26.4 – 31.8 °C. The extreme highest 38.4°C was recorded on 30th October, 1987 and 25th November 1986. Mean daily minimum temperature was recorded between 13 – 21.6°C. The extreme lowest 5.6°C was recorded on 18th December, 1918.

➤ **Humidity**

- In winter season humidity in morning hours’ ranges between 81 – 87 % while in evening hours it was between 71 – 78 %. In summer humidity in morning hours’ ranges between 73 – 81 % while in evening hours it was between 67 – 76 %. Summer is hot and humid. In post monsoon season humidity in morning hours’ ranges between 79 – 83 % while in evening hours it was between 77 – 81 %. Highest humidity levels observed during June – Sept. months which is period of active monsoon season. Humidity in morning hours remains between 86 – 89 % and in evening hours it was remains between 81 – 84 %.

➤ **Wind speed**

- Low to moderate wind speed is normal phenomenon in the region. Throughout the year wind speed remains between 1-19 Kmph and also it is same during monsoon period.

➤ **Rainfall**

- Annual total rainfall of was recorded 3395.1 mm. Season wise distribution include, 29.5 mm in winter, while 440 in summer, 2764.3 mm in monsoon and 161.3 mm in post monsoon. It was observed that, 81% rainfall was in monsoon season.

2.5 RESOURCE REQUIREMENT

2.5.1 Land Requirement

The SPMPL has a Processing area, storage area, roads etc. The existing land having area is 44248.32 m² has been already in possession of SPMPL. Additional land 11765.72 m² will be required for proposed expansion which will be utilized from the vacant land 22290.43 m². Land Document is attached as Annexure 13.

Table 2.1: Land Break up Details

S. No.	Particulars	Area in m ²			Area in %
		Existing	Proposed	Total	
1.	Plant processing area	4220.48	-	4220.48	9.54
2.	Storage area	3024.76	1438.64	4463.40	10.09

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3.	Utilities area such as boiler, ETP etc.	1910.71	337.6	2248.31	5.08
4.	Other miscellaneous – Toilet, Parking, office	2082.67	35.48	2118.15	4.79
5.	Roads	5718.43	-	5718.43	12.92
6.	Green belt area	5000.84	9954	14954.84	33.80
7.	Open Space	22290.43	-11765.72	10524.71	23.79
8.	Total Plot Area	44248.32	00	44248.32	100

Layout plan showing location of processing area, greenbelt area, internal road, parking etc. is depicted as **Figure 2.4**.

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

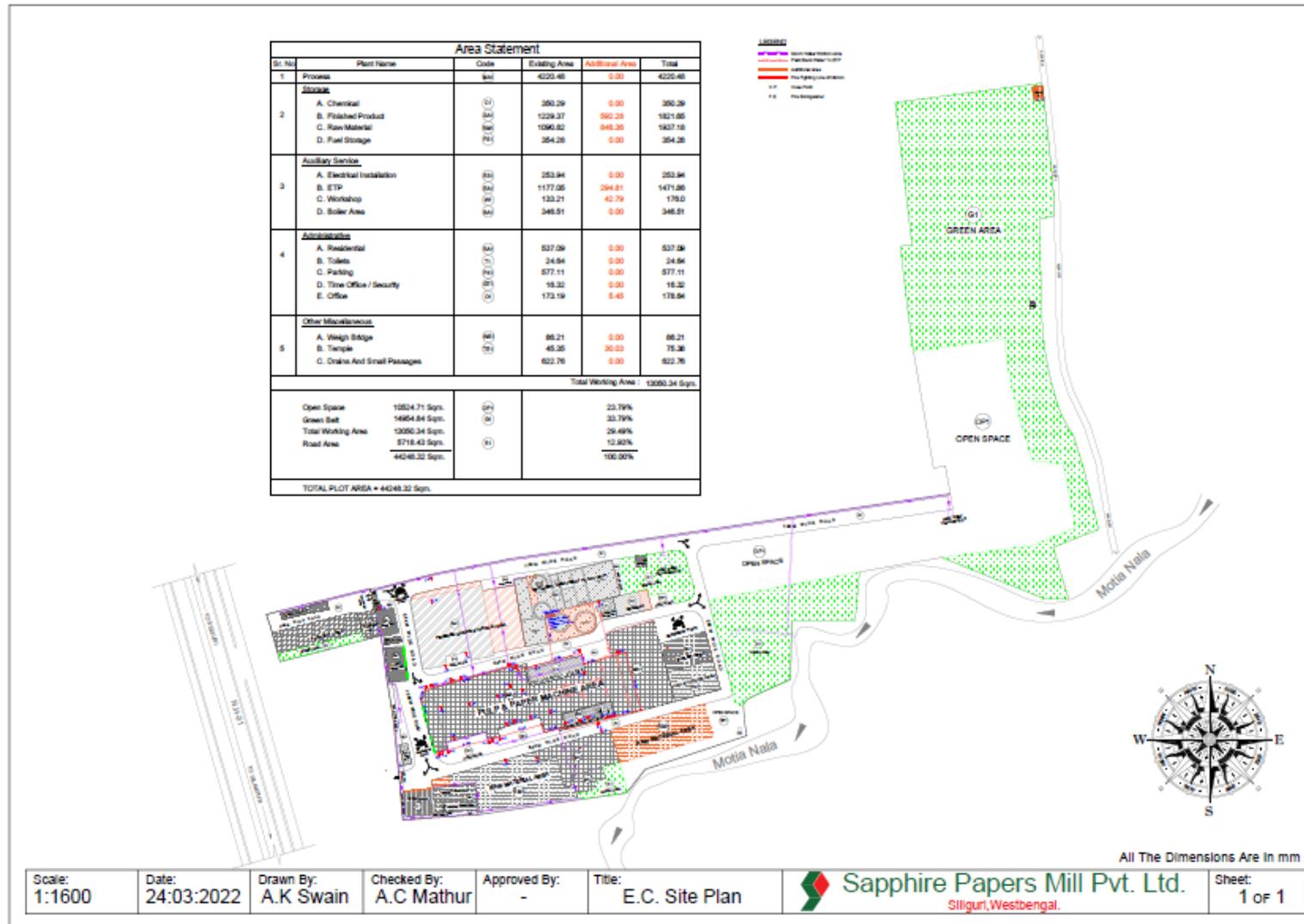


Figure 2.4: Plant Layout

2.5.2 Man Power

- During the construction phase approximate 20-25 Nos. of workers will be required.
- There will be opportunity of employment generation directly and indirectly due to proposed expansion project. Due to proposed project there will be requirement of supervisor, operator and semi-skilled workers. For this, the company will employ about additional 26 people to fulfil it's need to handle the plant.
- Presently there are 104 numbers of employees. There will be additional 26 numbers of employees, thus total 130 numbers of employees after proposed expansion.

2.5.3 Energy Requirement

Power for the existing facility is supplied by West Bengal State Electricity Distribution Company Limited (WBSEDCL). Existing Contract Demand Letter from WBSEDCL is available for 1499 KVA.

S. No.	Particulars	Quantity, KVA			Source
		Existing	Proposed	Total	
1.	Power – Electricity Requirement	1300	1200	2500	West Bengal State Electricity Distribution Company Limited.

2.5.4 Fuel Requirement

S. No.	Particulars	Quantity			Source
		Existing	Proposed	Total	
1.	Coal	400 kg/h	1200 kg/h	1600 kg/h	Indian coal -Through open market
2.	Rice Husk	600 kg/h	1700 kg/h	2300 kg/h	Local sources
3.	Diesel (HSD)	6 LPH	-	6 LPH	As and when required

2.5.5 Steam Requirement

Particulars	Existing	Proposed	Total	Source
Steam Requirement	60 TPD	180 TPD	240 TPD	Proposed to install 10 TPH boiler. Existing 6 TPH boiler will be kept as Standby, use in case of emergency

2.5.6 Utility

Particulars	Existing	Proposed	Total	Source
Boiler	6 TPH	10 TPH	10 TPH	Existing Boiler of 6 TPH will be kept as standby after proposed expansion.

2.5.7 Water Requirement

Construction Phase:

Around 10 KLD fresh water will be required for domestic activities and construction activities.

Operation Phase:

The existing fresh water requirement is about 256 KLD whereas fresh water requirement will be increased to about 740.6 KLD after proposed expansion. Hence the additional fresh water requirement due to the proposed expansion will be about 484.6 KLD. The specific fresh water consumption will be reduced due to installation of modern equipments and adoption of other recycling measures from 7.68 m³/Tonne of product to 4.93 m³/Tonne. As per Ganga Charter norms specific fresh water consumption shall be less than 15 m³/ Tonne of product and thus the facility will meet the prescribed norms. Groundwater is used as source of water. The facility has permission to withdraw 600 KLD of ground water. An application has been submitted for obtaining additional water from State Water Investigation Directorate, Kolkata. Ground water permission letter and application letter attached as Annexure 05.

Table 2.2 A: Water Consumption Details - Existing

S. No.	Particulars	Water Consumption (m ³ /day)	Remark
A.	Domestic	4.6	-
B.	Industrial		
1.	Processing	4837.9	4607.54 KLD recycled water
2.	Washing	10	-
3.	Boiler	55.5	44.46 KLD recycled water
	Total Industrial	4903.4	-
	Total (A+B)	4908.00	-

Table 2.2 B: Water Consumption Details - After expansion

S. No.	Particulars	Water Consumption (m ³ /day)	Remark
A.	Domestic	7.2	-
B.	Industrial		
1.	Processing	22071.3	20945.9 KLD recycled water & 442 KLD Treated water from ETP
2.	Washing	10	Treated water from ETP
3.	Boiler	252.1	202.1 KLD recycled water
	Total Industrial	22333.40	-
	Total (A+B)	22340.60	-

2.5.8 Capital Requirement

Estimated project cost for proposed expansion shall be approximately 31 Crore for total production of 4500 MT/Month. Capital cost includes cost towards plat and machinery, building, environmental management plan etc. are mentioned in Table 2.4.

Table 2.3: Cost Breakup

Sr. No.	Purpose	Total cost (Rs. In Crores)		
		Existing	Proposed	Total After Expansion
1.	Land	0.60	-	0.60
2.	Plant & Machinery	30.30	15.00	45.30
3.	Building	7.50	2.00	9.50
4.	Electrification and Laboratory set up and miscellaneous	10.00	9.00	19.00
5.	Environment Management System	3.60	5.00	8.60
TOTAL		52.00	31.00	83.00
CER Activities (1 % of Proposed Investment)		0	0.31	0.31

2.6 PRODUCT AND RAW MATERIAL

2.6.1 Product Details

The Writing Printing Paper is used for stationary purpose, printing note books of all sizes and similar other applications. The Newsprint Paper is used for printing of daily newspaper and used by different print media especially. Kraft paper is used in packaging operations for packing, wrapping individual items, bundling and void fill. These are having very good demand in domestic as well as international markets.

Table 2.4: Product Details

S. No.	Name of the Product/Unit	Existing Capacity	Proposed Capacity	Total Capacity	Remarks
1	Writing and Printing Paper/Newsprint/ Kraft Packaging Paper	1000 TPM	3500 TPM	4500 TPM	Using recycled paper by installing SFT (secondary fibre treatment) unit, up gradation / modernization of paper Machines and supporting facilities.
2	Sundry Board	40 TPM	60 TPM	100 TPM	Secondary fiber collected from the ETP.

Table 2.5: Transportation of Product

S. No.	Product	Physical State	Dispatch	Packing & Means of transportation
1.	Printing/ Writing/ News Print/Kraft Paper	Paper	Domestic & Export Market	Roll form through container

2.6.2 Raw Material Details

Table 2.6: Raw Material Consumption & Transportation

Sr. No.	Name of Raw material	Existing (TPM)	Proposed (TPM)	Total (TPM)	Source	Mode of Transportation
1.	Waste paper	1170	3937.5	5107.5	Local Waste paper collectors/suppliers, locally and North eastern states	Bags in Trucks
2.	Soap Stone Powder	6	19	25	Local Manufacturers in Uttarakhand	Bags in Trucks
3.	Alkyl Ketone Dimer (AKD)	14	40	54	Local Manufacturers in Amritsar & Kolkata	Road Transport by trucks
4.	Other miscellaneous chemicals	30	97	127	Local Manufacturers in Amritsar and Kolkata	Road Transport by Trucks

2.7 MANUFACTURING PROCESS

Project Proponent has adopted successful best process technology for manufacturing of paper. The company is/ will use modern machine and equipment's with emphasis on waste minimization techniques.

2.7.1 Paper Manufacturing

The waste paper (raw materials) is mixed with water in high consistency (HICON) slusher, the mixed stock of waste paper fibre and water is then passed through Contaminex for plastic removal followed by High Density Cleaner for Metal pins removal, entire stock then further cleaned in Coarse screens and centric cleaners for removal of fibre lumps, after coarse cleaning, stock in diluted form is fed to secondary fibre treatment (SFT) for the purpose of slushing and detraging to remove all the contaminants including printing inks.

The treated fibre is further cleaned in Fine screen and finally cleaned stock which is in diluted form is thickened in Disc filter for further processing. Thickened pulp is then subjected to chlorine free hydrogen peroxide treatment.

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Final cleaned stock of waste paper pulp is passed thru brushing refiner for mechanical action on fibre for better paper sheet formation, the stock is then mixed with filler and fluid resisting chemical and fed to head box of the paper machine, from head box stock in regulated form flows on top of wire part of the machine where excess water is drained out through hydro-foils and vacuum boxes and an even sheet is formed.

The sheet thus formed on wire is then passed thru set of rollers supported by felts for further water removal by mechanical pressing in Press Section, the sheet coming out of Press section still has considerable amount of water in it which is then dried in dryer section by passing through a series of steam heated dryers, by which the inherent moisture of the fiber evaporates, making the sheet dry.

Final dry sheet of paper is subjected to Calenders to impart surface smoothness characteristics and reeled on the large spools, Large spools of paper then converted into smaller reels/Sheets on Slitter rewinder/Sheet cutter and final product coming out from converting section is shipped after finishing and packing.

Proposal under Expansion and Modernization Plan

The present production plant is capable to produce 1000 TPM of quality Writing & Printing paper, Newsprint paper. To increase the capacity of the production to 4500 TPM, change in the existing equipment and some additional equipment is proposed.

The Stock preparation unit will consist of the following additions:

- Waste Paper Slushing System
- High Density Cleaner
- Three Stage Coarse Screening
- Centri-Cleaning System
- Secondary Fibre Treatment
- Three Stage Fine Screening
- Thickening by Disc Filter
- Reductive peroxide treatment (Chlorine free)
- Brushing Refining
- Stock Mixing and Approach Flow
- DCS, Electricals and Accessories for the stock preparation system

Some of these equipments are available in the lesser capacities which will be appended as a parallel line in the flow to augment the fibre-line to process broke generated during paper making and to process purchased readymade agro-pulp.

2.7.2 Process Flow of Proposed Expansion and Modernization Project

Waste Paper Slushing System

The new Waste Paper slusher will be of 18 cu.m. capacity to handle almost 5-6 Tonnes per hour in order to achieve the higher production. Combined with the best available design for the rotor and the ancillary equipment like contaminex and contaminex pump, this system will ensure not only the best treatment of fibre but also the proper handling of the resultant reject. The system has most modern design to attain a recovery of 95-98% of fibre content of waste paper.

High Density Cleaner

The high-density cleaner handles all the heavy rejects like staples, pins and big sizes of stones, etc by naturally using centrifugal force. The high density cleaner will have a patented centre dilution technology that ensures the maximum fibre acceptance and the optimum reject separation with no fibre attachment to rejects.

Three Stage Coarse Screening

Coarse Screening is the first stage of screening that will ensure in three stages the rejection of adhesives, plastics apart from ensure the disentangle of fibre flocs.

Centri-Cleaning System

The state of the art centri cleaning system will ensure the trouble-free rejection of sand and fine particles from the pulp solution. It is a closed-loop system as against the open systems available generally, which means better cleanliness and better pulp and water management.

SFT (Secondary Fibre Treatment)

Floatation cells with finely designed pump sensors Removal of hydrophobic contaminants such as printing inks, stickies, etc. from secondary fibre stocks.

Three Stage Fine Screening

The ultra-modern fine screening technology ensures optimal removal of stickies and very fine contaminants.

Thickening by Disc Filter

Bagless Thickening are one of the latest offering of Voith which will ensure the best reuse of water and a single step of thickening of pulp stock.

Reductive peroxide treatment (Chlorine free)

Secondary fibres will be treated with hydrogen peroxide, additives and detergents and the brightened RCF will be subjected to further treatment.

Brushing Refiner

The refiner at the last stage of the fiber line will ensure that the separated clean solution of fibers in the pulp are “brushed” like the brush used in cleaning clothes to remove ardent contaminants sticking to the pulp and also to fibrillate the fibers which will help in the paper making by facilitating bonding.

Stock Mixing and Approach Flow Solutions

The commix and the hydromix system with double dilution will ensure proper mixing of water, recycled waste paper fiber, purchased agro pulp fiber, chemicals and other additives at the end of the stock preparation line before the paper making starts. Apart from these, there is an additional Centricleaner Supply to act as last-minute inspection for contaminants before paper making.

DCS, Electricals and Accessories for the stock preparation system

Voith is the primary supplier in the stock preparation area. The technology upgrades in all areas envisages automation systems for better control and predictability of operations. For the various accessories like pumps, motors, electrical automations and drives, the suppliers are Andritz, Siemens etc.

Save-All Disc Filter (Infiltra Disc Filter IDF)

This is an ultra-modern fiber recovery equipment which will give a clear filtrate by recovering fiber and reduce drastically the load on the effluent treatment plant. Disc Filter will help to reduce the effluent and increase water recirculation. The water recovered will be clear with TSS < 20 mg/l which will help to reduce fresh water consumption.

Headbox

The function of a headbox is to deliver a uniform jet of furnish having essentially the same width as the paper web to be produced. The headbox will be suitable for handling 150 TPD production with the desired quality levels.

The headbox is critical for the formation, and all the final dry properties of paper. This is the heart of the paper making section.

Bi-Nip Press and other Paper Machine Modification:

There are mainly three aspects in the paper machine:

- Wire Table
- Press Section
- Dryer Section

To handle the required doubling production, the paper making machine will have to produce paper at a faster speed. The primary role of the paper making machine will be to dry the stock – by natural dewatering on the wire, then by vacuum section, then mechanically by the press section, and finally by the costly dryer section.

A suction couch is required to speed up the machine and better the drying capacity. The existing press section will be upgraded from single nip to bi-nip

The bi-nip configuration essentially means that instead of a single nip, there will be a double nip in order to increase the rate of mechanically dewatering the paper. In bi-nip press there will be a suction pick up cum press roll followed by central ceramic coated roll and BDR roll. All three rolls will make two nips for pressing.

Uni-run section of dryers will be added to help take care of flint and dust in the final product. The number of dryers will need to be added to increase drying of paper and thereby increasing the speed of the machine in order to make almost 6-7 tons per hour. Apart from this, some drives will have to be added in order to accommodate this addition of Bi Nip Rolls and dryers.

Steam and Condensate System

A very important cost head of operation in any paper mill is the fuel consumption for drying of paper. As such it is imperative to keep it abreast with the latest technology of the day to keep cost to a minimum. An effective steam and condensate system regulates the proper utilisation of steam for drying of paper in the dryer section of the paper machine, besides recovering the maximum amount of the consequent condensate to further reduce the fuel demand in the boiler or power plant. With the help of an electro-mechanical arrangement, various checks are installed keeping various aspects of steam engineering in mind. Kadant are world leaders for steam and condensate systems especially for paper mills.

Finishing House Rewinder

A rewinder to cater to higher speed of the machine will be required in the finishing house. A rewinder essentially converts a Jumbo Reel made on a paper machine into finished reels ready for despatch suitable for printers, publishers as per their ordered sizes. Rewinder is required to cater to the increased finishing house requirement as per the increased production.

Finishing House Sheeter

A simplex sheeter to handle the complex variety and combination of sizes for sheet orders will be required on site. Moreover, for the improved quality that we would make the cut size of the sheet with maximum accuracy resulting in better acceptability in the printing segment.

The manufacturing process flow diagram is presented in material balance diagram is presented in Figure below.

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

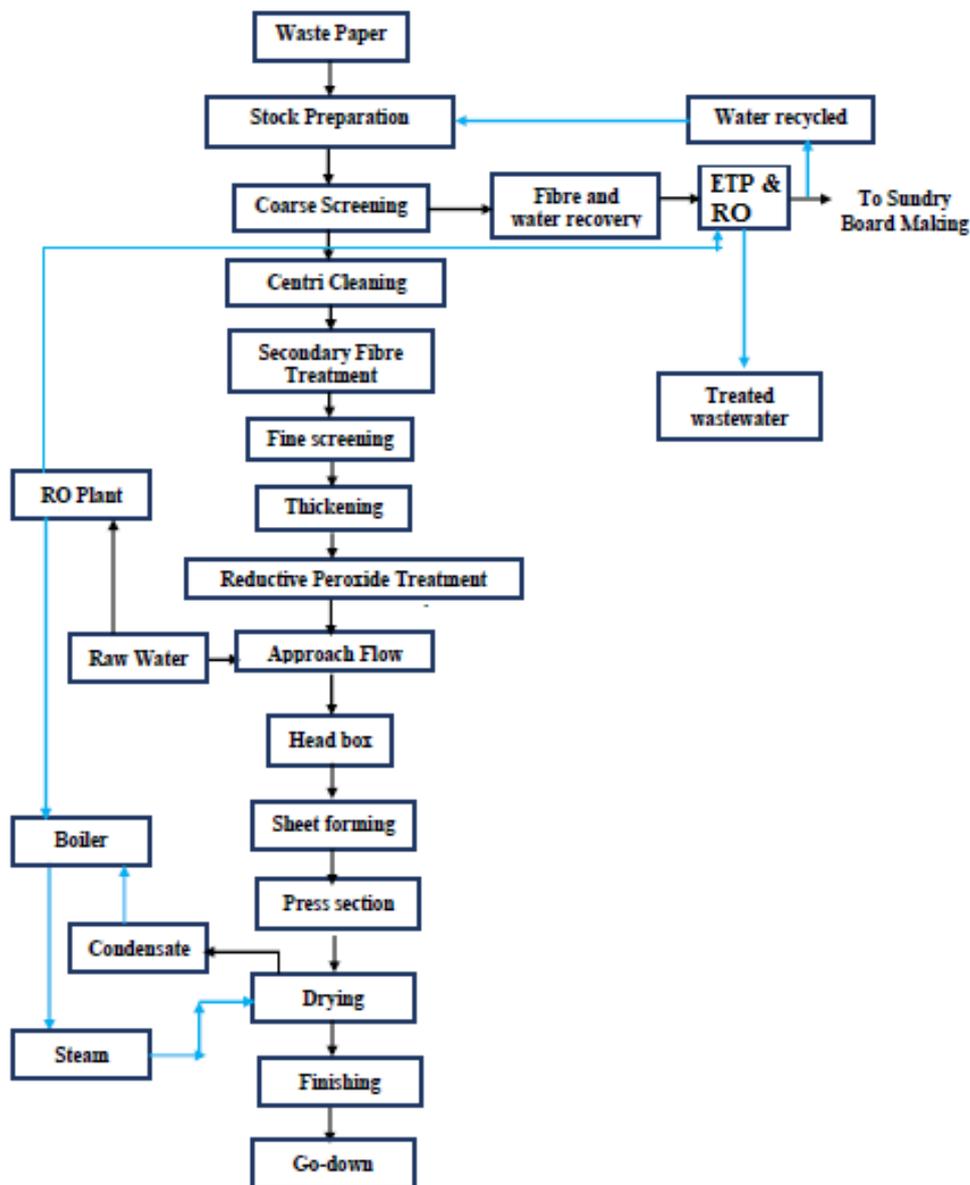


Figure 2.5: Process Flow Diagram Paper

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

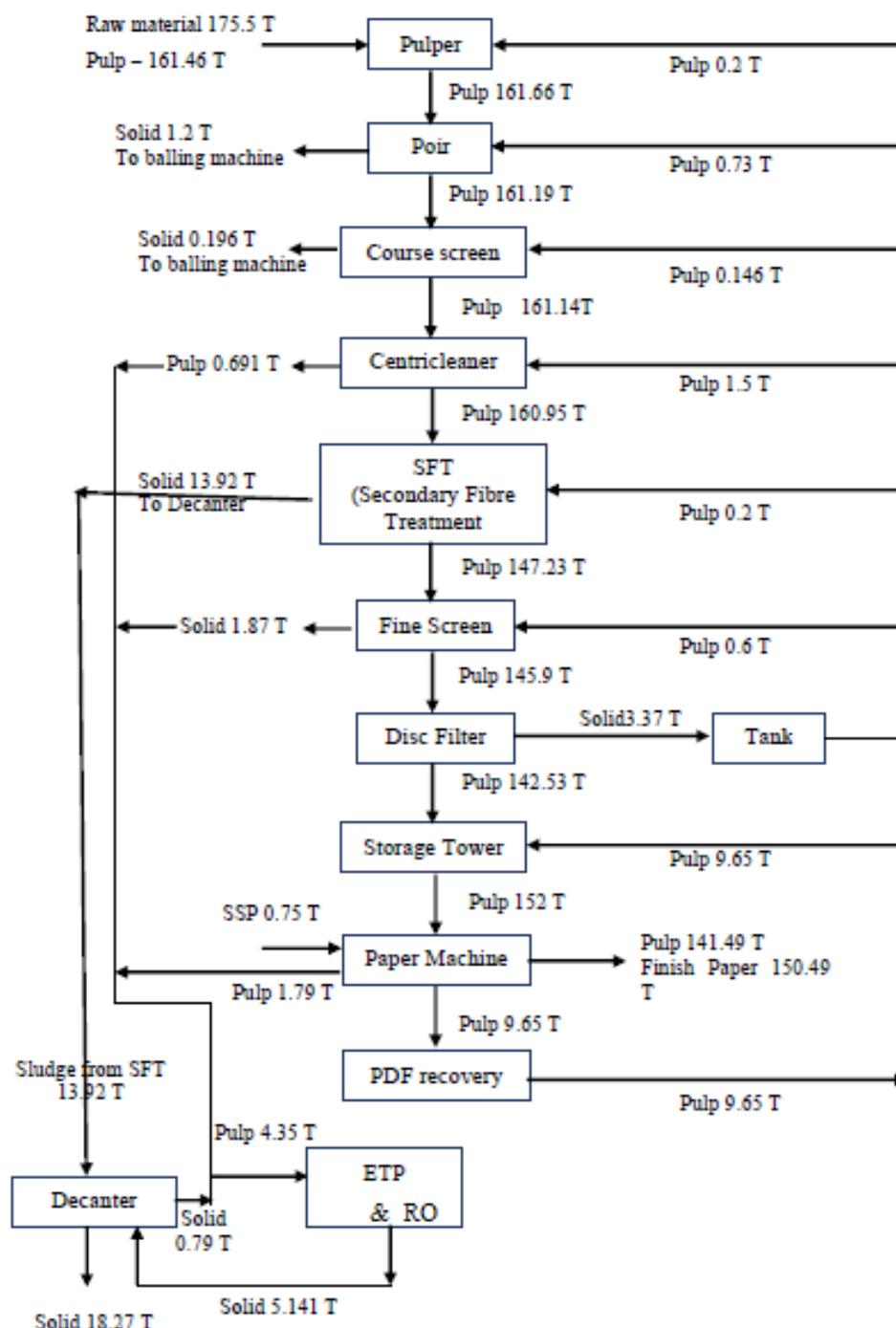


Figure 2.6: Mass Balance Diagram

2.8 POLLUTION POTENTIAL & ITS CONTROL MEASURES

Based on the overall process study/manufacturing details etc. following are the details of pollution potential v/s. mitigation measures proposed by the company in areas of wastewater management, air pollution, hazardous waste handling and management respectively as per the details given below:

2.8.1 Air Environment

At present, the unit is having existing Boiler with 6 TPH of Capacity and 35 m of chimney with Mechanical dust collector and Bag filter as APC device. Same will be kept standby after proposed expansion and use in case of emergency.

The unit will install additional one 10 TPH boiler having Bag filter and 35 meters height of chimney will be provided.

There is/will not be process emission from existing and proposed project.

Table 2.7: Air Pollution Control Details

S. No.	Source of emission With Capacity	Stack Height (meter)	Type of Fuel	Quantity of Fuel (MT/Day)	Type of emissions i.e. Air Pollutants	Air Pollution Control Measures (APCM)	Remarks
1.	Existing Steam Boiler (6 TPH)	35	Indian Coal/ Rice husk	400/ 600	PM SOx NOx	Mechanical dust collector and Bag filter	Will be kept standby after proposed expansion and use in case of emergency
2.	Steam Boiler (10 TPH)	35	Indian Coal/ Rice husk	1200/ 1700	PM SOx NOx	Bag filter	--

2.8.2 Water Environment

Existing:

- At present the total Industrial wastewater generation from Process, Boiler Blow Down and washing is 194.39 KLD which will be treated in ETP and 145 treated effluent will be reused for quenching and gardening. 4607 KLD waste water is recycled in process and 44.46 KLD is recycled in boiler. Domestic waste water 4.2 KLD is passed through Septic Tank/Soak Pit System.

After Expansion:

- After proposed expansion, additional effluent will be treated in modified effluent Treatment Plant. Existing ETP capacity is 450 KLD and after proposed expansion it will be augmented to 1000 KLD with required equipment to handle additional hydraulic load post expansion operations.
- Generated wastewater will be treated in ETP and around 452 KLD treated water will be recycled back in to manufacturing process, 50 KLD will be utilized for quenching on road, rice and ash and remaining 336.2 KLD wastewater will be utilized for irrigation.
- The treated wastewater quality is/will be maintained within the standards prescribed by CPCB/SPCB and Consent conditions. Unit has 25,479.54 sq.meter area within premises for discharge of existing effluent after treatment. For discharge of additional effluent unit

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will procure about 13.66 Acre irrigation land for complete utilization of treated effluent.

- Domestic waste water 6.2 KLD will be sent to septic tank/soak pit system.

Table 2.8: Waste Water Generation

S. No.	Particulars	Existing (KLD)	Additional (KLD)	Total After expansion (KLD)	Remarks
1.	Domestic	4.2	2.0	6.2	Sent to Septic tank/soak pit
2.	Industrial				
	Process	181.06	720.24	901.3	Sent to ETP for Treatment
	Boiler	4.33	15.17	19.5	
	Washing	9	0	9	
Total		194.39	735.41	929.8	
Total (1+2)		198.59	737.41	936.00	

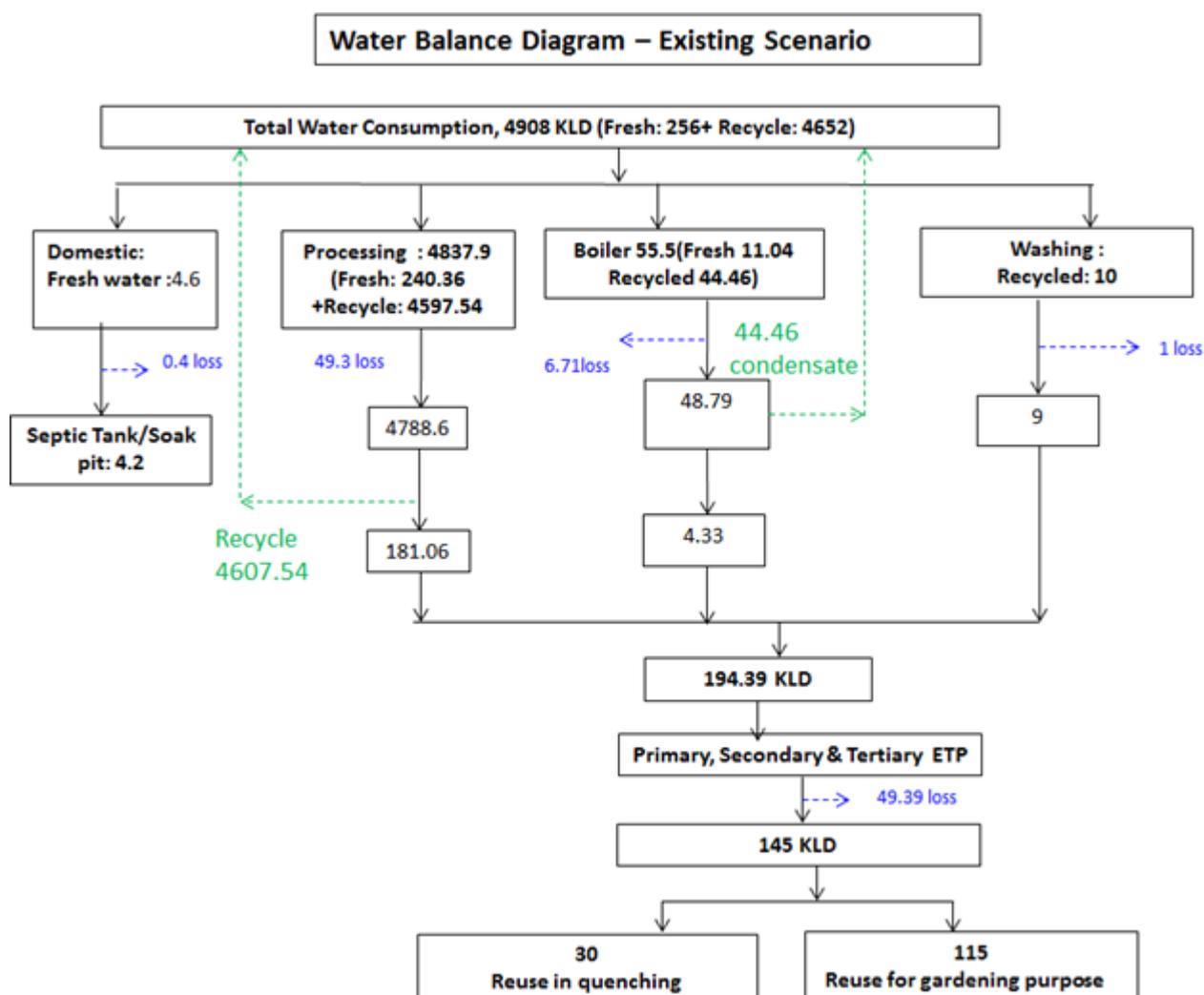


Figure 2.7: Water Balance Diagram for Existing Paper Manufacturing Process

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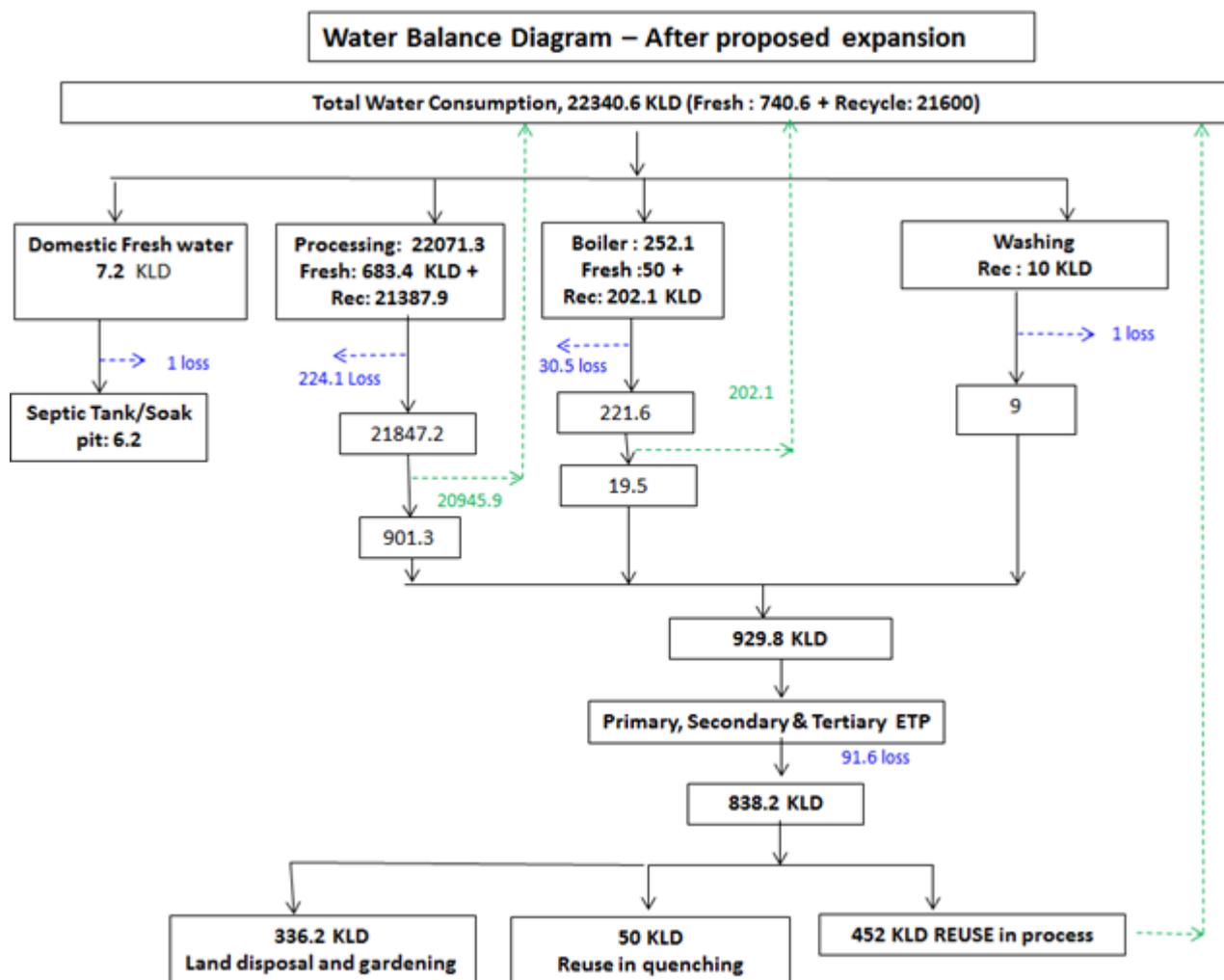


Figure 2.8: Water Balance Diagram for Proposed Paper Manufacturing Process

2.8.3 Solid and hazardous wastes

Solid and hazardous wastes generated at the end of manufacturing process or waste treatment process. Waste is/will be stored on impervious floor having roof and boundary wall. Management of generated wastes will be done as per HW (Management, Handling and Trans boundary Movement) Rules, 2016 and same is mentioned in Table 2.13.

The hazardous waste generation from plant will be used oil. ETP Sludge from primary clarifier & SFT, Metal pins, plastic waste, Rice husk ash and fly ash will be generated as solid waste from proposed project.

Table 2.9: Solid and Hazardous Waste Details

S. No.	Type/Name of Hazardous waste	Category and Schedule as per HW Rules.	Quantity (MT/Annum)			Disposal Method
			Existing	Additional	Total	
1.	Used oil	Sch:I/5.1	0.25	1.75	2.0	Will be sent to Authorized/ registered

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S. No.	Type/Name of Hazardous waste	Category and Schedule as per HW Rules.	Quantity (MT/Annum)			Disposal Method
			Existing	Additional	Total	
						recycler.
Solid Waste Generation						
2.	Rice husk ash	-	1095	2920	4015	Similar to existing practice, will be given to brick manufacturers.
3.	Fly ash generation (worst case scenario @ 100 % coal consumption)	-	1095	3285	4380	Similar to existing practice, will be sent to fly ash brick Manufacturers.
4.	ETP primary clarifier sludge	-	730	1095	1825	Will be used for sundry board manufacturing within the facility.
5.	Sludge from Secondary fibre treatment (SFT)	-	-	5110	5110	Will be used fuel in boilers.
6.	Plastic	-	219	693.5	912.5	Will be disposed through authorized recyclers.
7.	Metal pins from RCF processing process	-	14.6	40.15	54.75	Will be disposed through authorized recyclers.

2.8.4 Noise Environment

The noise levels will be primarily generated due to industrial activities like mechanical movement and material handling in unit. Noise may generate from motors, vehicular movement, generators, etc. General noise levels within plant will be expected to remain below 75 dB (A). In order to mitigate the noise levels during the operational phase, a green belt will be developed around the periphery of the plant. However, at places where noise levels may exceed the permissible limit, acoustic enclosure will be provided.

2.9 OCCUPATIONAL HEALTH AND SAFETY

The project proponent is committed towards the health and safety of workers. All the

necessary measure is/ will be planned for occupational health of the employees. Routine medical examination of each person will be carried out as a systematic program on a regular basis. Medical surveillance for the workers working in risk zone is/ will be carried out regularly and annual report of the health status of workers for the same is/ will be maintained which is attached as Annexure 9. Safe Operating Procedures (SOP) for different works/activities are/will be in place.

2.10 ASPECT - IMPACT ANALYSIS

Table 2.10 - Aspect Impact Analysis

Activity	Environment al Attribute	Cause	Impact Characteristics			
			Nature	Duration	Reversibility	Significance
Transportation activity	Air Quality	Exhaust Emissions	Negative	Mid Term	Reversible	High, basic activity of the project
Manufacturing process	Noise Levels	Noise Generation	Negative	Mid Term	Reversible	Low, due to noise protection measures
Operation of Boiler	Risk and Hazards	Injury to worker, cuts, trips, falls, etc.	Negative	Short Term	Irreversible	Medium due to loss of property and injury to manpower
	Water Quality	Wastewater disposal	Negative	Mid Term	Irreversible	Medium, due to treatment of effluent before disposal
Sewage / Industrial wastewater generation	Water Quality	Wastewater disposal	Negative	Short Term	Reversible	Medium, due to treatment of wastewater before disposal
Storage and handling of materials	Noise Levels	Noise Generation	Negative	Short Term	Reversible	Low, due to noise protection measures
	Work Zone Air Quality	Dust Generation	Negative	Mid Term	Reversible	Low, due to confined area
	Risk and Hazards	Accidents	Negative	Short Term	Irreversible	Low, due to injury to manpower

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

Activity	Environmental Attribute	Cause	Impact Characteristics			
			Nature	Duration	Reversibility	Significance
Solid Waste Disposal	Land and Soil	Generation of Solid Waste	Negative	Mid Term	Reversible	Low, proper collection and disposal
Green Belt Development	Ecology	Planting of Trees	Positive	Long Term	Reversible	High, Positive Impact
	Air Quality	Dust barrier	Positive	Mid Term	Reversible	Low, Positive Impact
	Noise	Noise barrier	Positive	Short Term	Reversible	Low, Positive Impact
	LU/LC	Conservation of Land	Positive	Long Term	Reversible	Medium, Positive Impact
	Soil	Increase in soil fertility	Positive	Long Term	Irreversible	Medium, Positive Impact
	Water	Water consumption	Negative	Mid Term	Irreversible	Low, due to water circulation

2.11 PROJECT IMPLEMENTATION SCHEDULE

The project will take approximately 12 months after receiving Environmental Clearance (EC) for procuring all the statutory clearances from GPCB. The various activity-wise and time-wise charts are given below for the project implementation.

Table 2.11 - Project Implementation Schedule

S. No.	Description	Period	Duration of month												
			1	2	3	4	5	6	7	8	9	10	11	12	
1.	Construction and development of other facilities	4 months													
2.	Installation of machineries	5 months													
3.	Project Commissioning	3 months													

2.12 SUMMARY

The proposed project envisages enhancement of existing paper manufacturing unit by Sapphire Papers Mill Private Limited located Plot No. No 2565, 4257, 4260, 4261, 4262, 4263, 4265, 4327, 4328, 4329, 4330, 4338, 4326, 4334, 4331, 4333, 4322, 4336, 4337, 4339, NH – 31, Jagannathpur, Bidhannagar, Darjeeling, WestBengal – 734426. Production capacity will be increased from 1000 TPM to 4500 TPM. Existing total land area of the project is 44248.32 m². Additional land 11765.72 m² will be required for proposed expansion which will be utilized from the vacant land 22290.43 m² of the existing total land area. Estimated project cost for proposed expansion shall be approximately 31 Crore. There will be additional 26 numbers of employees, thus total 130 numbers of employees after proposed expansion. The existing fresh water requirement is about 256 KLD whereas fresh water requirement will be increased to about 740.6 KLD after proposed expansion which will be fulfilled through ground water. Solid/Hazardous wastes generated from the project will be handled and managed as per Hazardous Wastes Rules, 2016. The project proponent is committed towards the health and safety of workers. All the necessary measure is/ will be planned for occupational health of the employees.

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3 DESCRIPTION OF THE ENVIRONMENT

3.1 GENERAL

The term '*baseline*' refers to conditions existing before development against which subsequent changes can be referenced. Environmental parameters during a pre-project period is considered for the purpose of determining the range of variation of the system and establishing reference points against which changes can be measured.

Baseline Monitoring studies are carried out to:

- Identify environmental conditions which might influence project design decisions (e.g. site layout, structural or operational characteristics);
- Identify sensitive issues or areas requiring mitigation or compensation;
- Collect input data for analytical models and predict effects due to proposed project;
- Provide proposed environmental monitoring programs.

M/s. Sapphire Papers Mill Pvt. Ltd. is located at Village Kajigach, Tehsil Lahugaon, District Darjeeling, West Bengal for manufacturing of writing and printing paper from the Waste Paper having total plot area 44,232 m². Unit has proposed the production capacity from 1000 TPM to 4500 TPM of writing – printing papers, newsprint papers, copier papers (with deinking and Chlorine free bleaching process) as main product and from 40 TPM to 100 TPM Sundry Board as surplus product from Secondary fibre. The proposed expansion will be developed in existing plot of the unit.

Present baseline environmental study has been carried out for the study region within 10 km radius from the project site for the environmental components *viz.* Ambient Air Quality, Noise Environment, Land Environment, Geology & Hydrology, Water Environment, Ecology & Biodiversity and Socio-economic Environment. An exhaustive attempt has been made in the current chapter to disclose all possible baseline status of environmental quality in the study area, which further serves as the basis for identification, prediction and evaluation of impacts. Villages covered within study region are shown in the **Figure 3.1**.

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

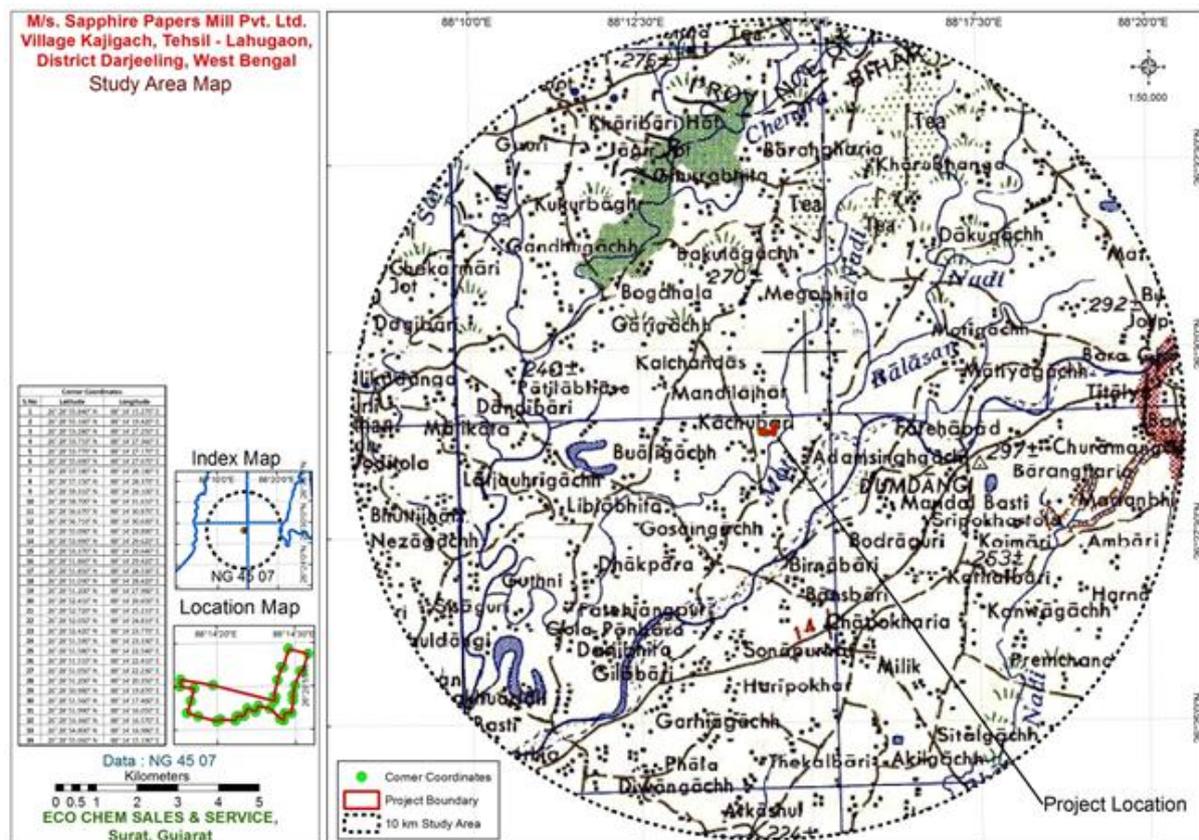


Figure 3.1 Study Area Map

3.2 BASELINE STUDY AREA AND PERIOD

The baseline environmental study has been conducted for the study region within 10 km radius of the Project Site for the period from 1st March 2022 to 31st May 2022.

3.2.1 Methodology

Locations were decided for the survey and monitoring of the study area. Before the selection of locations, a desktop study was carried out to select the sampling locations in such a way so that they can be selected as per the survey guidelines of various agencies like CPCB and BIS. To identify the feasibility of monitoring locations, field area experts had visited the sites and they had submitted their site visit reports with respect to suitability of locations for monitoring/ survey. After the submission of survey report locations were finalized for starting the monitoring and survey. Looking to the extent of impact, 5 km radius was considered as core zone and rest 5 km radius was considered as buffer zone. All the locations have been selected within 10 km radius from the project site as per the requirement of TOR and environmental samples were collected from the selected locations of the study area. Before starting the survey activity for ecology and bio-diversity, secondary data were used as reference during the desktop survey for listing the species of study zone and planning the survey. In case of socio economy, secondary data have also been used for deciding the parameters to be surveyed during socio economic data collection. As a secondary source of data, for Ecology and Biodiversity survey various publications by the government of India and literature available on internet site were used.

3.2.2 Frequency of Sampling

Details of frequency of environmental sampling considered for the study are illustrated in **Table 3.1**.

Table 3.1: Frequency of Environmental Monitoring

Attributes	Sampling		
	Locations	Parameters	Frequency
A. Air Environment			
Micro-meteorological Data	Project Site	Temperature, Relative Humidity, Precipitation Wind direction, Wind Speed.	Hourly data for the period 1 st March 2022 to 31 st May 2022.
Ambient Air Quality	8 numbers of locations in the study area of 10 km radius from the project site.	PM _{2.5} , PM ₁₀ , SO ₂ , NO _x , CO	24 hour basis, twice a week during study period
B. Noise	8 numbers of locations in the study area of 10 km radius from the project site.	Noise Levels in dB (A).	Once in Study Period.
C. Water			
Ground Water	Samples from 8 numbers of locations within 10 km radius from the project site.	Physical, Chemical, Microbiological and Heavy Metal.	Once in Study Period.
Surface Water	Samples from 8 numbers of locations within 10 km radius from the project site.	Physical, Chemical, Microbiological and Heavy Metal.	Once in Study Period.
D. Soil Quality	Samples from 8 numbers of locations within 10 km radius from the project site.	Physical, Chemical Characteristics, Soil Texture.	Once in Study Period.

3.2.3 Method of Environmental Sampling and Analysis

The methods adopted for environmental sampling and analysis are illustrated in following **Table 3.2.**

Table 3.2: Method of Environmental Sampling and Analysis

Attributes	Methods	
	Sampling/Preservation	Analysis/data analysis
A. Air Environment		
Micro-meteorological Data	Data collected on hourly basis using wind monitor as per CPCB Guideline.	IS 8829 and CPCB Guideline
Ambient air quality	As per IS: 5182, CPCB & AWMA.	As per IS:5182, CPCB & AWMA
B. Noise	Instrument : Sound level meter	IS 9989 & CPCB guideline
C. Water		
Ground Water, Surface Water	Standard Methods for Examination of Water and Wastewater, 23rd edition, APHA 2017.	IS 3025 & Standard Methods for Examination of Water and Wastewater, 23rd edition, APHA 2017.
D. Soil Quality	IS 2720, Soil Testing in India (Department of Agriculture & Cooperation).	IS 2720, Laboratory developed Method as per NABL requirement and Book - Soil Testing in India (Department of Agriculture & Cooperation).

3.3 MICROMETEOROLOGY

The prevailing micrometeorological condition at project site plays an important role for the prediction regarding the transport and dispersion of air pollutants. Dispersion of different air pollutants released into the atmosphere has significant impacts on the neighborhood air environment of project and forms an important part of impact assessment studies. Meteorological conditions of the site regulates the transport and diffusion of air-pollutants released into the atmosphere.

Ambient temperature, wind speed, wind direction, humidity, precipitation, pressure and visibility are called Meteorological Parameters because the dispersion and diffusion of pollutants depend mainly on these parameters. Atmospheric stability is derived meteorological parameters as they control the dispersion of the pollutants indirectly by affecting primary parameters. This data is useful for proper interpretation of the baseline information as well as serves as an input, to predictive models for air quality impacts.

It is imperative that one should work with idealized condition and all analysis pertaining to air turbulence and ambient air should be done with meteorological conditions, which can be best expected to occur.

3.3.1 Climate of Study area

The proposed project will be placed in existing plot of the unit in Kajigach, Darjeeling. Information presented in subsequent paragraphs from online website worldweatheronline.com for the above said locations.

Table 3.3: Month-wise Average data of the study region

Month	Mean daily temperature (°C)		Rainfall (mm), rainy day	Humidity (%)
	Day	Night		
January	15	7	25.75 mm, 2	56
February	17	9	42.69 mm, 3	50
March	22	13	91.30 mm, 5	42
April	24	15	320.70, 16	52
May	23	17	603.94, 23	69
June	24	18	892.99, 25	80
July	24	19	1126.60, 28	85
August	24	19	874.96, 26	85
September	23	18	595.15, 21	83
October	22	15	211.67, 8	74
November	19	11	26.43, 1	69
December	16	8	21.19, 1	65

Source: Online Website worldweatheronline.com

3.3.2 Site Specific Micro-Meteorological data

Meteorology of the study zones plays an important role in the study of air pollution. Micrometeorological data were collected by using the wind monitor as per CPCB guideline which was installed at the project site to collect the data for temperature, relative humidity, wind speed, wind direction and precipitation. All the micrometeorological data were collected on hourly basis. Data for precipitation was nil, as it was dry season. Minimum-maximum data for temperature, relative humidity and wind speed of the study area are presented in **Table 3.4**.

Table 3.4: Meteorological Condition of Study Area

Month	Temperature (°C)		Relative Humidity (%)		Wind Speed (km/hr)		Rain Fall (mm)
	Min.	Max.	Min.	Max.	Min.	Max.	
March '22	17.0	32.8	38.0	83.0	0.0	15.1	0.6
April '22	23.0	32.8	59.0	89.0	0.0	15.4	78.2
May '22	15.0	34.7	53.0	99.0	0.0	14.3	135.6

3.3.3 Temperature

During the study period minimum temperature was recorded 15.0°C on 9th day of May 2022 and maximum temperature was recorded as 34.7°C on 31st day of May, 2022. Temperature data were collected on hourly basis during the study period. Variation of temperature is graphically presented in **Figure 3.2** and temperature variation graph of last 10 years from the worldweatheronline.com for the study region is presented in **figure 3.3**.

3.3.4 Humidity

Humidity affects the nature and characteristics of pollutants in the atmosphere as it is the measure of amount of moisture in the atmosphere. Humidity helps suspended particulate matter to coalesce and grow in size to settle under the gaseous pollutants by providing them aqueous medium. During the study period minimum Humidity was recorded 38% on 15th day of March, 2022 and maximum Humidity was recorded as 99% on 30th day of May 2022. The variation in humidity is represented graphically in **Figure 3.4** and Humidity variation graph of the last 10 years from the worldweatheronline.com for the study region is presented in **figure 3.5**.

3.3.5 Wind Speed and Wind Direction

Hourly wind speed data were collected for the period 1st March 2022 to 31st May 2022 with the help of wind monitor. The rate of dispersion, diffusion and transportation of pollutants in the atmosphere mainly depend on wind speed and its direction. Wind direction and velocity data have been collected during the study period. Dominant wind directions in the study period were from NNE – SSW and N – S during the study period. Wind speed was observed from 0.0 to 15.1 km/hr in the month of March 2022, 0.0 to 15.4 km/hr in the month of April 2022 and from 0.0 to 14.3 km/hr in the Month of May 2022. Minimum detection range of the wind speed for the wind monitor was 1.0 km/hr and data below the minimum detection range has been considered as 0.0 km/hr. Month-wise maximum and minimum wind speed data are tabulated in **Table 3.3**.

3.3.6 Wind Rose

Wind rose diagram is a graphical representation of the magnitude and direction of wind speed considering all the directions. From the knowledge of wind rose one can easily predict the direction and extent of spreading of the gaseous and particulate matter from the source. Wind rose diagram has been prepared by using hourly wind velocity and dominant wind direction data and is presented in **Figure 3.6**.

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

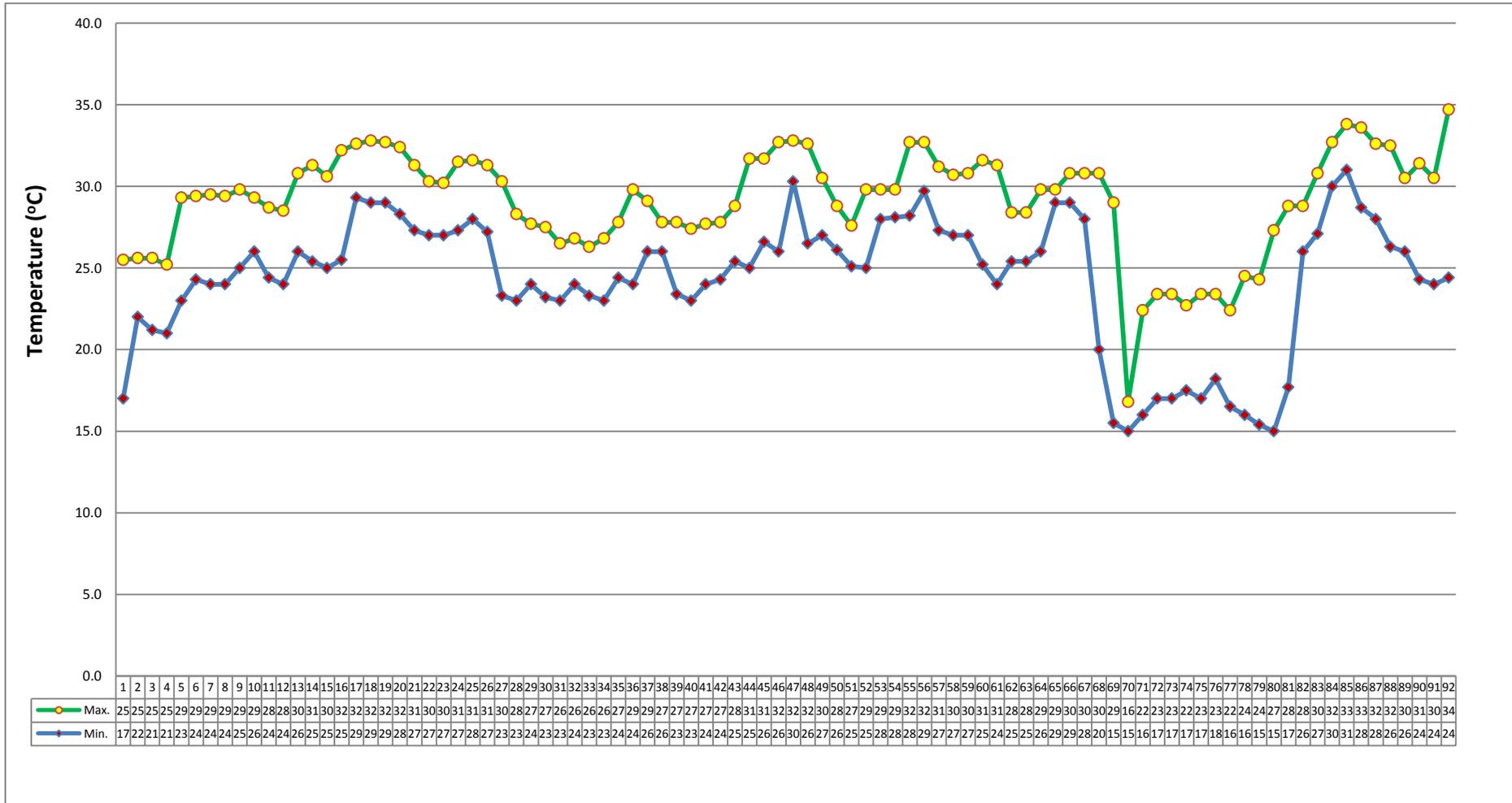


Figure 3.2: Graphical Presentation for the month wise Temperature Variation

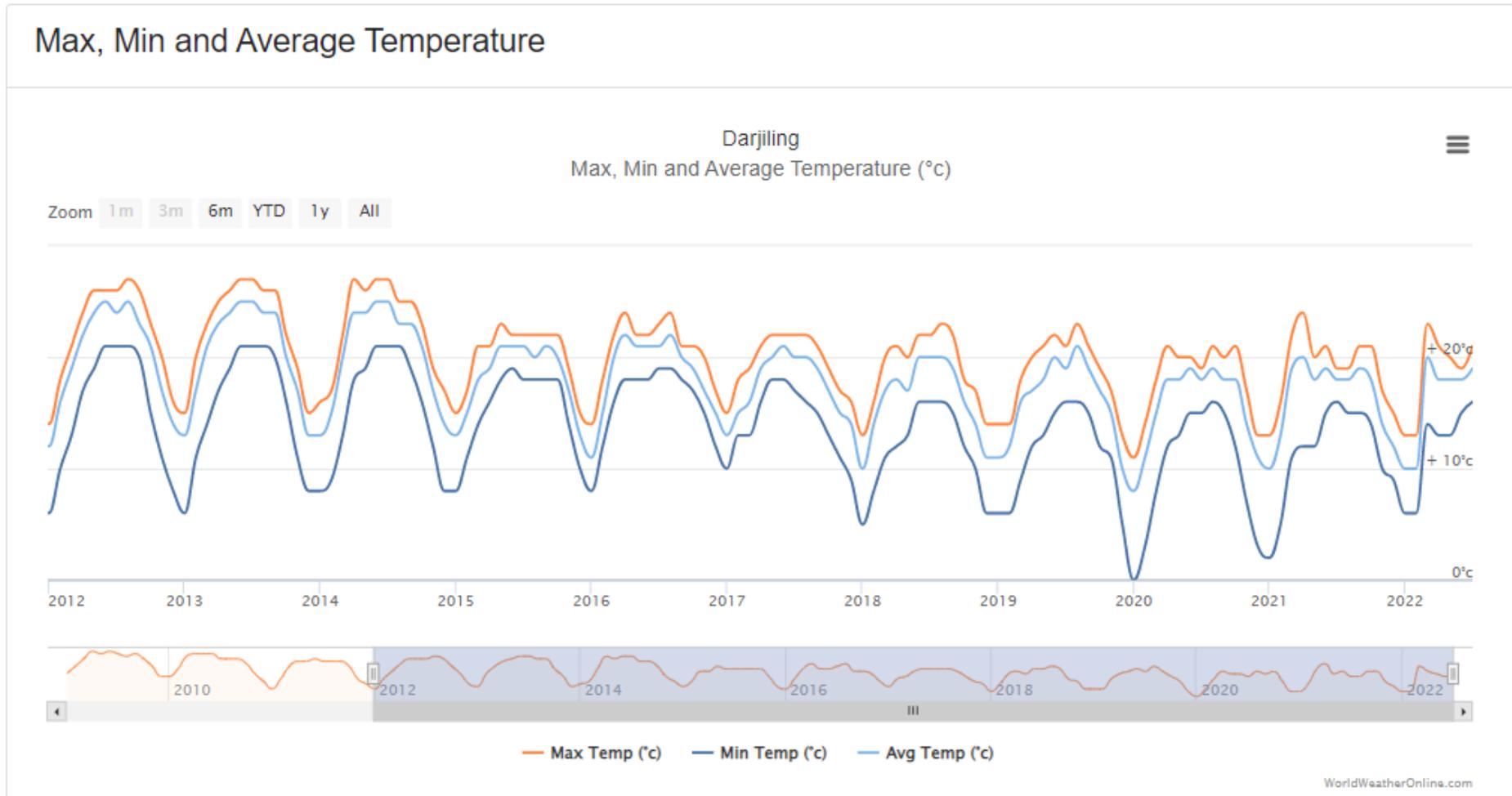


Figure 3.3: Graphical Presentation of last 10 years data of temperature Variation

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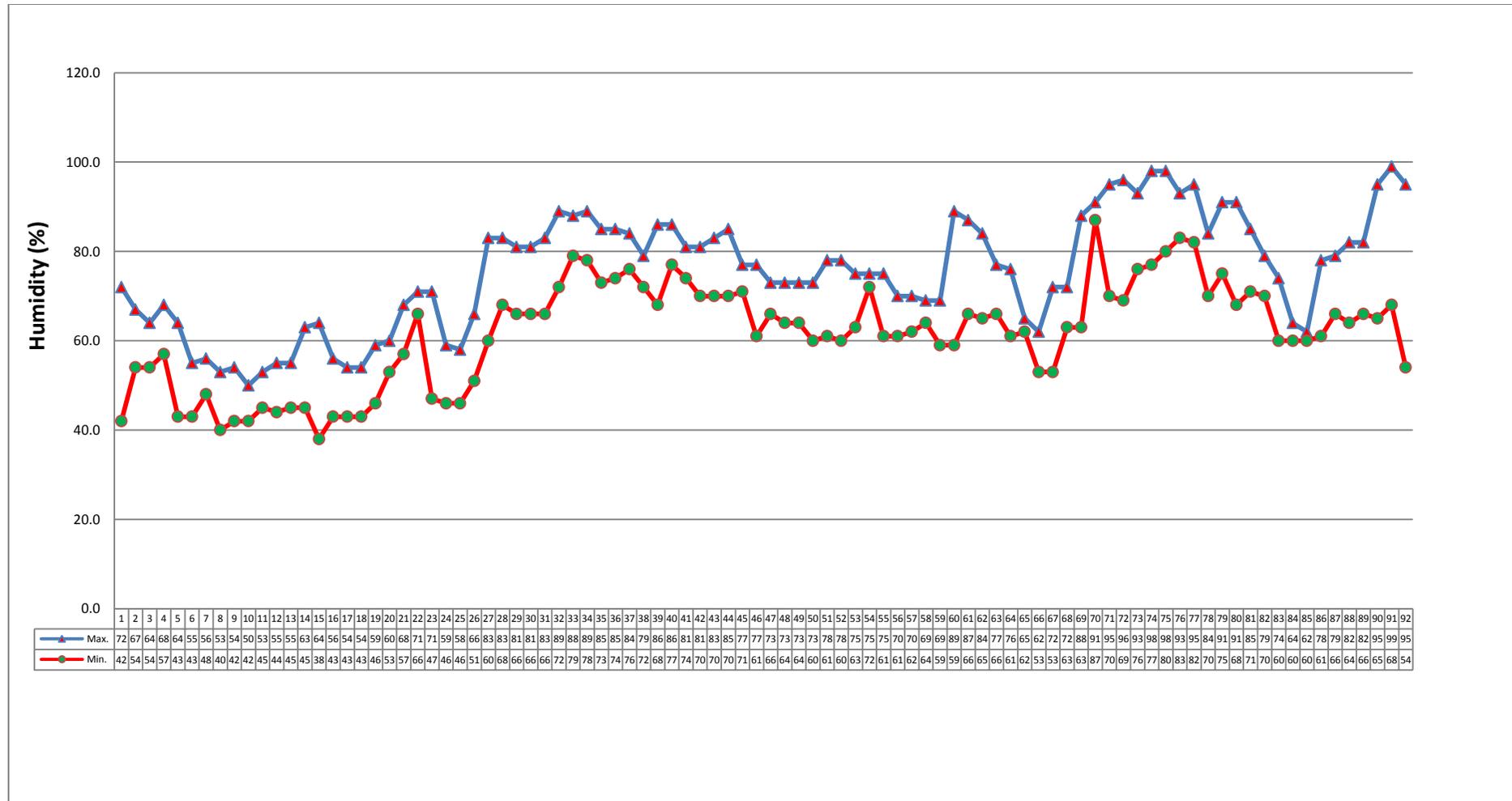


Figure 3.4: Graphical Presentation for the month wise Humidity Variation

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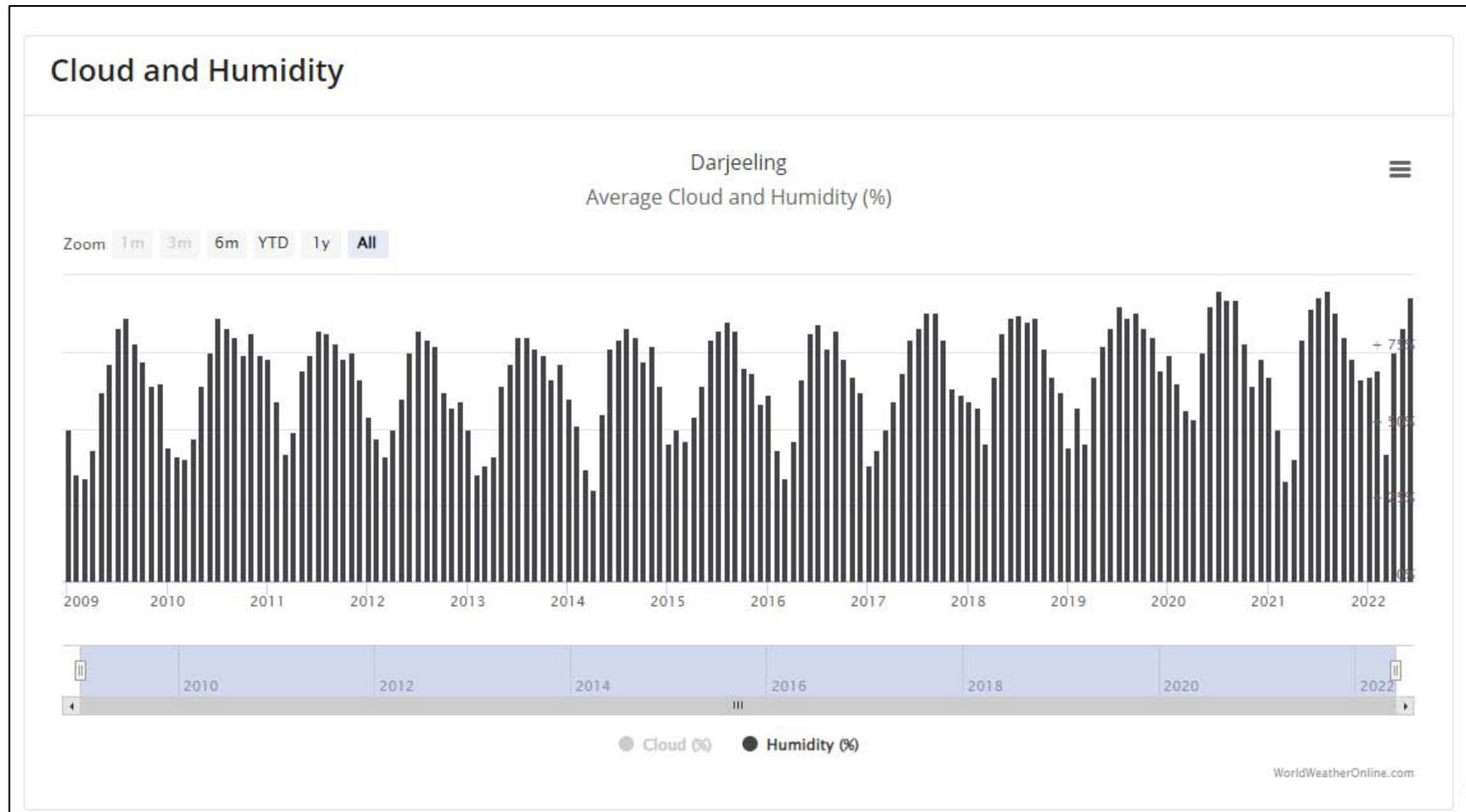


Figure 3.5: Graphical Presentation of last 10 years data of Humidity Variation

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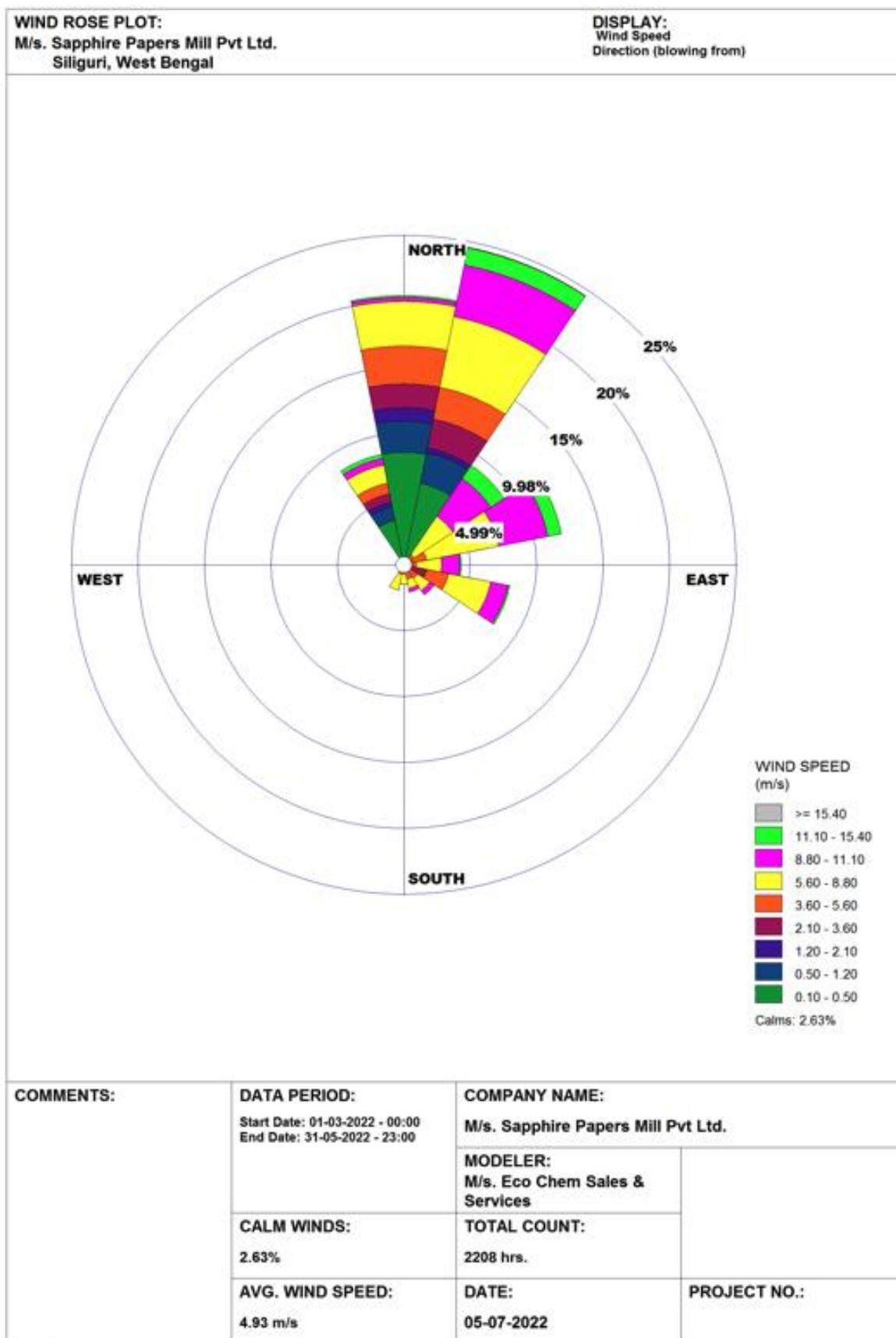


Figure 3.6: Wind Rose Diagram

3.3.7 Interpretation of Micrometeorological Data

During the study period dominant wind direction was NNE to SSW and N – S was second dominant wind direction. Wind speed was observed from 0.0 to 15.4 km/hr, where minimum detection limit of wind monitor was 0.1 km/hr. Calm condition was approx. 2.63 % of total data collected for wind speed. Based on wind direction and wind speed; it is interpreted that the chances of maximum dispersion of air pollutant will be in SSW and S direction during the period of March 2022 to May 2022. Comparative study for micrometeorological data was conducted with the past 10 years' data available on internet site timeanddate.com and it was noticed that all meteorological parameter follows the almost similar trend and there was no considerable change in the micrometeorological data.

3.4 AIR ENVIRONMENT

Air is essential requirement for the entire living organism on the earth. There is a large deterioration due to industrial process and flue gas emission. In general, air quality is being deteriorated day by day due to the anthropogenic activities and burning of non-conventional fuels. Ambient air quality data may be helpful for deciding the condition of air as well as in mitigating the impacts on air. Ambient air quality monitoring was carried out for the assessment of the existing status of background air quality in the study area. This will be useful for assessing the conformity of the ambient air quality to the standards even after commencement of the proposed project.

3.4.1 Selection of Sampling Locations

Following points were considered during the selection of Ambient Air Quality Monitoring locations.

- Topography/terrain of the study area,
- Densely populated areas within the region,
- Location of surrounding Industries,
- Representation of regional background,
- Facility for Ambient Air Monitoring,
- Representation of valid cross – sectional distribution in downwind direction,
- Avoidance of proximity of roads, construction activity or any other perturbing activity which may be temporary in nature, which may lead to some erroneous conclusions.
- Availability of manpower, electricity, approach, sturdy structure and protection of samplers.
- Dominant Wind Direction.

To establish the baseline status around the project site of the study region, monitoring was conducted for 8 numbers of locations within the study region during the period of 1st March 2022 to 31st May 2022. At the time of location selection previous micrometeorological data available on the internet site worldweather.com was referred and general wind pattern in the study region was considered for the selection locations so that minimum one location can be established in the upwind direction and maximum locations in downwind direction. In this particular case, 1 no. of location has been selected at project site, 2 nos. of locations have been selected in downwind directions and 1 nos. of locations has been selected in upwind direction, remaining 4 nos. locations have been selected in the crosswind direction. The

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locations were selected in/surrounding the human settlement within the study area. Sampling team was appointed with one FAE and Technical Assistant to carry out Ambient Air Quality Monitoring for 8 numbers of locations within 10 km radius from the project site. Heavy Rainy days were avoided for AAQM.

Ambient Air Quality monitoring locations are presented in **Figure 3.7** and **Table 3.4**. The photographs of ambient air quality monitoring locations are presented in **Figure 3.8**.

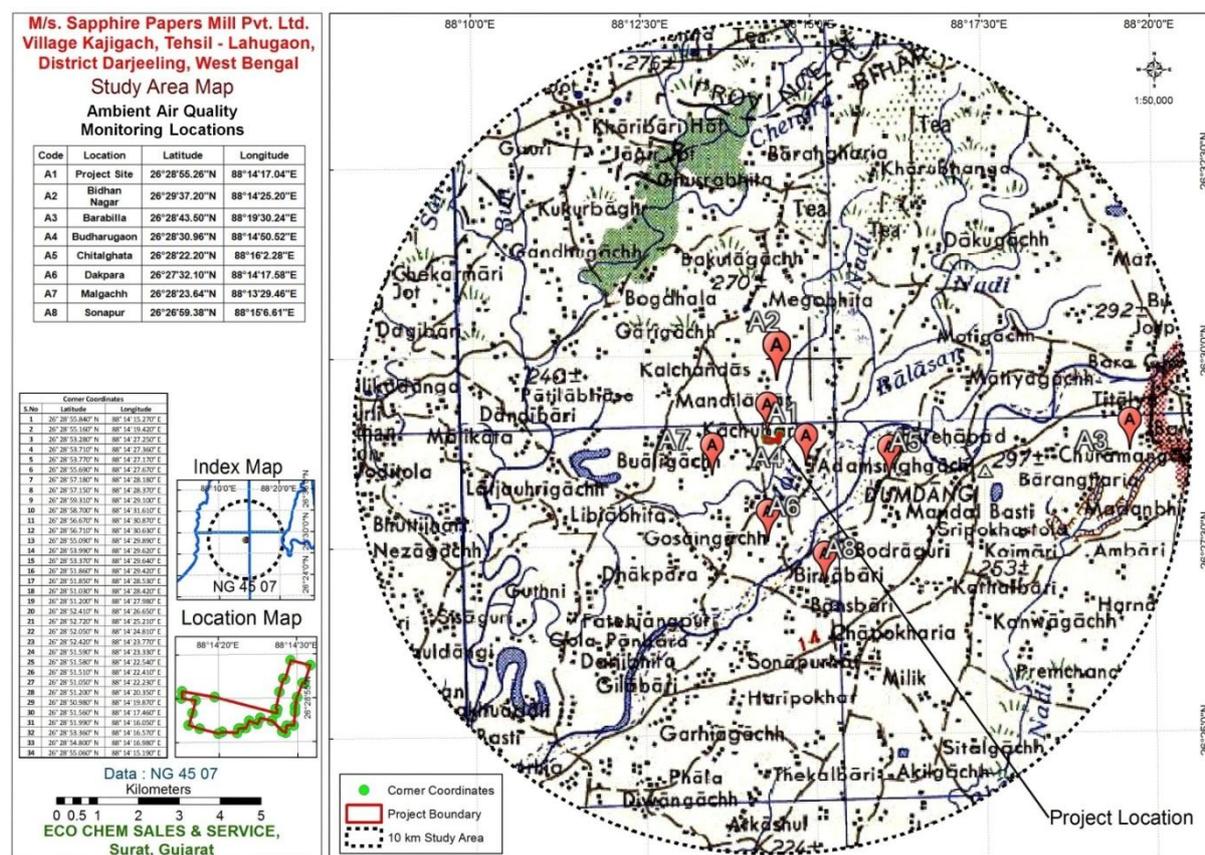


Figure 3.7: Map showing the Study Region location of Ambient Air

Table 3.5 Ambient Air Quality Monitoring Locations in the Study Region

Code	Location	Distance/Direction w.r.t to Project Site	Latitude and Longitude	Selection Criteria
A1	Project Site	--	26°28'55.26"N 88°14'17.04"E	--
A2	Bidhan Nagar	1.35 km / N	26°29'37.20"N 88°14'25.20"E	Up wind
A3	Borobilla	8.56 km / E	26°28'43.50"N 88°19'30.24"E	Cross wind
A4	Budharugaon	1.05 km / SE	26°28'30.96"N 88°14'50.52"E	Cross wind
A5	Chitalghata	2.76 km / ESE	26°28'22.20"N 88°16'2.28"E	Cross wind
A6	Dakpara	2.49 km / S	26°27'32.10"N	Down wind

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Code	Location	Distance/Direction w.r.t to Project Site	Latitude and Longitude	Selection Criteria
			88°14'17.58"E	
A7	Malgachh	1.70 km / SW	26°28'23.64"N 88°13'29.46"E	Cross wind
A8	Sonapur	3.60 km / SSE	26°26'59.38"N 88°15'6.61"E	Down wind

	
Project Site (A1)	Bidhan Nagar (A2)
	
Borobilla (A3)	Budharugaon (A4)
	
Chitalghata (A5)	Dakpara (A6)

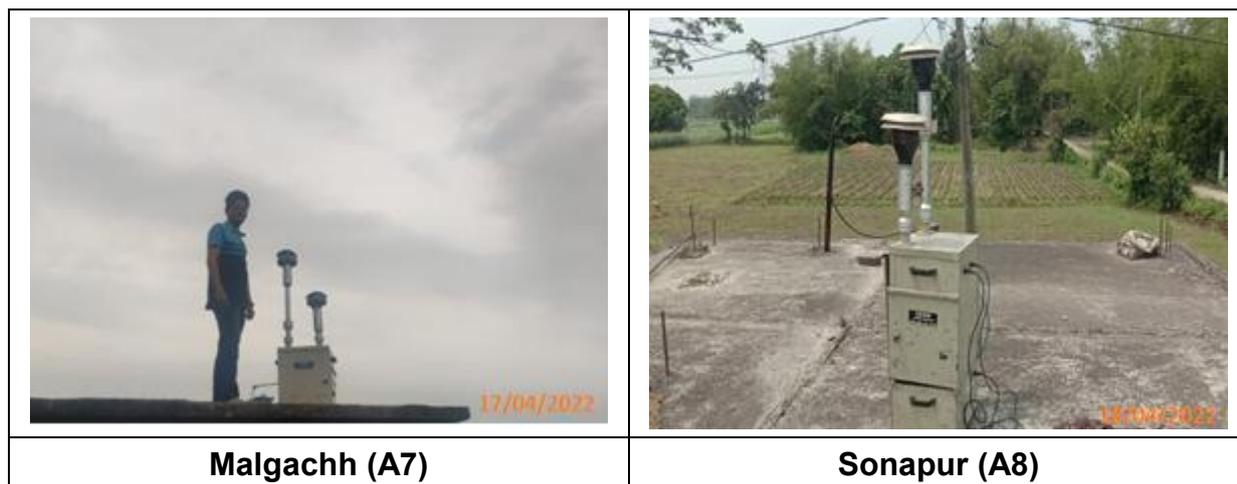


Figure 3.8: Photographs of Ambient Air Quality Monitoring Locations

3.4.2 Frequency and Parameters for Sampling

Samples were collected on 24 hr basis for PM_{2.5}, PM₁₀, SO₂, NO_x, CO. Duration of sampling was decided as per the CPCB guideline and probability of concentration for said parameters. After the completion of sampling, samples were brought to the laboratory in ice box and filter box for analysis. Frequency of sampling was twice a week during study period.

3.4.3 Methodology for Sampling and Analysis

Samples were collected by using the PM₁₀ and PM_{2.5} micron dust sampler. Reference of sampling and analysis are presented in Table 3.6.

Table 3.6 Details of Analysis Method

S. No.	Parameters	Test Method
i.	Particular matter (PM _{2.5})	SOP No. WI/5.4/02-B/03, Issue No.1 Date:01/01/2010, CPCB Guideline
ii.	Particulate Matter (PM ₁₀)	IS 5182 (Part 13):2006/Reaffirmed 2012
iii.	Sulphur Dioxide (SO ₂)	IS 5182 (Part 2):2001/Reaffirmed 2012
iv.	Oxide of Nitrogen (NO _x)	IS 5182 (Part 6):2006
v.	Carbon monoxide (CO)	Methods of Air Sampling & Analysis AWMA, APHA (CO Analyser)

3.4.4 Quality of Ambient Air

Minimum, maximum, average and 98th percentile values for the parameters PM_{2.5}, PM₁₀, SO₂, NO_x CO are tabulated in Table 3.7 to describe the quality of Ambient Air.

Table 3.7 Summary of Ambient Air Quality Result

Location	Statistics	PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO _x µg/m ³	CO mg/m ³
A1	Minimum	68.6	36.8	15.8	22.5	<1.00
	Maximum	87.0	48.8	21.4	28.2	<1.00
	Average	77.1	44.2	18.3	25.2	-
	98 th Percentile	86.1	48.8	21.3	27.9	-
A2	Minimum	59.3	29.3	8.1	13.6	<1.00
	Maximum	73.5	36.0	11.3	16.4	<1.00
	Average	66.2	32.4	9.9	15.1	-
	98 th Percentile	72.8	35.8	11.2	16.4	-
A3	Minimum	53.2	28.0	<6.0	10.2	<1.00
	Maximum	62.3	33.6	9.1	14.7	<1.00
	Average	57.9	30.0	8.1	12.3	-
	98 th Percentile	62.1	33.0	9.1	14.5	-
A4	Minimum	53.5	27.1	7.1	10.3	<1.00
	Maximum	65.6	34.5	10.2	14.4	<1.00
	Average	59.3	30.4	8.6	12.0	-
	98 th Percentile	65.2	33.7	10.2	14.0	-
A5	Minimum	51.0	25.9	<6.0	12.3	<1.00
	Maximum	61.2	34.5	10.2	16.0	<1.00
	Average	54.9	28.7	8.3	14.3	-
	98 th Percentile	60.8	33.5	9.7	16.0	-
A6	Minimum	54.3	28.8	<6.0	10.7	<1.00
	Maximum	66	35.0	9.1	14.6	<1.00
	Average	59.3	31.0	7.8	12.4	-
	98 th Percentile	65.4	35.0	9.1	14.5	-
A7	Minimum	51.5	28.0	<6.0	10.6	<1.00
	Maximum	60.7	34.5	9.1	14.8	<1.00
	Average	56.1	30.2	8.2	12.5	-
	98 th Percentile	60.6	34.1	9.1	14.7	-
A8	Minimum	53.4	28.5	7.1	12.5	<1.00
	Maximum	63.6	34.0	10.1	16.0	<1.00
	Average	59.0	30.7	8.5	14.3	-
	98 th Percentile	63.4	33.9	10.1	15.9	-
NAAQS Standard		100	60	80	80	2.00

3.4.5 Summary of Ambient Air Quality

- During the monitoring period, we have conducted the Ambient Air Quality Monitoring for PM10, PM2.5, SO₂, NO_x & CO. As per the monitoring results,
- Average values of PM_{2.5} for all monitoring locations are found in the range of 28.7-44.2 µg/m³. Maximum concentration of PM_{2.5} was observed as 48.8 µg/m³ at project site and minimum concentration was observed as 25.9 µg/m³ at Chitalghata Village. All the results were found to be below the NAAQS limits *i.e.* 60 µg/m³.
- Average values of PM₁₀ for all monitoring locations are found in the range of 54.9-77.1 µg/m³. Maximum concentration of PM₁₀ was observed as 87.0 µg/m³ at project site and minimum concentration was observed as 51.0 µg/m³ at Chitalghata Village. All the results were found to be below the NAAQS limits *i.e.* 100 µg/m³.
- Average values of SO₂ for all monitoring locations are found in the range of 7.8-18.3 µg/m³. Maximum concentration of SO₂ was observed as 21.4 µg/m³ at project site and minimum concentration was observed as <6.0 µg/m³ at many villages. All the results were found to be below the NAAQS limits *i.e.* 80 µg/m³.
- Average values of NO_x for all monitoring locations are found in the range of 12.0-25.2 µg/m³. Maximum concentration of NO_x was observed as 28.2 µg/m³ at project site and minimum concentration was observed as 10.6 µg/m³ at Malgachh Village. All the results were found to be below the NAAQS limits *i.e.* 80 µg/m³.
- CO was found in the range of below the detection limit and the same is well within the limit as per NAAQS.

3.4.6 Interpretation of Ambient Air Quality Data

All the results of ambient air quality parameters have been found within the limit as per NAAQS standards. Based on comparison study of results for tested parameters with NAAQS, it is interpreted that current ambient air quality of studied locations is well within the NAAQS limits and it can be considered satisfactory based on AQI index calculated. This interpretation is considered based on the results found for particular locations during the specific study period. Due to the usage of the solid fuel in the boiler, there might be the chances of the incremental change in the current ambient air quality. The industry should adopt adequate mitigation measures to control the air emissions *i.e.* flue gas emissions and fugitive emissions.

3.5 NOISE ENVIRONMENT

Noise is unpleasant, unexpected, or undesired with various frequencies over the audible range due to the regular activities of the mankind. The source of most outdoor noise worldwide is mainly evolved from Industries, constructions and transportation systems, including motor vehicle noise, aircraft noise and rail noise, poor urban planning may give rise to noise pollution.

Industrial Noise resulting to noise pollution has many reasons such as industries being close to human habitats which prevent the noise from decaying before it reaches human ear.

A determination is made of the micro scale impact by predicting anticipated noise levels for each alternative during both construction and operational phases. Predicted noise levels are compared with applicable standards or criteria in order to assess the impact.

The objective of the baseline noise survey was to identify existing noise sources and to measure background noise levels at the sensitive receptors within the study area. Peoples' perception of noise varies depending on number of factors including their natural sensitivity and hearing ability, past experience of sound, cultural factors and the time of day at which sound is experienced. Continuous sound is perceived quite differently from intermittent sound at the same level. High or continuous noise levels may cause permanent loss of hearing ranging from reduced perception at certain frequencies to total deafness. At comparatively lower levels noise may have psychological effects including disturbance of sleep, annoyance and irritation.

Monitoring of noise is done by identifying suitable number of noise quality monitoring locations. Background noise quality is monitored in dB (A) Leq (d) and dB (A) Leq (n) at the selected locations.

One day monitoring was carried out at all the locations. The frequency of monitoring was set at an interval of one hour for 24-hours.

Table 3.8 Noise Monitoring Methodology

Environment Component	Sampling Frequency	Methodology	Sample Collection			Sampling Parameter
			Sampling Parameter	Range	Resolution	
Ambient Noise	Once during the study period (Hourly reading for 24 hours at each location)	IS: 9989:1981 RA. 2014	Sound level meter	34 dB(A) to 130 dB(A)	0.1 dB	Decibels – dB (A)

3.5.1 Sources of Noise Pollution

The sources of noise pollution in the study area are industrial noise, noise due to commercial activities, noise generated by Community, Vehicular traffic *etc.*

3.5.2 Noise Level in the Study Area

Keeping in view of various local activities such as residential, commercial, agricultural and industrial activities, noise level monitoring was carried out with the help of sound level meter at 8 different locations fall under residential, commercial, industrial and silence zone within the 5 km radius. The locations are away from the major roads and major noise sources so as to measure the ambient noise levels. One-day monitoring was carried out at all the locations. Noise sampling locations are presented in **Figure 3.9** and **Table 3.9**. Analysis results are presented in **Table 3.10** and **Table 3.11**. Photographs of noise monitoring during the study period is presented in **Figure 3.10**.

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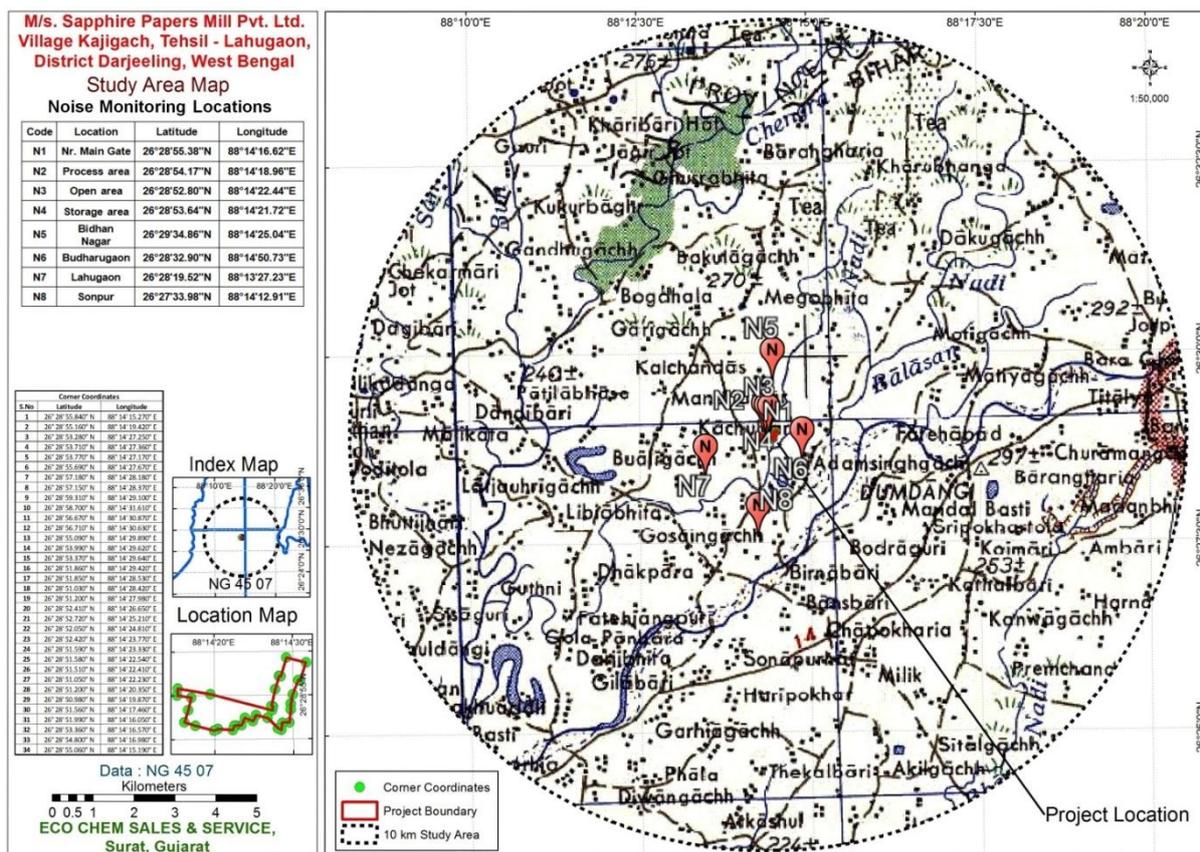


Figure 3.9: Map showing the study region location of Noise

Table 3.9 Noise Monitoring Locations in the Study Region

Code	Location	Distance/Direction w.r.t to Project Site	Latitude and Longitude	Selection Criteria
N1	Project Site (Main Gate)	--	26°28'55.38"N 88°14'16.62"E	Industrial Zone
N2	Project Site (Process area)	--	26°28'54.17"N 88°14'18.96"E	Industrial Zone
N3	Project Site (Open area)	--	26°28'52.80"N 88°14'22.44"E	Industrial Zone
N4	Project Site (Storage area)	--	26°28'53.64"N 88°14'21.72"E	Industrial Zone
N5	Bidhan Nagar	1.28 km /NNE	26°29'34.86"N 88°14'25.04"E	Commercial zone
N6	Budharugaon	1.17 km / SE	26°28'32.90"N 88°14'50.73"E	Silence zone
N7	Lahugaon	1.76 km / SW	26°28'19.52"N 88°13'27.23"E	Silence zone
N8	Sonpur	2.51 km / SSW	26°27'33.98"N 88°14'12.91"E	Silence zone

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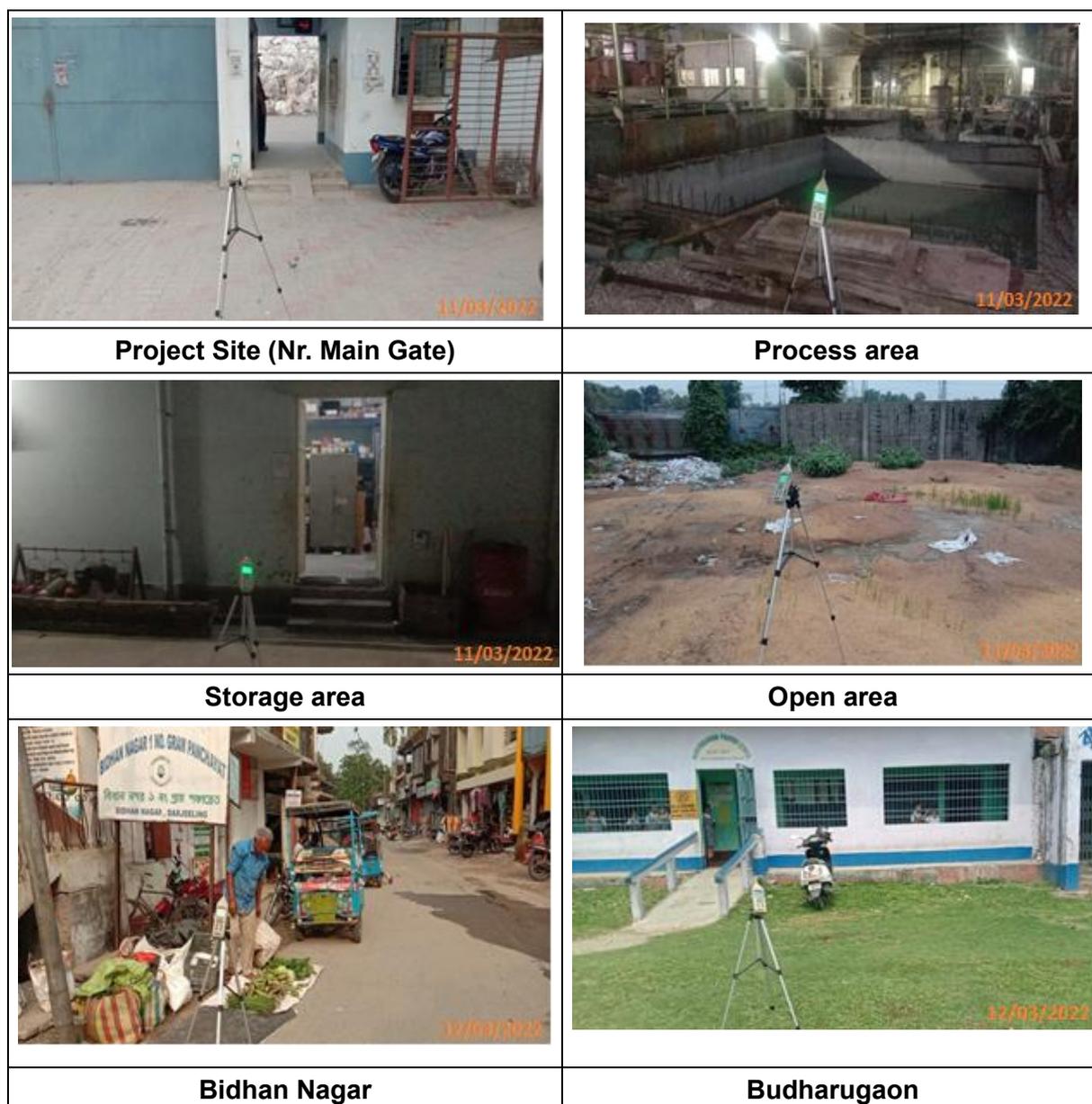


Figure 3.10: Photographs of Noise Monitoring at various locations

Table 3.10 Noise Monitoring report during day time

Code	L_{min} dB	L_d dB(A)	L_{max} dB	Limit dB(A) as per Noise Pollution (Regulation and Control) Rules, 2000
N1	60.0	68.4	75.1	75
N2	64.4	68.6	72.3	75
N3	56.3	62.7	65.2	75
N4	55.2	62.9	68.7	75
N5	55.6	59.5	63.4	65
N6	45.7	50.4	52.9	50
N7	45.2	49.3	51.4	50
N8	48.3	55.1	57.9	55

Table 3.11 Noise Monitoring report during night time

Code	L _{min} dB	L _n dB(A)	L _{max} dB	Limit dB(A) as per Noise Pollution (Regulation and Control) Rules, 2000
N1	53.4	62.5	67.4	70
N2	57.3	63.2	69.1	70
N3	51.6	56.5	62.5	70
N4	51.3	56.5	60.5	70
N5	43.2	50.5	53.4	55
N6	36.6	40.1	41.7	40
N7	37.0	40.0	41.0	40
N8	39.6	44.9	46.5	45

Note: Day time –6.00 AM to 10.00 PM, Night time – 10.00 PM to 6.00 AM

Table 3.12 Ambient Noise Monitoring Standards for Different Areas/Zones

Regulation	Category	Limits in dB(A) L _{eq}	
		Day Time	Night Time
The Noise Pollution (Regulation and Control) Rules, 2000 and its subsequent amendments	Industrial	75.0	70.0
	Commercial	65.0	55.0
	Residential	55.0	45.0
	Silence	50.0	45.0

Note:

- Leq denotes the time weighted average of the level of sound in decibels on scale A, which is relatable to human hearing. Day Time: 6:00 AM to 10:00 PM and Night Time: 10:00 PM to 6:00 AM.
- Area comprising not less than 100 m around Hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority

3.5.3 Summary of Noise Data

- Average noise level at the Project Site was recorded in the range of 62.7 dB (A) to 68.6 dB (A) during day time and it is in the range of 56.5 dB (A) to 63.2 dB (A) during night time.
- Average noise level was recorded 55.1 dB(A) at residential area during day time and it is 44.9 dB(A) during night time.
- Average noise level was recorded in the range of 49.3 to 50.4 dB(A) at silence zone during day time and it is in the range of 40.0 to 40.1 dB(A) during night time.
- Average noise level was recorded 59.5 dB(A) at commercial zone during day time and it is 50.5 dB(A) during night time.

3.5.4 Interpretation of Noise Data

Out of total 8 nos. of locations for noise monitoring 4 nos. of locations are monitored in the industry premises and 4 nos. of locations are monitored in surrounding villages within 3-4 km radius from the project site. Noise level in all the locations are within the standard norms prescribed by MoEF&CC. Noise level measured at villages is mainly due to vehicular movements of local people located within and nearby the villages. The nearby village surrounding to the project site is about 1 km away from the project site and results of the same are found within the prescribed norms during the baseline survey. Due to the project activities, there might be chances of incremental value in the noise levels due to increase in vehicular movement & plant activities. The interpretation can be considered based on the baseline survey conducted during the study period.

3.6 TRAFFIC STUDY

Traffic surveys aim to capture data that accurately reflects the real traffic situation in the area. It may be counting the number of vehicles using a road or collecting journey time information. Any development/Expansion of commercial project, directly or indirectly affect the traffic. Proposed project is adjacent to National Highway 27. Proposed expansion will attract to commercial vehicles as a result traffic load will also increase on highway. Traffic data helps in planning and design of road construction, renovation or maintenance works, and for assessing the economic feasibility of future road works. To assess the traffic load, 4 no. of surveyors were appointed to survey for National Highway 27.

Traffic data collected continuously for 24 hours by visual observation and counting of vehicles under three categories, viz., heavy motor vehicles, light motor vehicles and two/three wheelers. As traffic densities on the road is high, two persons were deployed simultaneously at each station during each shift- one person on each of the two directions for counting the traffic. At the end of each hour, fresh counting and recording was undertaken. Total numbers of vehicles per hour under the three categories were determined.



Figure 3.11: Photograph of traffic survey at NH-27

Table 3.13 Traffic Study Report

S. No.	Vehicles Distribution	No. of Vehicles/Day	Passenger Car Unit (PCU)	Total No. of Vehicle in PCU	Total No. of Vehicle (PCU)/Hour
		NH-27		NH-27	NH-27
1.	Cars	15224	1.0	15224	634
2.	Buses	2986	3.0	8958	373
3.	Trucks	2845	3.0	8535	356
4.	Two wheelers	5264	0.5	2632	110
5.	Three wheelers	1268	0.75	951	40
Total		27587	--	36300	1513

Table 3.14 Existing Traffic Scenario with respect to LOS

Road	V (Volume in PCU/hr)	C (Capacity in PCU/hr)	Existing V/C Ratio	LOS
NH- 27	1513	3000	0.50	C

V/C	LOS	Performance
0.0-0.2	A	Excellent
0.2-0.4	B	Very Good
0.4-0.6	C	Good/Average/Fair
0.6-0.8	D	Poor
0.8-1.0	E	Very Poor

(Source: IRC 64 -1990 & IRC 106-1990)

3.6.1 Interpretation of Traffic Study

LOS values have been calculated based on traffic data on NH-27 and it has been found 0.5. LOS value indicates that the performance of NH-27 is good with respect to traffic load. Looking to the probability of increase in traffic volume it is interpreted that there will be minor increase in LOS.

3.7 LAND ENVIRONMENT

3.7.1 Land Use Pattern of the Study area

Studies on land use aspects of eco system play an important role to identify sensitive issues and to take appropriate action for maintaining ecological homeostasis in the region. The main objective of this section is to provide a baseline status of the area, so that temporal changes due to the proposed project on the surroundings can be assessed in future.

Data Used: United States Geological Survey (USGS) Satellite Data: Land sat 8 cloud free data has been used for Land use /Land cover analysis, Satellite Sensor–OLITIRS multi-spectral digital data has been used for the preparation of land use/ land cover map of present study. Survey of India reference map on 1:50,000 scales have been used for the preparation of base map and geometric correction of satellite data. Ground trothing has been carried out to validate the interpretation accuracy and reliability of remotely sensed data, by enabling verification of the interpreted details and by supplementing with the information, which cannot be obtained directly on satellite imagery.

Methodology: The methodology used for the study consists of following components.

Methodology Adopted for Thematic Data Extraction from the Satellite Imageries

ERDAS image processing 10.0 software and ARC/GIS 10.0 software were used for the project. ERDAS 10.0 image processing software was used for digital processing of the spatial data. Digital image processing techniques were applied for the mapping of the land use land cover classes of the provided area from the satellite data. Methodology used for land use classification and mapping is presented in **Figure 3.9**. Land use map is presented in **Figure 3.12**. Land Use Statistic (10 km) is presented in **Figure 3.13 and Table 3.14**.

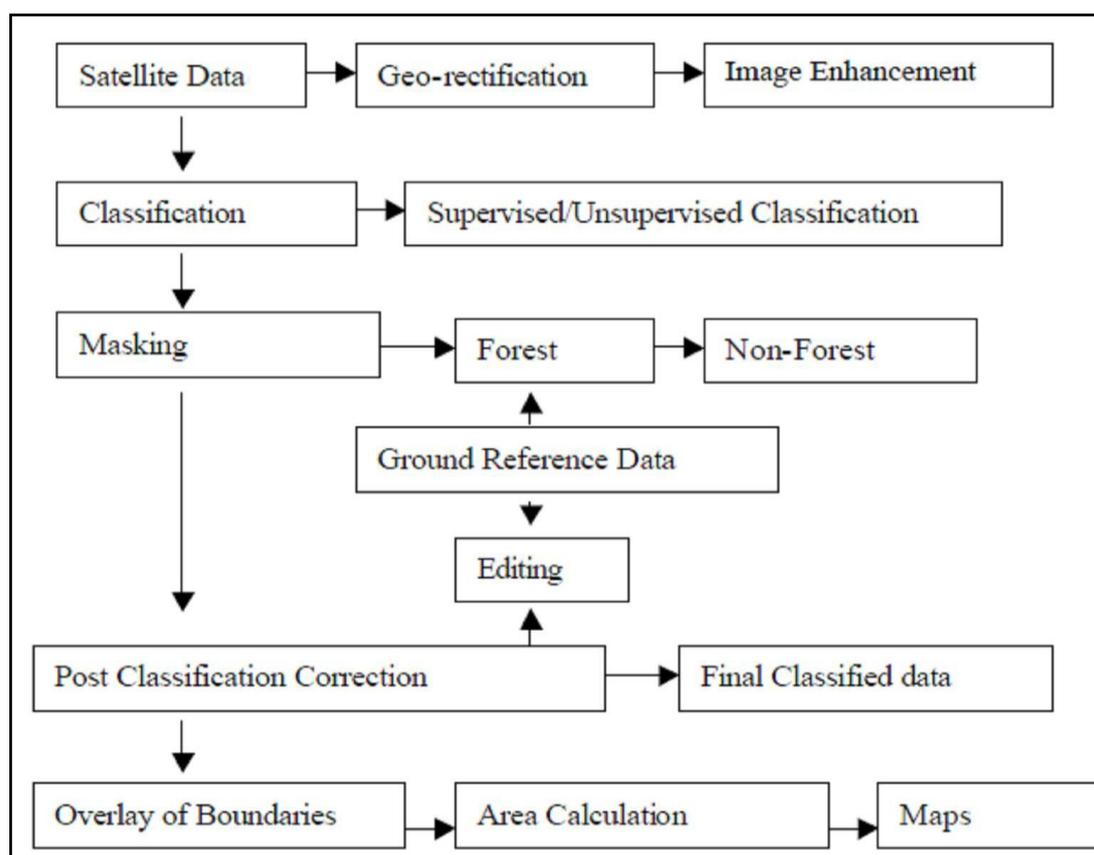


Figure 3.12: Methodology Used for Land Use Classification

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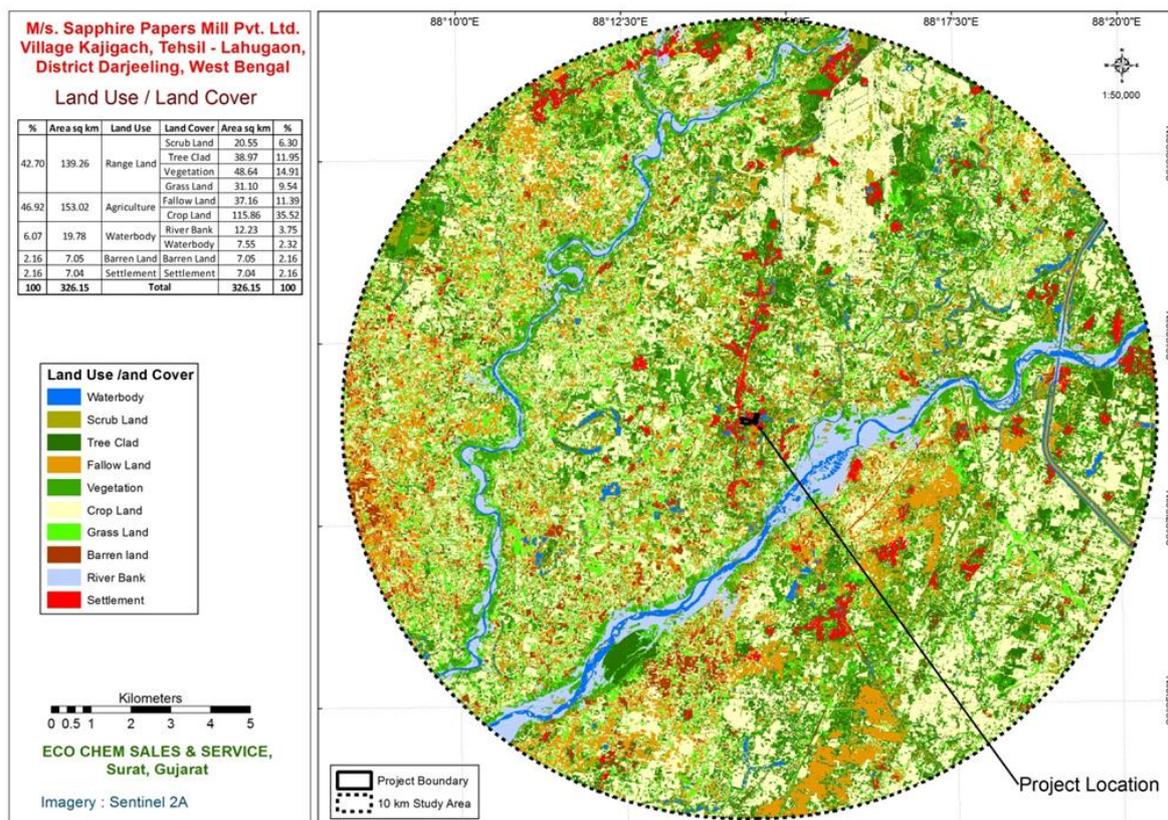


Figure 3.13: Land Use Map

Table 3.15 Land use Statistics

Area Sq. Km	Land Use	Land Cover	Area (Sq.km)	% (Percentage)
139.26	Range Land	Scrub land	20.55	6.30
		Tree Clad	38.97	11.95
		Vegetation	48.64	14.91
		Grass land	31.10	9.54
153.02	Agriculture	Fallow land	37.16	11.39
		Crop land	115.86	35.52
19.78	Water body	River Bank	12.23	3.75
		Water body	7.55	2.32
7.05	Barren land	Barren land	7.05	2.16
7.04	Settlement	Settlement	7.04	2.16
326.15	Total		326.15	100

(Source: Land use mapping and primary survey of the area)

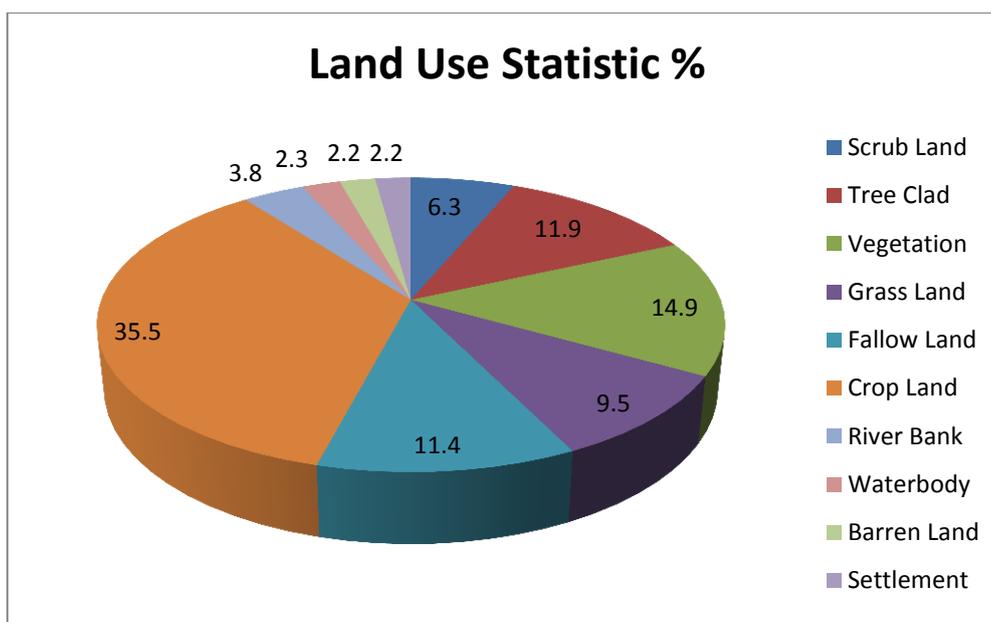


Figure 3.14: Land use Statistics

3.7.2 Summary and Interpretation of Land Use Map

The area surrounding the project site is largely by Agriculture land like Crop land & Fallow land, which is covering around 35.52 % & 11.39 % of the total study area respectively. Range land like Scrub land, Tree clad, Vegetation & Grass land are covering around 6.30 %, 11.95 %, 14.91 % & 9.54 % of the total study area respectively. Water body, barren land & settlement land are covering around 6.07%, 2.16% & 2.16% respectively of the total study area. The proposed expansion will be placed within existing facility; hence there will be no change in land use pattern due to proposed expansion.

3.8 GEOLOGY

The geological formations of the Darjeeling Himalaya consist essentially of unaltered sedimentary rocks. The Sub-Himalaya is made up of Siwalik deposits of the Tertiary age. North of the Siwaliks is the coal-bearing lower Gondwana formations. The Daling series (Pre-Cambrian) follows and is succeeded by the Darjeeling gneiss further north.

The general geology of the area shows that the tectonic units occur in a reverse order of stratigraphic superposition represented by the Siwalik in the south followed towards north by trusted sheets of Gondwana, Daling and Darjeeling group of rocks.

3.8.1 Geomorphology

The landscape of Darjeeling district is essentially a function of structure, process and stage. The geomorphology has been configured by the folded structure outlined during the Tertiary period on the site of precursor geosynclines, called Tethys. The mountains have been formed as a result of a series of north - south horizontal compressions and tangential thrusts. In the Kalimpong range the region lies on the south - east of Darjeeling Himalayas and extends from the Tista River in the west to the river Jaldhaka in the east. The region is characterized by the presence of rising hills, numerous rivers and small torrents.

3.9 HYDROGEOLOGY

In the Darjeeling District average annual rainfall is 2841mm. In this district consolidated formation of Dalings and Darjeeling Gneiss, Piedmont zone unconsolidated sediments. In 2006 water level fluctuation in pre-monsoon is 1.10-9.69 mbgl and in post-monsoon is 1.29-4.66 mbgl. Hydro-geological map of Dargeeling District is presented in Figure.

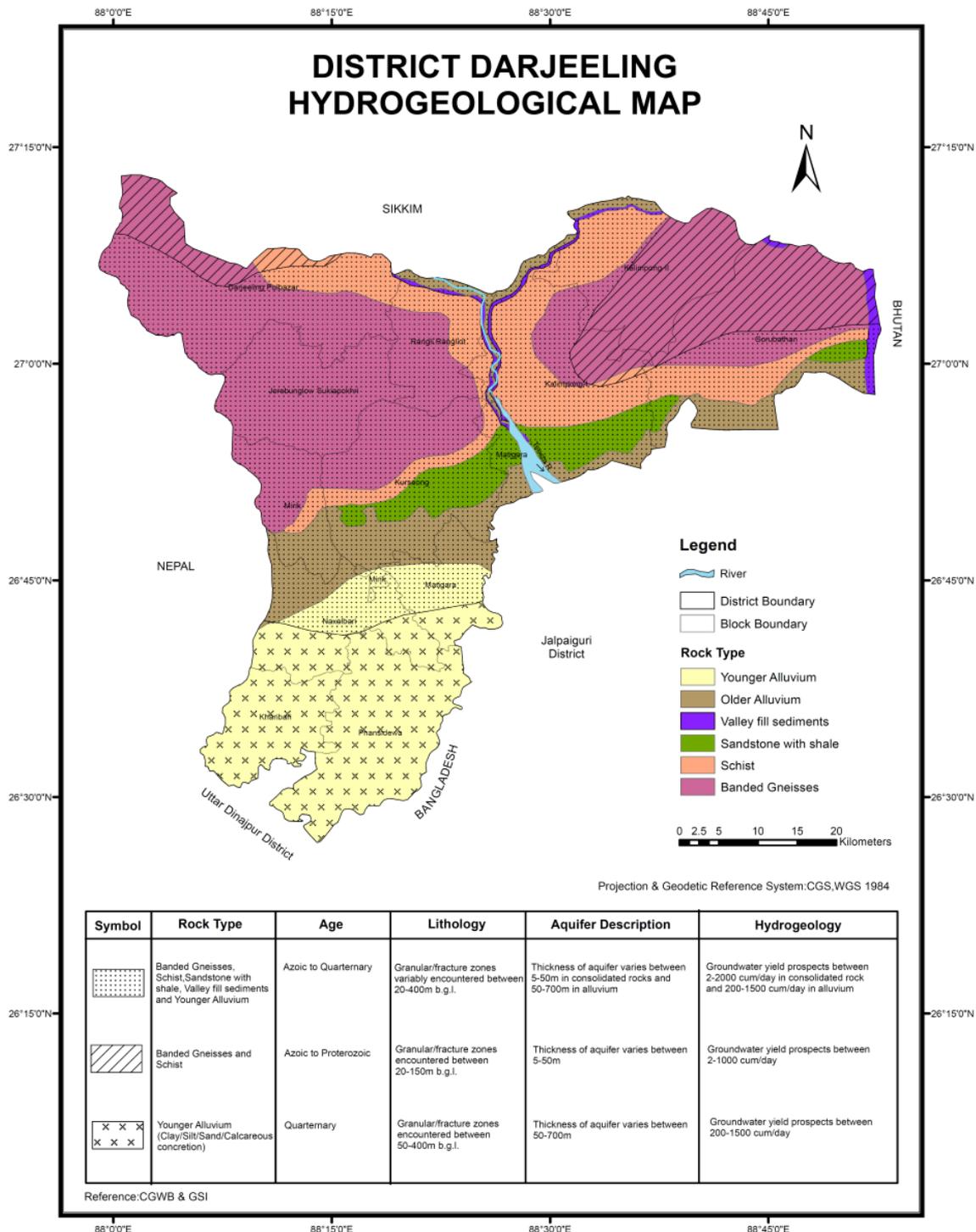


Figure 3.15: Hydrogeological map, Darjeeling district

3.10 SOIL QUALITY

The project location falls under Agro Climatic Zone of Easter himalayan region (II) & Easter himalayas and warm perhumid eco-region as per Agro Ecological Sub Region, characterized by medium deep to very deep loamy soils (35%), sandy loam soil (34.7%), shallow to medium deep loamy soils (30%). The main source of irrigation in the region are canals and bore well. The major crops cultivated are Rice, Maize, Wheat & Oilseed and Mustard. Fruit crops are Pineapple, Mandarin, Banana, Litchi etc. and vegetables are Cucumber, Brinjal, Cabbage, Cauliflower & radish. (Source: Agriculture Contingency Plan for West bengal State, District: Darjeeling).

During the study period, total 8 numbers of samples were collected from different locations within 10 km radius to assess the baseline status of soil within the study region. Analysis was also carried out for physico-chemical parameters as well as the parameters to define the texture class. Soil samples were collected by using Khurpi, Augar and Core cutter. Samples were brought to the laboratory in polythene bags. Standard procedures have been followed for soil sampling and analysis. Soil sampling locations are presented in **Figure 3.16** and tabulated in **Table 3.16**. Results are presented in **Table 3.17**. Photographs of the soil sampling are presented in **Figure 3.17**.

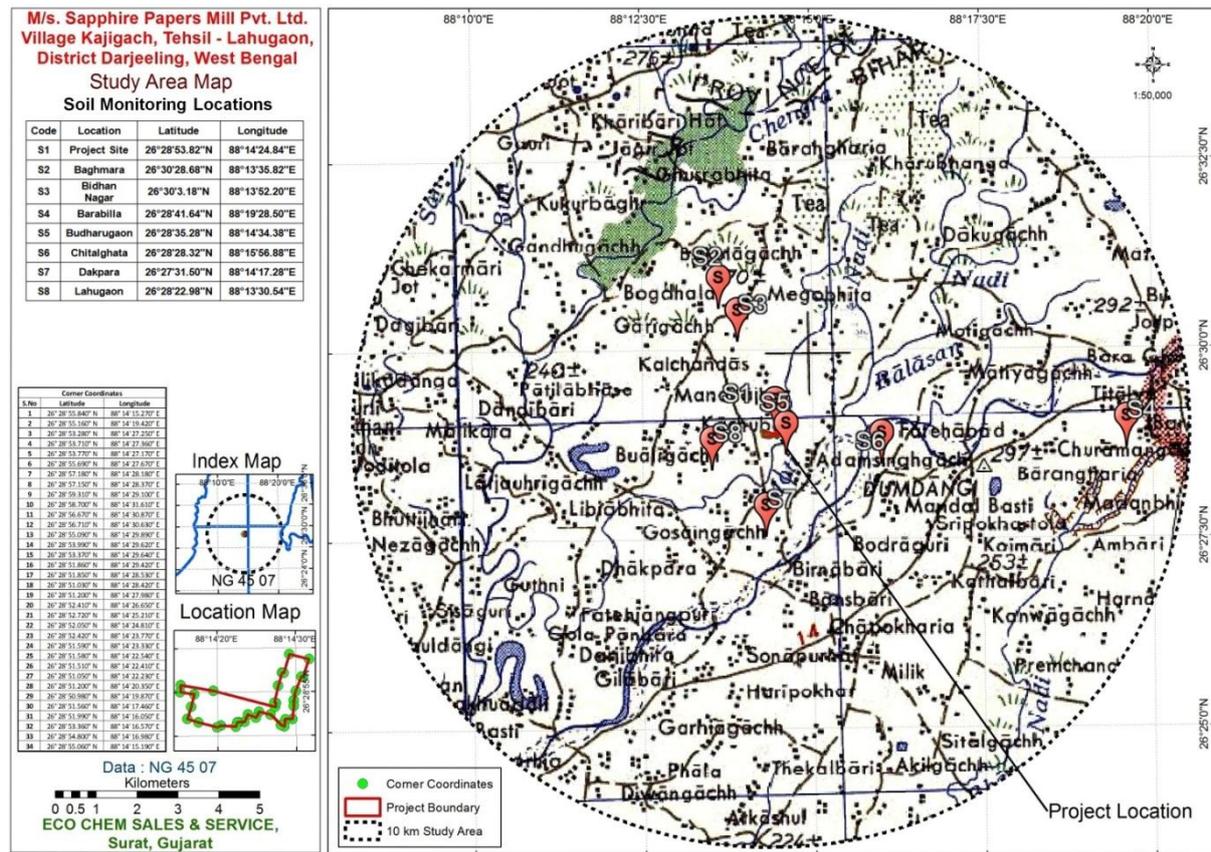


Figure 3.16: Map showing the study region location of Soil

Table 3.16 Details of Soil sampling location

Code	Location	Distance/Direction w.r.t to Project Site	Latitude and Longitude	Selection Criteria
S1	Project Site	--	26°28'53.82"N 88°14'24.84"E	Industrial land
S2	Baghmara	3.23 km / NNW	26°30'28.68"N 88°13'35.82"E	Scrub Land
S3	Bidhan Nagar	2.37 km / NNW	26°30'3.18"N 88°13'52.20"E	Fellow land
S4	Borobilla	8.42 km / E	26°28'41.64"N 88°19'28.50"E	Scrub land
S5	Budharugaon	0.63 km / SSE	26°28'35.28"N 88°14'34.38"E	Scrub land
S6	Chitalghata	2.63 km / ESE	26°28'28.32"N 88°15'56.88"E	Barren Land
S7	Dakpara	2.52 km / SSW	26°27'31.50"N 88°14'17.28"E	Fellow Land
S8	Lahugaon	1.77 km / SW	26°28'22.98"N 88°13'30.54"E	Crop Land



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Figure 3.17: Photographs of soil sampling

Table 3.17 Soil Sample Analysis Result

S. No	Parameters	Unit	S1	S2	S3	S4	S5	S6	S7	S8
1.	Water Holding Capacity	%	36.01	41.9	39.7	40.07	43.65	35.77	39.6	35.83
2.	Porosity	%	39.51	50.98	47.09	56.16	53.62	52.69	55.34	54.28
	Bulk Density	gm/cc	1.29	1.1	1.33	1.1	1.25	1.13	1.12	1.12
3.	Particle Size Distribution									
a.	Sand	%	22.4	24.1	24.6	22.8	22.4	25.5	24.1	23.8
b.	Silt	%	32.1	32.2	29.3	24.2	27.3	27.6	30.8	28.1
c.	Clay	%	45.5	42.6	46.1	53.0	50.3	46.8	45.1	48.1
4.	Texture	-	Clay	Clay loam	Clay	Clay	Clay	Clay loam	Clay loam	Clay loam
5.	Cation Exchange Capacity	meq/100 g	82.42	102.43	78.82	86.52	71.66	99.40	79.34	68.93
6.	pH	-	7.3	6.3	6.9	7.2	6.7	7.2	7.1	7.07
7.	Electrical Conductivity	dS/m	0.9	0.82	0.83	0.91	0.82	0.86	0.79	1.03
8.	SAR	-	0.54	0.52	0.54	0.38	0.51	0.45	0.47	0.51
9.	Exchangeable Sodium percentage	%	3.89	3.38	3.89	2.72	3.88	2.99	3.39	3.93
10.	Exchangeable Calcium	meq/100g	43.47	58.59	37.85	57.78	39.27	51.09	47.89	37.70
11.	Exchangeable Magnesium	meq/100g	28.05	30.08	26.72	17.82	20.43	37.81	18.41	18.78
12.	Exchangeable Sodium	meq/100g	3.21	3.46	3.07	2.32	2.78	2.91	2.69	2.71
13.	Exchangeable Potassium	meq/100g	7.69	10.30	11.18	8.57	9.18	7.52	10.35	9.74
14.	Organic Carbon(OC)	%	1.02	1.02	0.96	0.9	0.8	1.0	1.02	0.91
16.	Total Nitrogen	%	0.088	0.088	0.083	0.078	0.069	0.086	0.088	0.078
18.	Nitrate N	mg/100gm	2.07	1.8	1.8	1.5	2.08	1.95	2.19	1.71
19.	Available Phosphorus	Kg/ha	196.69	193.42	220.08	185.09	193.42	215.10	236.76	203.42
20.	Total Iron	mg/kg	7871.77	7867.77	7997.51	8266.67	7977.57	8476.08	7169.77	7907.69

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S. No	Parameters	Unit	S1	S2	S3	S4	S5	S6	S7	S8
21.	Total Zinc	mg/kg	28	15	20	27	32	25	22	26
22.	Total Copper	mg/kg	6.7	7.4	7	8	9	5.9	6	8.8
23.	Available Boron	mg/kg	2.32	1.69	2.19	2.01	2.26	2.68	3.12	2.32
24.	Total Chromium	mg/kg	77.14	72.86	51.43	38.57	60.00	47.14	68.57	42.86

3.10.1 Summary of Soil Data

The soils are categorized as sandy clay loam to clay based on different soil separates (sand, silt and clay). Soils have moderate water holding capacity (35.77 to 43.65 %) and porosity (39.51 to 56.16 %). The drainage is likely to be good though texture is clay loam to clay on account of high organic matter. The soil depth is <1m. The pH of the soil samples ranged from 6.3 to 7.3 during the study period, indicating that soils are acidic (pH <6.5) to normal (pH 6.5 to 7.8) in soil reaction. The soil EC also varied from 0.79 to 1.03 dS/m, this indicate that soils are non-saline (EC <0.80) to slightly saline (pH <1.6) and ESP ranged from 2.72 to 3.93, which does not exceed threshold level of 15. Among exchangeable basic cations predominance of Ca (37.70 to 58.89 meq/100g soil) was seen followed by Mg (17.82 to 37.81 meq/100 g soil), Na (2.32 to 3.89 meq/100 g) and K (7.52 to 11.18 meq/100g soil). The loss on ignition (0.80 to 1.02 % OC) indicate that soils are high (>0.75 % OC) in organic carbon status. This shows that soils are high in nitrogen status. The available phosphorus status (185.09 to 236.76 kg/ha) was very high (>56 kg/ha). Considering exchangeable potassium values (657.0 to 976.7 kg K₂O/ha), soils are rated as very high in (>280 kg K₂O /ha) in available potassium status. The results relating to total Fe, Cu, Cr, B and Zn do not show alarming concentrations in different soil samples.

3.10.2 Interpretation of Soil Data

Based on soil analysis data it is concluded that surface soils are acidic to neutral in reaction, majority samples are non-saline except one and non-sodic. The soils are rich in nitrogen, very high in available phosphorus and available potassium status. The levels of total Fe, Cu, Cr, B and Zn are within the safe limits. However, for successful greenbelt development liberal quantity of organic manure and half the recommended doses of N, P and K fertilizers should be applied. The soil should be periodically monitored for EC, pH and ESP. In the proposed project, there will be utilization of the treated wastewater generated from the process in the gardening purpose within the plant premises only. It is suggested that the treated water should be used for gardening purpose only after conforming the guideline of treated effluent discharge for gardening/irrigation purpose.

3.11 WATER ENVIRONMENT

Water quality studies have been carried out in the study area to understand the availability of water resources, possibility of water contamination and existing water quality. Physical, Chemical and Microbiological factors influencing water quality are so interrelated that a change in any water quality parameter may trigger other changes in a complete network of interrelated variables. Selected water quality parameters for surface and ground water resources along with biological indicators within study region have been used for water environment and assessing the impact on it by proposed project. A study on water environment aspects of ecosystem plays an important role in environmental assessment to identify water related sensitive issues.

3.11.1 Reconnaissance

As a significant part of predefined framework of the present study water samples were collected from selected locations. The Reconnaissance survey was undertaken and monitoring locations were finalized based on:

- Presence, Location and uses of major water bodies in the region,
- Type and Location of Industrial/residential areas, their intake and effluent disposal locations,
- Likely areas that can represent baseline conditions.

3.11.2 Water Quality

With the start of water quality study, the water resources in the study area were divided into two categories for getting ideal upshot of baseline status of water quality of the region. These two categories as determined are:

- Ground water resources (tube well, open well, springs etc.)
- Surface water resources including ponds, rivers, canals.

3.11.3 Sampling and Analysis

All the water samples were collected and analyzed as per “Standard Methods for Examination of Water & Wastewater”, APHA 23rd edition, 2017. Water Samples for the analysis of physico-chemical parameters were collected in plastic carboy and parameter wise preserved onsite as per the technique defined in the book of APHA, 23rd edition, 2017. Temperature, pH and DO were analyzed onsite and samples were brought to the laboratory for the analysis of remaining parameters. Parameters were selected based on the Technical Guideline Manual and ToR granted to the unit.

3.11.4 Ground Water

The ground water samples were collected from 8 nos. of location to assess the quality of ground water within the study region. Ground water sampling locations are presented in **Table 3.18** and **Figure 3.18**. Analysis results are presented in **Table 3.19**. Photographs of Ground Water Sampling are presented in **Figure 3.19**.

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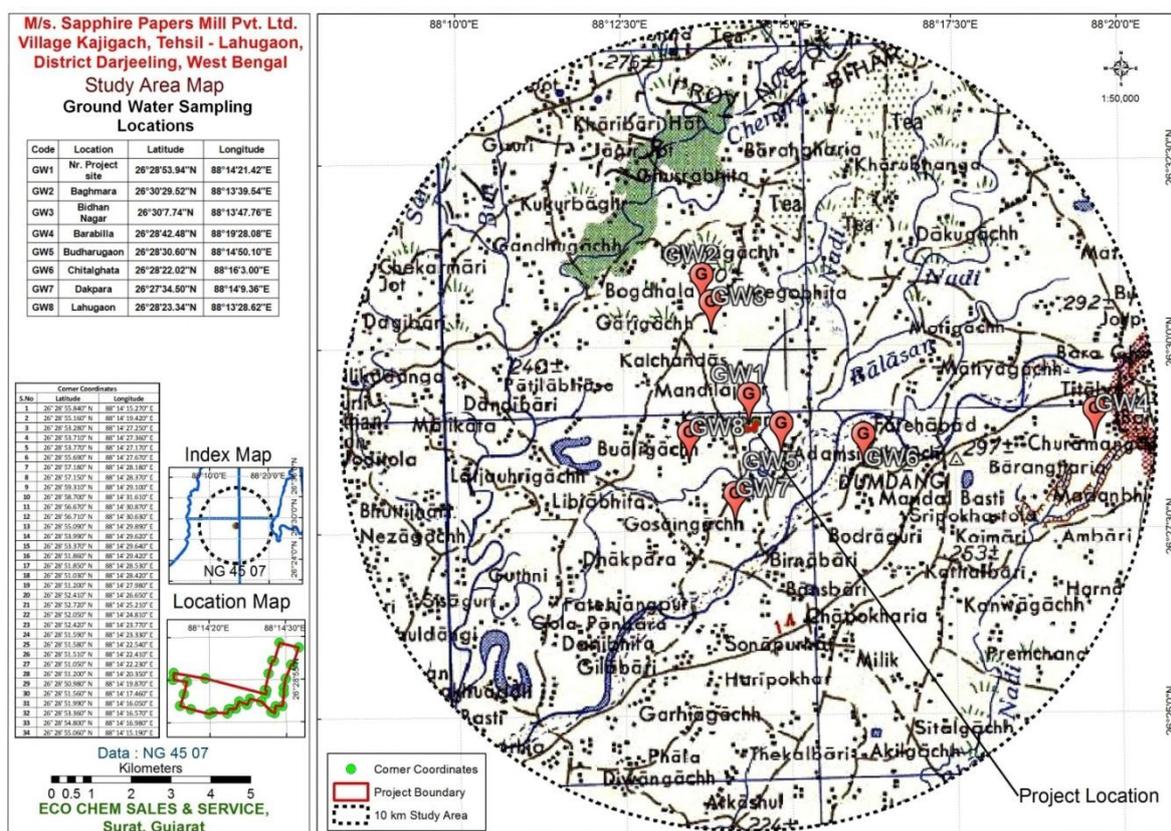


Figure 3.18: Map showing the study area with locations for Ground Water

Table 3.18 Details of Ground Water sampling locations

Code	Location	Distance/Direction w.r.t to Project Site	Latitude and Longitude	Source
GW1	Nr. Project site	--	26°28'53.94"N 88°14'21.42"E	Bore Well
GW2	Baghmara	3.23 km / NNW	26°30'29.52"N 88°13'39.54"E	Bore Well
GW3	Bidhan Nagar	2.53 km / NNW	88°13'39.54"E 88°13'47.76"E	Hand pump
GW4	Borobilla	8.54 km/ E	26°28'42.48"N 88°19'28.08"E	Hand Pump
GW5	Budharugaon	1.07 km / SE	26°28'30.60"N 88°14'50.10"E	Hand Pump
GW6	Chitalghata	2.94 km / SEE	26°28'22.02"N 88°16'3.00"E	Hand Pump
GW7	Dakpara	2.40 km / SSW	26°27'34.50"N 88°14'9.36"E	Hand Pump
GW8	Lahugaon	1.84 km/ SW	26°28'23.34"N 88°13'28.62"E	Hand Pump

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Nr. Project site



Baghmara



Bidhan Nagar



Borobilla



Budharugaon



Chitalghata



Dakpara



Lahugaon

Figure 3.19: Photographs of Ground Water Sampling

Table 3.19 Ground water Analysis Results

S. No.	Parameters	Unit	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	Drinking Water Specification IS 10500: 2012	
											Desirable Limit	Permissible Limit
1.	Temperature	°C	26	27	27	27	26	27	26	26	--	--
2.	pH @ 25°C	pH Unit	7.52	7.52	7.58	7.56	7.45	7.54	7.48	7.66	6.5 – 8.5	No Relaxation
3.	Colour	Hazen	<5	<5	<5	<5	<5	<5	<5	<5	5	15
4.	TDS @ 180°C	mg/L	58	132	60	62	240	166	92	63	500	2000
5.	Conductivity	µmho/cm	92	230	99	98	370	262	150	98	--	--
6.	Turbidity	NTU	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	5
7.	Total Hardness as CaCO ₃	mg/L	28	38	32	28	102	64	30	36	200	600
8.	Calcium	mg/L	6.4	9.6	6.4	7.2	24.4	16.0	9.6	9.6	75	200
9.	Total Alkalinity as CaCO ₃	mg/L	27	50	32	30	92	68	40	32	200	600
10.	Chloride	mg/L	7	26	6	9	54	25	18	6	250	1000
11.	Magnesium	mg/L	2.9	3.4	3.9	2.4	10.0	5.8	1.5	2.9	30	100
12.	Sulphate	mg/L	4	9	4	2	29	15	4	3	200	400
13.	Total Phosphorus (PO ₄ -P)	mg/L	0.9	1.4	0.7	0.9	1.2	1.6	1.2	0.6	--	--
14.	Sodium	mg/L	5	24	5	7	38	18	7	3	--	--

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S. No.	Parameters	Unit	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	Drinking Water Specification IS 10500: 2012	
											Desirable Limit	Permissible Limit
15.	Potassium	mg/L	1	4	1	1	12	2	2	1	--	--
16.	Fluoride	mg/L	0.1	0.3	0.1	0.1	0.3	0.6	0.2	0.1	1.0	1.5
17.	Phenolic Compound	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.001	0.002
18.	Oil and Grease	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	--
19.	Dissolved Oxygen	mg/L	5	5.2	4.9	5	5.6	5.6	5.2	5	--	--
20.	Nitrate	mg/L	<2	<2	<2	<2	<2	<2	<2	<2	45	No Relaxation
21.	Total Nitrogen	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-
22.	Iron	mg/L	0.08	0.1	0.12	0.11	0.16	0.14	0.14	0.12	0.3	No Relaxation
23.	Copper	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	1.5
24.	Boron	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.5	1.0
25.	Chromium	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.05	No Relaxation
26.	Zinc	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	15
27.	Total Coliform	Present/ Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Shall not be detectable in any 100 ml of sample	

3.11.5 Summary of Ground Water Quality

- During the baseline monitoring maximum values and minimum values pertaining to the major parameters along with their sampling locations are tabulated as below:

Parameters	Unit	Minimum		Maximum	
		Results	Sampling Location	Results	Sampling Location
pH	--	7.45	Budharugaon	7.66	Lahugaon
TDS	mg/l	58	Project Site	240	Budharugaon
Total Hardness	mg/l	28	Project Site	102	Budharugaon
Total Alkalinity	mg/l	27	Project Site	92	Budharugaon
Chlorides	mg/l	6	Bidhan Nagar	54	Budharugaon
Sulphate	mg/l	2	Borobilla	29	Budharugaon
Iron	mg/l	0.08	Project Site	0.16	Budharugaon

- Turbidity was found <0.1 NTU.
- Total Dissolved Solid (TDS) varies in the range of 58-240 mg/L & Conductivity varies in the range of 92-370 μ mho/cm. The ratio of TDS to conductivity was observed 0.65 which is within the desired range.
- As microbiological parameters MPN analysis was also carried out and it was found absent.
- Heavy metal concentrations were observed below Indian Standard/Specification for drinking water IS: 10500-2012 in all the locations except iron.

3.11.6 Interpretation of Ground Water Quality Data

Based on comparison study of test results and summary report with drinking water norms, it is interpreted that the ground water sample collected from all the locations can be used in drinking as well as all domestic purposes and irrigation as all results meet with the desirable limit for drinking water as per IS: 10500 :2012. It is suggested that, No untreated wastewater shall be discharged on land at any condition and treated water after confirming all the irrigation standard shall be used for irrigation purpose.

3.11.7 Surface Water

To assess the quality of Surface water, sample was collected from 8 numbers of locations for the analysis of 33 physico-chemical and microbiological parameters. Frequency of sampling was once during the study period. Sampling and analysis was carried out as per "Standard Methods for Examination of Water and Wastewater 23rd edition, 2017. Surface water sampling locations are presented in the **Table 3.20** and **Figure 3.20**. Analysis results are presented in **Table 3.21 & 3.22**. Photographs of Surface Water Sampling are presented in **Figure 3.21**.

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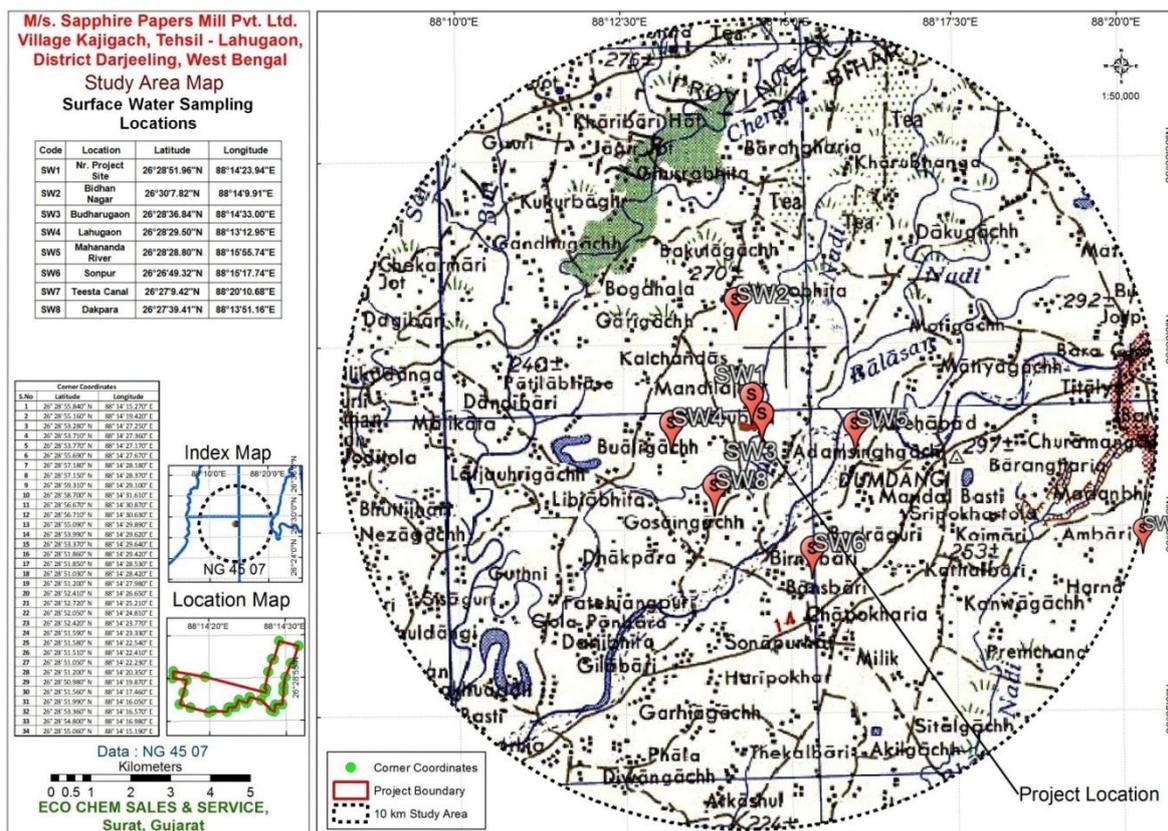


Figure 3.20: Map showing the locations for Surface water

Table 3.20 Details of Surface Water Sampling Locations

Code	Location	Distance/Direction w.r.t to Project Site	Latitude and Longitude	Source
SW1	Nr. Project Site	0.22 km / ESE	26°28'51.96"N 88°14'23.94"E	Canal
SW2	Bidhan Nagar	2.33 km / NNW	26°30'7.82"N 88°14'9.91"E	Pond
SW3	Budharugaon	0.67 km / SE	26°28'36.84"N 88°14'33.00"E	Pond
SW4	Lahugaon	2.02 km / WSW	26°28'29.50"N 88°13'12.95"E	Pond
SW5	Mahananda River	2.74 km / ESE	26°28'28.80"N 88°15'55.74"E	River
SW6	Sompur	4.11 km / SSE	26°26'49.32"N 26°26'49.32"N	Pond
SW7	Teesta Canal	10.21 km / ESE	26°27'9.42"N 88°20'10.68"E	Canal
SW8	Dakpara	2.37 km / SW	26°27'39.41"N 88°13'51.16"E	Pond

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<p>Nr. Project Site</p>	<p>Bidhan Nagar</p>
	
<p>Budharugaon</p>	<p>Lahugaon</p>
	
<p>Mahananda River</p>	<p>Sonpur</p>
	
<p>Teesta Canal</p>	

Figure 3.21: Photographs of Surface Water Sampling

Table 3.21 Surface water Analysis Results

S. No.	Parameters	Unit	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
1.	Temperature	°C	27	26	26	27	26	27	26	27
2.	pH @ 25°C	pH Unit	7.34	7.54	7.48	7.54	7.22	7.78	7.65	7.02
3.	Colour	Hazen	<5	<5	<5	<5	<5	<5	<5	<5
4.	Odour	-	Unobjectable	Unobjectable	Unobjectable	Unobjectable	Unobjectable	Unobjectable	Unobjectable	Unobjectable
5.	TDS @ 180°C	mg/L	510	110	36	70	44	36	48	112
6.	Conductivity	µmho/cm	830	176	57	112	74	60	81	172
7.	TSS	mg/L	18	8	4	6	4	4	6	12
8.	Total Hardness as CaCO ₃	mg/L	120	36	15	36	24	14	32	76
9.	Calcium	mg/L	36	8.8	3.6	9.6	8	3.2	7.2	12
10.	Total Alkalinity as CaCO ₃	mg/L	160	32	14	29	18	14	29	66
11.	Chloride	mg/L	115	20	5	20	7	5	6	36
12.	Magnesium	mg/L	7.3	3.4	1.5	2.7	1.0	1.5	3.4	11
13.	Sulphate	mg/L	46	20	4	18	10	2	6	8
14.	Total Phosphorus	mg/L	0.8	0.6	0.2	0.5	0.4	0.4	0.5	0.7
15.	Sodium	mg/L	98	18	4	17	6	4	5	22
16.	Potassium	mg/L	18	4	1	2	1	0	1	2
17.	Fluoride	mg/L	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.2
18.	Phenolic Comp.	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
19.	Oil and Grease	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
20.	Dissolved Oxygen	mg/L	4.7	4.9	4.6	4.7	4.6	4.6	5.0	4.6
21.	COD	mg/L	14	10	4	8	4	8	8	12
22.	BOD (3 days at 27°C)	mg/L	7	5	3	4	3	4	4	5

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S. No.	Parameters	Unit	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
23.	Nitrate	mg/L	<2	<2	<2	<2	<2	<2	<2	<2
24.	Total Nitrogen	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
25.	Iron	mg/L	0.22	0.14	0.08	0.1	0.09	0.08	0.09	0.12
26.	Copper	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27.	Boron	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
28.	Chromium	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
29.	Zinc	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Table 3.22 Microbiological Analysis of surface Water

Code	Total coliform	Faecal coliform	Escherichia coli	Fecal Streptococci
	Most Probable No (MPN): No/100 MI			
SW1	39	26	<1.1	<1.1
SW2	34	22	<1.1	<1.1
SW3	26	17	<1.1	<1.1
SW4	25	17	<1.1	<1.1
SW5	22	13	<1.1	<1.1
SW6	25	17	<1.1	<1.1
SW7	20	14	<1.1	<1.1
SW8	34	26	<1.1	<1.1

Table 3.23 Inland Surface Water Classification (CPCB Standards)

S. No.	Characteristics	Class				
		A	B	C	D	E
1.	Dissolved Oxygen, mg/L, Min	6	5	4	4	-
2.	Biochemical Oxygen Demand, mg/ L Max	2	3	3	-	-
3.	Total Coliform Organisms* MPN/100 ml, Max	50	500	5000	-	-
4.	Total Dissolved Solids mg/L Max	500	-	1500	-	2100
5.	Chlorides (as CL), mg/L, Max	250	-	600	-	600
6.	Colour, Hazen Units, Max	10	300	300	-	-
7.	Sodium Absorption Ratio, Max	-	-	-	-	26
8.	Boron (as B) mg/L Max	-	-	-	-	2
9.	Sulphates (as SO ₄), mg/L Max	400	-	400	-	1000
10.	Nitrates (as NO ₃), mg/L Max	20	-	50	-	-
11.	Free Ammonia (as N), mg/L Max	-	-	-	12	-
12.	Conductivity at 250C, micromhos/cm, Max	-	-	-	1000	2250
13.	pH value	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
14.	Iron (as Fe), mg/l, Max	0.3	-	50	-	-
15.	Fluorides (as F), mg/L, Max	1.5	1.5	1.5	-	-
16.	Copper (as Cu), mg/L, Max	1.5	-	1.5	-	-

* If the Coliform is found to be more than the prescribed tolerance limits, the criteria for Coliform shall be satisfied if not more than 20 percent of samples show more than the tolerance limit specified, and not more than 5 percent of samples show values more than 4 times the tolerance limits. Further, the faecal Coliform should not be more than 20 percent of the Coliform.

Source: Indian Standard (IS: 2296 – 1982).

A' Drinking water surface without conventional treatment but after disinfection

B' Outdoor bathing (organized)

C' Drinking water source with conventional treatment followed by disinfection

D' Propagation of wild life, fisheries

E' Irrigation, industrial, cooling, controlled waste disposal

3.11.8 Summary of Surface Water Quality

- During the baseline monitoring maximum values and minimum values pertaining to the major parameters along with their sampling locations are tabulated as below:

Parameters	Unit	Minimum		Maximum	
		Results	Sampling Location	Results	Sampling Location
pH	--	7.02	Dakpara	7.78	Sonpur
TDS	mg/l	36	Sonpur	510	Nr. Project Site
TSS	mg/l	4	Badharugaon	18	Nr. Project Site
Total Hardness	mg/l	14	Sonpur	120	Nr. Project Site
Dissolved Oxygen	mg/l	4.6	Budharugaon	5.0	Teesta Canal
COD	mg/l	4	Budharugaon	14	Nr. Project Site
BOD	mg/l	3	Budharugaon	7	Nr. Project Site
Total Nitrogen	mg/l	<0.2	--	<0.2	--
Iron	mg/l	0.08	Budharugaon	0.22	Nr. Project Site

- MPN test was also carried out for the surface water sample and it was found positive. *E-coli* and *Streptococci* test was found negative in all samples.

3.11.9 Interpretation of Surface Water Quality Data

Based on test result data comparison study with CPCB standard for inland surface water classification, it is interpreted that surface water quality of all locations meet with the criteria D and E except the samples from Budharugaon pond and Mahananda river, it means these water sources can be used for propagation of wild life, fisheries and Irrigation, industrial utilization for cooling, etc. The surface water samples are collected from all the locations presence of COD & BOD is found in the samples, which indicated the presence of organic matter in the surface water body. The DO level of all surface water sampling locations are found >4.0 mg/L, DO level >4.0 mg/L is considered suitable for the survival of aquatic life and <4.0 mg/L is not considered suitable for aquatic life survival. The samples collected from the Budharugaon pond and Mahanada river meets with the criteria "C", it means it can be used in drinking purpose after conventional treatment with disinfection. It is suggested that no wastewater or treated water shall be discharged to the any surface water body.

3.12 ECOLOGY AND BIODIVERSITY

Ecology is the branch of science for the study of the relations that living organisms have with respect to each other and their natural environment. Producer, consumer and decomposer govern whole cycle of ecology. Plant and animal both are interdependent to each other. Producer is necessary for each consumer. Plant plays their role in ecology as producer. Plant, animals and microorganism together with the environment in which they live make an independent unit called the Ecosystem.

Study of biological environment is an important aspect of EIA with respect to deciding about the conservation plan needed for the organisms depending on the availability and their status as per wild life protection act 1972 and red data book list. Biodiversity helps to makeup the structure of the ecosystem and habitats that support essential living resources like faunal and

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floral structures. Biodiversity also play an important role in maintaining oxygen in the air, enriching the soil, purifying water protecting from floods and erosion.

The main objective of the ecological survey is aimed to assess the vegetation types, identifying flora and fauna, rare and endangered species and evaluating the impact on this biodiversity. The objective of ecological survey is also preparing the list of flora and fauna to decide whether the conservation plan is needed.

3.12.1 Study Area

The study period of the baseline study has been considered from December 2021 to February 2022. Total 10 Km radius from the project site has been considered as study region, out of which study area up to 5 km radius from the project site has been considered as core zone and 5 km to 10 km radius has been considered as buffer zone. Map showing the core zone and buffer zone of the study area is presented in Figure.

Total study area shows Range land (42.7%), Agriculture land (46.91%), Water body (6.07%), barren land (2.16%) and Settlement land (2.16%).

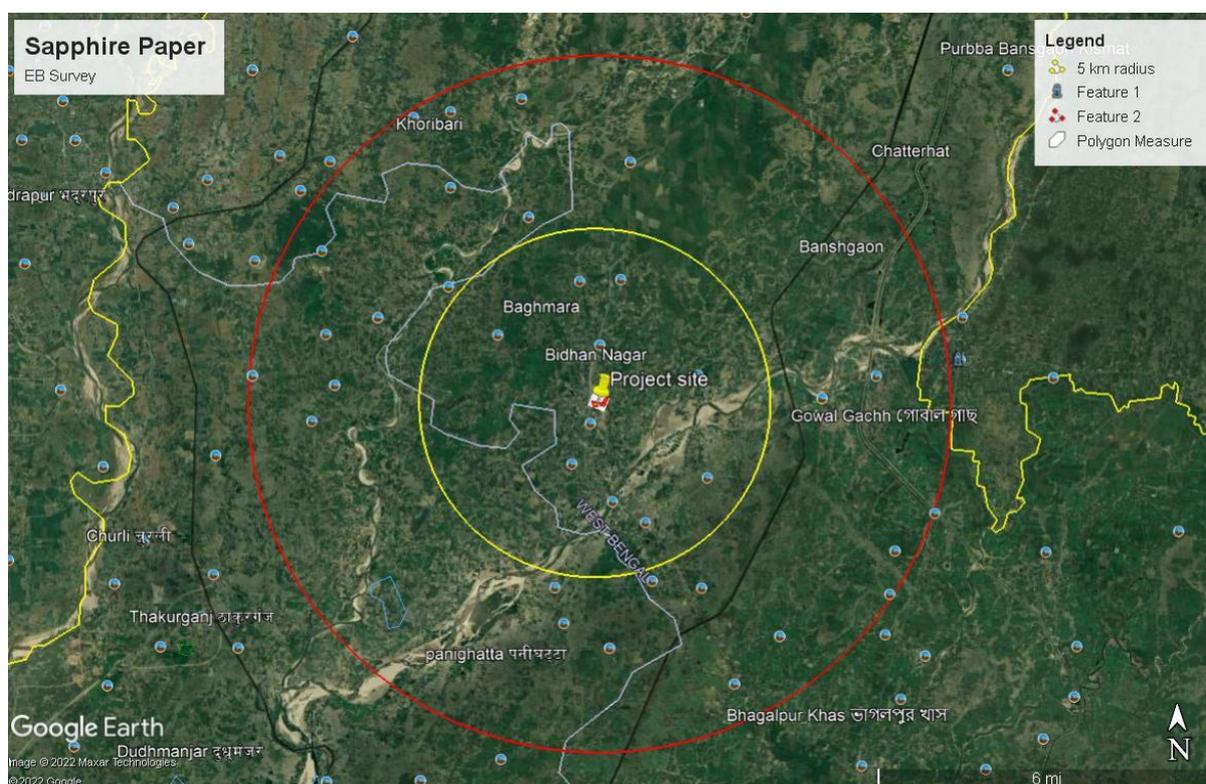


Figure 3.22: Map showing the core zone and buffer zone of the study area

3.12.2 Methodology adopted for primary survey of ecology & biodiversity

The importance of primary data collection in all ecological work cannot be over-emphasized as without good survey data. Prior to initiate the primary survey, a list was prepared with help of data available from the secondary source. Secondary data was also collected from the authenticated sources in the public domain. Sources of secondary data mainly comprise standard field guides, published research papers or articles, governmental publications and websites of internationally recognized conservation organizations such as International Union

for Conservation of Nature and Natural Resources (IUCN), Birdlife International, Conservation International, Wildlife Conservation Society (WCS) and World Wildlife Fund (WWF). The locations were decided on toposheet of the particular area during the desktop study based on maximum probability of the floral species. Monitoring of all species was not clearly feasible during a short duration baseline survey. Therefore the most commonly used species based attributes of habitat composition are species presences or absences, abundance of typical species or vegetation communities, and the distribution (range) of a species and Qualitative floral survey was conducted by adopting the method: opportunistic survey (personal observation) & Supplementary information was obtained through informal interactions with local communities.

3.12.3 Floral Biodiversity observed during the primary survey in the immediate impact zone

Floral species like Shrish Tree (*Albizia lebbeck*), Tamhan tree (*Lagerstroemia speciosa*), Blackboard tree (*Alstonia scholaris*), Pipal (*Ficus religiosa*), Nilgiri (*Eucalyptus*), castor (*Ricinus communis*), royal palm (*Roystonea regia*), horsetail tree (*Casuarina equisetifolia*), False Asoka (*Polyalthia longifolia*), Jambu (*Syzygium cumini*), Neem (*Azadirachta indica*), frangipani (*Plumeria alba*), copper pod tree (*Peltophorum pterocarpum*), Sadaphuli (*Catharanthus roseus*), etc. are found at the project site and its immediate surroundings.

3.12.4 Secondary data of the floral species in the region

Under the floral baseline study, secondary data was collected for crops, trees, shrubs, herbs, climbers from the Forest Department, darjeeling District. The study area was considered up to 10 km radius covering core zone and buffer zone. Details of the secondary data and validated species sited from the list are specified below:

3.12.5 Crops

The prevalent cropping systems of this area are the cumulative results of past and present decisions by individuals; these decisions are usually based on experience, tradition, expected profit, personal preferences and resources, and so on. The crop occupying the highest percentage of the shown area of this region is taken as the major crop and all other possible alternative crops which are shown in this region either as substitutes of the base crop in the same season or as the crops which fit in the rotation in the subsequent season, are considered as minor crop. The crops are cultivated in all three seasons. The district has varied Major field cultivated crops, Horticulture fruit crops, Horticulture vegetable crops, Medicinal/Aromatic & Plantation Crops. Details of crops are listed below.

Major Field Crops	Rice
	Maize
	Wheat
	Oilseed (Mustard, Linseed)
Horticulture Crops Fruit	Pineapple
	Mandarin
	Other Citrus
	Banana
	Litchi
Horticulture Crops Vegetable	Cucumbers

	Brinjal
	Cabbage
	Cauliflower
	Radish
Medicinal/ Aromatic and Plantation Crops	Tea
	Ginger
	Chillies
	Potato
	Large Cardamom

3.12.6 Trees

Total 111 species of trees belong to 41 families were observed in the study area. The dominant trees in the study area are *Albizia lebbek* (Kalo Sirirs), *Holarrhena pubescens* (madhese khirro), *Terminalia arjuna* (Arjun), *Oroxylum indicum* (totola), *Macaranga denticulate* (Jogi malate), *Azadirachta indica* (Neem), *Syzigium cumini* (jamun), *Tectona grandis* (Teak), *Neolamarckia cadamba* (Kadam). Trees observed during the survey are tabulated in Table 3.24.

Table 3.24 List of Trees in the Study area

S. No.	Scientific Name & family	Common Name
1	Actinidiaceae	
1/1	<i>Saurauia nepaulensis</i>	Gogun
2/2	<i>Saurauria fasciculata</i>	Gogun
3/3	<i>Saurauria roxburgii*</i>	Aulae gagun
2	Alanginaceae	
4/1	<i>Alangium salvifolium</i>	Asare
5/2	<i>Alangium chinense</i>	Phir Phire
3	Anacardiaceae	
6/1	<i>Buchanania lanzan</i>	Charoli
7/2	<i>Choerospondias axillaris</i>	Lapsi
8/3	<i>Lannea coromandelica</i>	Doka
9/4	<i>Mangifera sylvatica*</i>	Chuche Anp
10/5	<i>Semecarpus anacardium</i>	Bhayla
11/6	<i>Spondias axillaris</i>	Hug Plum
4	Anacardiceae	
12/1	<i>Spondias pinnata</i>	Amaro
5	Anonaceae	
13/1	<i>Polyalthia simiarum</i>	Lapche Kath
6	Apocynaceae	
14/1	<i>Alstonia scholaris*</i>	Chatiwan
15/2	<i>Holarrhena pubescens</i>	Madhese Khirro
16/3	<i>Wrightia arborea</i>	Khirra
7	Araliaceae	
17/1	<i>Aralia leschenaultii</i>	Chinde
18/2	<i>Heteropanax fragrans</i>	Lal Totola
19/3	<i>Trevesia palmata</i>	Phutta

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S. No.	Scientific Name & family	Common Name
8	Arecaceae	
20/1	<i>Caryota urens*</i>	Rangbhang
21/2	<i>Phoenix rupicola*</i>	Cliff date Palm
9	Asteraceae	
22/1	<i>Vernonia talaumifolia</i>	Nundheki
10	Betulaceae	
23/1	<i>Alnus nepalensis</i>	Utis
24/2	<i>Betula alnoides</i>	Saur
11	Bignoniaceae	
25/1	<i>Oroxylum indicum</i>	Totola
12	Boraginaceae	
26/1	<i>Cordia myxa</i>	Bohri
27/2	<i>Cordia dichotoma</i>	Nimat-kung
13	Burseraceae	
28/1	<i>Garuga pinnata</i>	Dabdabe
14	Caesalpinoideae	
29/1	<i>Cassia fistula*</i>	Amaltas
	Celastraceae	
30/1	<i>Salacia chinensis</i>	
15	Clausiaceae	
31/1	<i>Calophyllum polyanthum Wall.</i>	Rate
32/2	<i>Garcinia cowa</i>	Kaphal
33/3	<i>Garcinia stipulata</i>	Sanakadan kung
16	Combretaceae	
34/1	<i>Terminalia arjuna</i>	Arjun
35/2	<i>Terminalia bellirica*</i>	Barra
36/3	<i>Terminalia chebula</i>	Harra
37/4	<i>Terminalia crenulata</i>	Pakasajh
38/5	<i>Terminalia tomentosa</i>	Saj
39/6	<i>Terminilia myriocarpa</i>	Panisaj
17	Cornaceae	
40/1	<i>Cornus capitata</i>	Bamora
18	Daphniphyllaceae	
41/1	<i>Daphniphyllum himalayense</i>	Lal or Rakta chandan
19	Dilleniaceae	
42/1	<i>Dillenia indica*</i>	Panchphale
43/2	<i>Dillenia pentagyna</i>	Tatri
20	Dipterocarpaceae	
44/1	<i>Shorea robusta</i>	Sal
21	Elaeocarpaceae	
45/1	<i>Elaeocarpus sphaericus</i>	Jalpai
22	Ericaceae	

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S. No.	Scientific Name & family	Common Name
46/1	<i>Lyonia ovalifolia</i>	Angeri
47/2	<i>Rhododendron arboreum</i>	Lali gurans
48/3	<i>Rhododendron grande</i>	Patle korlinga
23	Euphorbiaceae	
49/1	<i>Macaranga denticulata</i>	Jogi Malata
50/2	<i>Macaranga indica</i>	Rani Malata
51/3	<i>Mallotus nudiflorus</i>	Pitali
52/4	<i>Sapium baccatum</i>	Pudlikat
24	Fabaceae	
53/1	<i>Albizia lebbbeck*</i>	Kalo siris
54/2	<i>Albizia procera</i>	Seto Siris
55/3	<i>Albizia odoratissima</i>	Kalo shirish
56/4	<i>Bauhinia purpurea*</i>	Tanki
57/5	<i>Bauhinia variegata</i>	Koirala
58/6	<i>Tamarindus indica*</i>	Titri
25	Fagaceae	
59/1	<i>Castanopsis lanceifolia</i>	Serang
60/2	<i>Lithocarpus pachyphylla</i>	Bante/Sungure
61/3	<i>Quercus glauca</i>	Phalant
62/4	<i>Quercus lamellosa</i>	Buk
26	Hamamelidaceae	
63/1	<i>Exbucklandia populnea</i>	Pipli
27	Juglandaceae	
64/1	<i>Engelhardtia spicata</i>	Mauwa
65/2	<i>Juglans regia</i>	Okhar
28	Lauraceae	
66/1	<i>Alseodaphne owdenii</i>	Tilkhundi
67/2	<i>Cinnamomum glanduliferum</i>	Malagiri
68/3	<i>Cinnamomum tamala</i>	Sinkowli/Tejpata
69/4	<i>Cinnamomum glaucescens</i>	Sugandhakokila
70/5	<i>Cryptocarya amygdalina</i>	Patpatae
71/6	<i>Lindera neesiana</i>	Siltimbur
29	Lythraceae	
72/1	<i>Duabanga grandiflora</i>	Lampatae
73/2	<i>Lagerstroemia parviflora</i>	Sida
74/3	<i>Lagerstroemia speciosa*</i>	Jarul
30	Magnoliaceae	
75/1	<i>Magnolia cathcartii</i>	Tite champ
76/2	<i>Magnolia doltsopa</i>	Rani/Mithe Champ
77/3	<i>Michelia champaca*</i>	Aule Champ
31	Malvaceae	
78/1	<i>Bombax ceiba*</i>	Simal
79/2	<i>Firmiana colorata</i>	Samarri pisi

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S. No.	Scientific Name & family	Common Name
80/3	<i>Kydia calycina</i>	Kubinde
81/4	<i>Pterygota alata</i>	Narkeli
32	Meliaceae	
82/1	<i>Aphanamixis polystachya</i>	Lhasunae
83/2	<i>Azadirachta indica*</i>	Neem
84/3	<i>Chukrasia tabularis</i>	Chekrasi
85/4	<i>Heynea trijuga</i>	Akhaterva
33	Moraceae	
86/1	<i>Artocarpus heterophyllus</i>	Rukh
87/2	<i>Artocarpus lacucha</i>	Badar
88/3	<i>Ficus auriculata</i>	Nevara
89/4	<i>Ficus benjamina*</i>	Swami
90/5	<i>Ficus hirta</i>	Khasreto
91/6	<i>Ficus hispida</i>	Khasre
92/7	<i>Ficus racemosa*</i>	Dumri
93/8	<i>Ficus semicordata</i>	Khasre Khaneu
34	Myrtaceae	
94/1	<i>Syzigium cumini</i>	Jamun
95/2	<i>Syzigium claviflorum</i>	Hare jamuna
35	Pinaceae	
96/1	<i>Pinus roxburghii</i>	Dhup
36	Rhamnaceae	
97/1	<i>Ziziphus mauritiana</i>	Baer
98/2	<i>Ziziphus rugosa</i>	Bukh baer
37	Rubiaceae	
99/1	<i>Aegle marmelos</i>	Bael
100/2	<i>Neolamarckia cadamba</i>	Kadam
101/3	<i>Neonauclea purpurea</i>	Kadam
38	Rutaceae	
102/1	<i>Citrus medica</i>	Bimbira
103/2	<i>Murraya paniculata</i>	Kamini
39	Simaroubaceae	
104/1	<i>Ailanthus excelsa</i>	Gokul
105/2	<i>Ailanthus integrifolia</i>	Saragphula
40	Theaceae	
106/1	<i>Eurya acuminata</i>	Sanu Jhiganae
107/2	<i>Eurya japonica</i>	Jhigni
41	Verbenaceae	
108/1	<i>Gmelina arborea</i>	Kasnar
109/2	<i>Premna longifolia</i>	Gineri
110/3	<i>Tectona grandis*</i>	Teak
111/4	<i>Vitex negundo</i>	Nisinda

Note: *Sited during the Primary Survey

3.12.7 Shrubs

Total 51 species of Shrubs belong to 31 families are enumerated from the study area. Common shrubs of the study area were Moti phool, Kalo Chuletro, Aank, Urillo, Galeni, Dhangayro, Jasmin, Babui tulsi. Species details along with their scientific name are presented in Table 3.25.

Table 3.25 List of Shrub in the Study area

S. No.	Scientific Name & family	Common Name
1	Acanthaceae	
1/1	<i>Strobilanthes divaricatus</i> (Nees)T.	Aakhlae
2/2	<i>Justicia adhatoda</i>	Basak
3/3	<i>Sambucus adnata</i>	Moti phool
2	Anacardiaceae	
4/1	<i>Dobinea vulgaris</i>	Sangli phul
3	Apocynaceae	
5/1	<i>Tabernaemontana divericata*</i>	Chandnee/Tagar
4	Araliaceae	
6/1	<i>Brassaiopsis glomerulata</i>	Kalo Chuletro
7/2	<i>Brassaiopsis hainla</i>	Seto Chuletro
8/3	<i>Brassaiopsis hispida</i> Seem	Putta
5	Aristolochiaceae	
9/1	<i>Aristolochia saccata</i>	Sanghar-vaibel
6	Asclepiadaceae	
10/1	<i>Calotropis gigantean*</i>	Aank
7	Asteraceae	
11/1	<i>Ageratina adenophora</i>	Kalo Banmara
8	Cannabiaceae	
12/1	<i>Cannabis sativa</i>	Phul tarul
9	Clusiaceae	
13/1	<i>Garcinia cornea</i>	Chunyel
10	Ericaceae	
14/1	<i>Agapetes serpens</i>	Khorsane
15/2	<i>Rhododendron dalhousae</i>	Lahare chimal
11	Euphorbiaceae	
16/1	<i>Jatropha curcas*</i>	Bhernada
12	Fabaceae	
17/1	<i>Flemingia stricta</i>	Uifawma-ring
13	Hamamelidaceae	
18/1	<i>Helwingia himalaica</i>	Pipli
14	Hydrangeaceae	
19/1	<i>Hydrangea aspera</i>	Phirphire ghans
15	Hypericaceae	
20/1	<i>Hypericum uralum</i>	Urillo

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S. No.	Scientific Name & family	Common Name
16	Leeaceae	
21/1	<i>Leea asiatica</i>	Galeni
17	Loranthaceae	
22/1	<i>Dendrophthoe falcata</i>	Banda
23/2	<i>Helixanthera ligustrina</i>	Aijaru
24/3	<i>Helixanthera parasitica</i>	Sanu Aijaru
18	Lythraceae	
25/1	<i>Woodfordia fruticosa</i>	Dhangayro
19	Malvaceae	
26/1	<i>Grewia sapida</i>	Kuail
27/2	<i>Grewia eriocarpa</i>	Fuhura
20	Melastomataceae	
28/1	<i>Osbeckia stellata</i>	Babui tulsi
29/2	<i>Oxyspora paniculata</i>	Chulesi
21	Myrtaceae	
30/1	<i>Eugeniabracteata</i>	Nyasey
22	Oleaceae	
31/1	<i>Jasminum elongatem*</i>	Jasmin
23	Palmae	
32/1	<i>Wallichia oblongifolia</i>	Thakal
24	Poaceae	
33/1	<i>Bambusa nutans</i>	
34/2	<i>Bambusa tulda</i>	Katta bans
25	Polemoniaceae	
35/1	<i>Polygala arrilata</i>	Marcha
26	Rosaceae	
36/1	<i>Rosa sericea*</i>	Sebimendo
37/2	<i>Ixora undulata</i>	Takchirnyok
38/3	<i>Morinda angustifolia*</i>	Hardi Kath
39/4	<i>Paederia foetida</i>	Barilahara
27	Solanaceae	
40/1	<i>Solanum capsicoides</i>	Kanre Bee
41/2	<i>Solanum pseudocapsicum</i>	Boksi Kanra
42/3	<i>Solanum torvum</i>	Gothbegun
28	Sterculiaceae	
43/1	<i>Abroma augusta</i>	Ulatkamal
29	Urticaceae	
44/1	<i>Dendrocnide sinuata</i>	Morngay
45/2	<i>Girardiana diversifolia</i>	Bhangre sisnu
46/3	<i>Laportea terminalis</i>	Patle sisnu
47/4	<i>Urtica parviflora</i>	Chorat
30	Verbenaceae	
48/1	<i>Clerodendrum infortunatum</i>	Bhante

S. No.	Scientific Name & family	Common Name
49/2	<i>Clerodendrum serratum</i>	Chitu
50/3	<i>Lantana camara*</i>	
31	Zingiberaceae	
51/1	<i>Amomum dealbatum</i>	Churumpha

Source: Primary survey, consultation with local people & forest department Darjeeling district

Note: *Sited during the Primary Survey

3.12.8 Herbs

Total 70 species of Herbs belong to 32 families were enumerated from the study area. Details of the herbs with their family, scientific name and vernacular name are presented in Table 3.26.

Table 3.26 List of Herbs in the Study Area

S. No.	Scientific Name & family	Common Name
1	Acanthaceae	
1/1	<i>Andrographis paniculata</i>	Ankuri phul
2/2	<i>Eranthemum indicum</i>	Seto Chuwa
3/3	<i>Lepidagathis incurva</i>	
4/4	<i>Peristrophe speciosa</i>	
5/5	<i>Strobilanthes capitata</i>	Ankhle
2	Amaranthaceae	
6/1	<i>Achyranthes aspera</i>	Apamarg
7/2	<i>Aerva javanica</i>	Kapok bush
8/3	<i>Amaranthus spinosus</i>	Lude saag
9/4	<i>Amaranthus viridus</i>	Lude saag
10/5	<i>Pupalia atropurpurea</i>	
3	Apiaceae	
11/1	<i>Centella asiatica</i>	Athane Jhar
12/2	<i>Heracleum wallichii</i>	Chimphing
4	Apocynaceae	
13/1	<i>Catharanthus roseus*</i>	Nayantara
14/2	<i>Rauwolfia serpentine*</i>	Nagbeli
5	Araceae	
15/1	<i>Arisaema nepenthoides</i>	Tuwa
16/2	<i>Colocasia affinis</i>	Ban piralu
6	Asteraceae	
17/1	<i>Acmella calva</i>	Kalijhar
18/2	<i>Acmella paniculata</i>	Lato Jhar
19/3	<i>Anaphalis margaritacea</i>	Indian Cudweed
20/4	<i>Artemisia dubia</i>	Titepati
21/5	<i>Chromolaena odorata</i>	Aula Banmara
22/6	<i>Tridax procumbens</i>	Kanaiya

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S. No.	Scientific Name & family	Common Name
7	Begoniaceae	
23/1	<i>Begonia cathcartii</i>	Dieng Jajew
24/2	<i>Begonia dioica</i>	Mangarkanche
25/3	<i>Begonia hatacoa</i>	
26/4	<i>Begonia picta</i>	Magarkache
27/5	<i>Begonia rubella</i>	Magar kanche
8	Dryopteridaceae	
28/1	<i>Nephrolepis cordifolia</i>	Pani Amla
9	Euphorbiaceae	
29/1	<i>Euphorbia hirta</i>	Pusidudh
30/2	<i>Phyllanthus fraternus</i>	Bhui-amla
10	Fabaceae	
31/1	<i>Dolichos biflorus</i>	Horse gram
32/2	<i>Phaseolus coccineus</i>	Common Bean
11	Gesneriaceae	
33/1	<i>Aeschynanthus novogracilis</i>	Nilgiri Blushwort
34/2	<i>Aeschynanthus parviflorus</i>	Thirjo
12	Lamiaceae	
35/3	<i>Ocimum basilicum</i>	Sweet basil
36/4	<i>Ocimum tenuiflorum</i>	Tulasipatta
13	Liliaceae	
37/1	<i>Asparagus racemosus</i>	Kurilo
38/2	<i>Gloriosa superba</i>	Bishalanguli
39/3	<i>Paris polyphylla</i>	Satuwa
14	Malvaceae	
40/1	<i>Sida acuta</i>	Khareto
41/2	<i>Urena lobata*</i>	Samthai
15	Mimosaceae	
42/1	<i>Mimosa pudica</i>	Lajwanti
16	Nephrolepidaceae	
43/1	<i>Nephrolepis auriculata*</i>	Fern
17	Orchidaceae	
44/1	<i>Geodorum densiflorum</i>	Orchid
18	Papaveraceae	
45/1	<i>Dactylicapnos scandens</i>	Mutu Jhar
19	Phytolacaceae	
46/1	<i>Phytolacca acinosa</i>	Jaringo
20	Piperaceae	
47/1	<i>Peperomia pellucida</i>	Silverbush
48/2	<i>Piper peepuloides</i>	Wild pepper
21	Plantaginaceae	
49/1	<i>Plantago asiatica</i>	Nasey jhar

S. No.	Scientific Name & family	Common Name
22	Poaceae	
50/1	<i>Cymbopogon citratus</i>	Lemon grass
51/2	<i>Imperata cylindrica</i>	Siru
23	Polygonaceae	
52/1	<i>Fagopyrum dibotrys</i>	Tite phapar
24	Rosaceae	
53/1	<i>Duchesna indica</i>	Bhui Aiselu
25	Rubiaceae	
54/1	<i>Gallium elgans</i>	Lahare Kuro
55/2	<i>Spermacoce latifolia</i>	Winged false buttonweed
26	Rutaceae	
56/1	<i>Boenninghausenia albiflora</i>	Ankuree
27	Scrophularaceae	
57/1	<i>Digitalis purpurea</i>	Jhandi phool
29	Solanaceae	
58/1	<i>Physalis divaricata</i>	Bon Tepari
59/2	<i>Physalis minima</i>	Jungali tamatar
60/3	<i>Solanum nigrum</i>	Kalo bihi
30	Tiliaceae	
61/1	<i>Triumfetta rhomboidea</i>	Chinese bur
31	Urticaceae	
62/1	<i>Elatostema platyphyllum</i>	Gagleto
63/2	<i>Elatostema reptans</i>	Gagleto
64/3	<i>Gonostegia hirta</i>	Chiple
65/4	<i>Pilea bracteosa</i>	Bracted Himalayan Clearweed
66/5	<i>Urtica dioica</i>	Gharia sisnu
32	Zingiberaceae	
67/1	<i>Curcuma longa*</i>	Haldi
68/2	<i>Curcuma zedoaria</i>	Kochura
69/3	<i>Zingiber officinale</i>	Aduwa
70/4	<i>Zingiber rubens*</i>	Bengal Ginger

Note: *Sited during the Primary Survey

3.12.9 Climbers

39 species of climbers belong to 28 families were enumerated from the study area.

Table 3.27 List of Climbers in the Study Area

S. No.	Scientific Name & family	Common Name
1	Acanthaceae	
1/1	<i>Thunbergia fragrance</i>	Kanasae Lahara

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S. No.	Scientific Name & family	Common Name
2	Actinidiaceae	
2/1	<i>Actinidia callosa</i>	Theki Phal
3	Anonaceae	
3/1	<i>Uvaria hamiltonii</i>	Bandar Jhula
4	Apocynaceae	
4/1	<i>Beaumontia grandiflora</i>	Chimale lahara
5	Araliaceae	
5/1	<i>Aralia gigantea</i>	Chindey
6	Arecaceae	
6/1	<i>Calamus latifolius</i>	Phekre Bet
7	Asclepiadaceae	
7/1	<i>Hoya parasitica*</i>	Aak
8	Asperagaceae	
8/1	<i>Asparagus officinalis</i>	Kurilo
9	Convolvulaceae	
9/1	<i>Argyreia hookeri</i>	Suntiki
10	Cucurbitaceae	
10/1	<i>Herpetospermum pedunculosum*</i>	Jungali Ghiraula
11/2	<i>Hodgsonia heteroclita</i>	Ghiuphal
12/3	<i>Momordica dioica*</i>	Chetheli
11	Dioscoreaceae	
13/1	<i>Dioscorea bulbifera</i>	Aerial yam
14/2	<i>Dioscorea deltoidea</i>	Nepal Yam
15/3	<i>Dioscorea hispida</i>	Intoxicating Yam
12	Euphorbiaceae	
16/1	<i>Bridelia stipularis</i>	Gayo lahara
17/2	<i>Croton caudatus</i>	Supare Lahara
13	Fabaceae	
18/1	<i>Bauhinia vahlii</i>	Bharla
19/2	<i>Caesalpinia cucullata</i>	Boksi Kara
20/3	<i>Dalbergia stipulacea</i>	Lahare Siris
21/4	<i>Dalbergia volubilis</i>	Bar medeluwaa
14	Leguminosae	
22/1	<i>Millettia extensa</i>	Gonjo
23/2	<i>Millettia pachycarpa</i>	Kojulara
15	Liliaceae	
24/1	<i>Aloe barbadensis</i>	Chal-kuori
16	Lycopodiaceae	
25/1	<i>Lycopodium clavatum</i>	Nagbeli
17	Malpighiaceae	
26/1	<i>Hiptage benghalensis</i>	Shempati
18	Menipermaceae	
27/1	<i>Cissampelos pareira</i>	Tamarke/Batulpate

S. No.	Scientific Name & family	Common Name
19	Menispermaceae	
28/1	<i>Tinospora sinensis</i>	Gurjo Lahara
20	Mimosoideae	
29/1	<i>Acacia pennata</i>	Arkhu
22	Oleaceae	
30/1	<i>Jasminum scandens</i>	Hade lahara
23	Papilionoideae	
31/1	<i>Mucuna nigricans</i>	Baldengra
24	Papillionoideae	
32/1	<i>Butea parviflora</i>	Dhak
25	Phyllanthaceae	
33/1	<i>Bridelea retusa</i>	Gayo lahara
26	Rubiaceae	
34/1	<i>Hedyotis scandens</i>	Bakhra Kanae
35/2	<i>Rubia manjith</i>	Manjito
27	Verbenaceae	
36/1	<i>Premna scandens</i>	Gineri Lahara
28	Vitaceae	
37/4	<i>Ampelocissus barbata</i>	Jarila laha
38/2	<i>Cayratia trifolia</i>	Amalbel
39/3	<i>Tetrastigma serrulatum</i>	Charchare (Syaano)

Source: Consultation with local people & forest department Darjeeling district

Note: *Sited during the Primary Survey

3.12.10 Bamboos & Grasses

Total 15 species of Bamboos & Grasses were recorded during the survey and they were belonging to the family of Poaceae. The details of the bamboo & grasses are presented in **Table 3.28**.

Table 3.28 List of Bamboos & Grasses in the Study Area

S. No.	Family & Scientific Name	Common Name
1.	Poaceae	
2.	<i>Arundinaria intermedia</i>	Malingo
3.	<i>Arundinaria maling</i>	Malingo
4.	<i>Capillipedium assimile</i>	Scented-tops
5.	<i>Cephalostachyum capitatum</i>	Gope/ Dallo Bans
6.	<i>Cynadon dactylon.</i>	Dubo
7.	<i>Dendrocalamus hamiltonii</i>	Choya Bans
8.	<i>Himalayacalamus hookerianus</i>	Pareng Bans
9.	<i>Isachne globosa</i>	Marsh Millet
10.	<i>Melocana baccifera</i>	Philing bans
11.	<i>Oplismenus burmannii</i>	Wavy-Leaf Basketgrass

12.	<i>Oplismenus compositus</i>	Running mountain grass
13.	<i>Pseudostachyum polymorphum</i>	Philing bans
14.	<i>Saccharum arundinaceum</i>	Sugrcane
15.	<i>Setaria palmifolia</i>	Palmgrass

Source: Consultation with local people & forest department Darjeeling district

3.12.11 Rare and Endangered Flora

The IUCN Red List is the world's most comprehensive inventory of the global conservation status of plant and animal species. It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. With its strong scientific base, the IUCN Red List is recognized as the most authoritative guide to the status of biological diversity. Out of 17000 species of higher plants known to occur in India, nearly 614 higher plant species were evaluated by IUCN. Among them 247 species are under threatened category (IUCN, 2008).

Among the enumerated flora in the study area, none of them were assigned any threat category by Red data book of Indian Plants (Jain and Sastry, 1984; Nayer and Sastry, 1987; 1988, 1990; Oldfield et al., 1998; Kholia and Bhakuni, 2009) and Red list of threatened Vascular plants (IUCN, 2010).

3.12.12 Endemic Plants

De Candolle (1855), Swiss botanist, first used the concept of Endemic, which is defined as an area of a taxonomic unit, especially a species which has a restricted distribution or habitat, isolated from its surrounding region through geographical, ecological or temporal barriers. Out of 17000 species of known flowering plants of India nearly 5000 species are said to be endemic. Nearly 58 genera and 1932 taxa are found to be endemic to peninsular India (Nayar, 1980; Ahmedullah and Nayar, 1986; 1987; Jain 1992; Nayar, 1996; Vijaya Shankar et al., 2005; Nautiyal et al., 2009a, b; Shendage et al., 2010).

Among recorded plant species none can be assigned the status of endemic plant of this region.

3.12.13 Faunal Biodiversity of the Study Area

The role of fauna investigations in Environmental Impact Assessment (EIA) is to provide sufficient data to allow a complete identification, prediction and evaluation of potential impacts of proposed developments upon that flora and fauna.

The information collected provides people with the ability to assess conservation values of areas, understand the implications of changes in land use, document natural heritage, and assist in natural resource management.

Baseline survey was conducted for the documentation of Fauna with respect to Mammals, Birds, Reptiles, invertebrates and fishes.

3.12.14 Methodology adopted for faunal survey

Methodology adopted for faunal survey involve random survey, opportunistic observations, diurnal avifauna observation, active search for reptiles, faunal habitat assessment, active

search for scats and foot prints, animal call, review of previous studies and pictorial representation before local people. Species of mammals, birds, reptile, amphibians and insects were identified and they are being represented under their respective headings and table.

3.12.15 Mammals

The study area shows the presence of Rhesus Macaque, Lesser Bamboo Rat, Indian Gerbil, Five- striped Palm Squirrel, Jungle Cat, Grey Mongoose, Indian grey mongoose etc. other than the domesticated mammals. No Schedule I mammalian species was sighted physically during the survey. Details of mammals are tabulated in Table 3.29.

Table 3.29 List of Mammals in the Study Area

S.No.	Scientific name	Common name	Family	IWPA,1972, Schedule
1.	<i>Tupaia belangeri</i>	Northern Treeshrew	Tupaiaidae	Schedule-II
2.	<i>Macaca assamensis</i>	Assam Macaque	Cercopithecidae	Schedule-II
3.	<i>Macaca mulatta*</i>	Rhesus Macaque	Cercopithecidae	Schedule-II
4.	<i>Funambulus pennant*</i>	Five- striped Palm Squirrel	Sciuridae	Schedule-IV
5.	<i>Tamiops macclellandii</i>	Himalayan Striped Squirrel	Sciuridae	Schedule-II
6.	<i>Cannomys badius</i>	Lesser Bamboo Rat	Spalacidae	Schedule-V
7.	<i>Tatera indica</i>	Indian Gerbil	Muridae	Schedule-V
8.	<i>Bandicota bengalensis</i>	Lesser Bandicoot Rat	Muridae	Schedule-V
9.	<i>Bandicota indica</i>	Greater Bandicoot Rat	Muridae	Schedule-V
10.	<i>Rattus rattus</i>	House Rat	Muridae	Schedule-V
11.	<i>Hystrix brachyura</i>	Malayan Porcupine	Hystricidae	Schedule-II
12.	<i>Ochotona macrotis</i>	Large-eared Pika	Ochotonidae	Not assigned
13.	<i>Ochotona roylei</i>	Royle's Pika	Ochotonidae	Schedule-IV
14.	<i>Ochotona sikimaria</i>	Sikkim Pika	Ochotonidae	Not assigned
15.	<i>Lepus nigricollis</i>	Indian Hare	Leporidae	Schedule-IV
16.	<i>Lepus oiostolus</i>	Wolly Hare	Leporidae	Not assigned
17.	<i>Suncus murinus</i>	House Shrew	Soricidae	Not assigned
18.	<i>Cynopterus sphinx</i>	Greater Short-nosed Fruit Bat	Pteropodidae	Schedule-V
19.	<i>Eonycteris spelaea</i>	Lesser Dawn Bat	Pteropodidae	Schedule-V
20.	<i>Pteropus giganteus</i>	Indian Flying Fox	Pteropodidae	Schedule-V
21.	<i>Felis chaus</i>	Jungle Cat	Felidae	Schedule-II
22.	<i>Panthera pardus</i>	Leopard	Felidae	Schedule-I
23.	<i>Herpestes auropunctatus</i>	Small Indian Mongoose	Herpestidae	Schedule-IV
24.	<i>Herpestes edwardsii*</i>	Grey Mongoose	Herpestidae	Schedule-II
25.	<i>Herpestes urva</i>	Crab-eating Mongoose	Herpestidae	Schedule-II
26.	<i>Vulpes bengalensis</i>	Bengal Fox	Canidae	Schedule-II
27.	<i>Sus scrofa</i>	Wild Boar	Suidae	Schedule-III
28.	<i>Axis axis</i>	Chital	Cervidae	Schedule-III
29.	<i>Muntiacus vaginalis</i>	Northern Red Muntjac	Cervidae	Schedule-III
30.	<i>Semnopithecus hector</i>	Tarai Gray Langur	Cercopithecidae	Schedule-II

Source: Primary survey, consultation with local people & forest department Darjeeling district

Note: *Sited during the Primary Survey

3.12.16 Avifauna

Avifauna is an important part of the ecosystem which plays various roles as scavengers, pollinators, predators of insect pest, etc. They are also one of the bio-indicators of different status of environment and affected by urbanization, industrialization and human interference. The areas having good avifauna diversity signifies healthy ecosystem. They can be used as sensitive indicators of pollution and malfunction of ecosystem.

The survey for Avifauna was conducted early in the morning and evening time. Common species of avifauna observed during the survey were Common house crow, Common drongo, Tailor bird, Jungle myna, Eastern rose ringed Parakeet, Indian spotted Dove, Cattle Egret. List of birds are presented in Table 3.30.

Table 3.30 List of Avifauna in the Study Area

S.No.	Scientific name	Common name	Family	IWPA,1972, Schedule
1.	<i>Corvus splendens</i> *	Common house crow	Corvidae	Schedule-V
2.	<i>Corvus macrorhynchos</i> *	Jungle crow	Corvidae	Schedule-IV
3.	<i>Pycnonotus cafer</i> *	Red vented bulbul	Pycnonotidae	Schedule-IV
4.	<i>Pycnonotus jocosus</i>	Red whiskered bulbul	Pycnonotidae	Schedule-IV
5.	<i>Dicrurus adsimilis</i> *	Common drongo	Dicruridae	Schedule-IV
6.	<i>Acridotheres tristis</i> *	Common house myna	Sturnidae	Schedule-IV
7.	<i>Passer domesticus</i>	House Sparrow	Passeridae	Schedule-IV
8.	<i>Dendrocitta vagabunda</i>	Indian Tree pie	Corvidae	Schedule-IV
9.	<i>Turdoides caudatus</i>	Common babbler	Leiothrichidae	Schedule-IV
10.	<i>Dicrurus paradiseus</i> *	Great Racket tailed Drongo	Dicruridae	Schedule-IV
11.	<i>Cisticola juncidis</i>	Streaked fantail warbler	Cisticolidae	Schedule-IV
12.	<i>Orthotomus sutorius</i>	Tailor bird	Cisticolidae	Schedule-IV
13.	<i>Acridotheres fuscus</i>	Jungle myna	Sturnidae	Schedule-IV
14.	<i>Gracula religiosa</i>	Hill myna	Sturnidae	Schedule-IV
15.	<i>Oriolus xanthornus</i>	Black headed oriole	Oriolidae	Schedule-IV
16.	<i>Motacilla alba</i>	White wagtail	Motacillidae	Schedule-IV
17.	<i>Motacilla citreola</i> *	Yellow headed wagtail	Motacillidae	Schedule-IV
18.	<i>Motacilla cinerea</i>	Grey wagtail	Motacillidae	Schedule-IV
19.	<i>Lonchura punctulata</i>	Spotted munia	Estrildidae	Schedule-IV
20.	<i>Lonchura striata</i>	White munia	Estrildidae	Schedule-IV
21.	<i>Nectarinia asiatica</i>	Purple sunbird	Nectariniidae	Schedule-IV
22.	<i>Nectarinia zeylanica</i>	Purple rumped sunbird	Nectariniidae	Schedule-IV
23.	<i>Aethopyga siparaja</i>	Indian yellow backed sunbird	Nectariniidae	Schedule-IV
24.	<i>Pericrocotus flammeus</i>	Scarlet minivet	Campephagidae	Schedule-IV
25.	<i>Coracias benghalensis</i> *	Indian roller	Coraciidae	Schedule-IV
26.	<i>Merops orientalis</i> *	Common Bee eater	Meropidae	Schedule-IV
27.	<i>Halcyon smyrnensis</i>	White breasted king	Alcedinidae	Schedule-IV

S.No.	Scientific name	Common name	Family	IWPA,1972, Schedule
		fisher		
28.	<i>Alcedo atthis*</i>	Common kingfisher	Alcedinidae	Schedule-IV
29.	<i>Upupa epops</i>	Indian Hoopoe	Upupidae	Schedule-IV
30.	<i>Cuculus micropterus</i>	Indian cuckoo	Cuculidae	Schedule-IV
31.	<i>Clamator jacobinus</i>	Pied crested cuckoo	Cuculidae	Schedule-IV
32.	<i>Centropus sinensis*</i>	Crow pheasant	Cuculidae	Schedule-IV
33.	<i>Eudynamys scolopacea</i>	Common Koel	Cuculidae	Schedule-IV
34.	<i>Psittacula cyanocephala</i>	Blossom-headed parakeet	Psittaculidae	Schedule-IV
35.	<i>Psittacula krameri*</i>	Eastern rose ringed Parakeet	Psittaculidae	Schedule-IV
36.	<i>Spilopelia chinensis</i>	Indian spotted Dove	Columbidae	Schedule-IV
37.	<i>Grus antigone</i>	Sarus crane	Gruidae	Schedule-IV
38.	<i>Metopidius indicus</i>	Bronze winged jacana	Jacanidae	Schedule-IV
39.	<i>Hydrophasianus chirurgus</i>	Pheasant tailed jacana	Jacanidae	Schedule-IV
40.	<i>Vanellus indicus</i>	Red wattled lapping	Charadriidae	Schedule-IV
41.	<i>Ciconia episcopus</i>	White necked stork	Ciconiidae	Schedule-IV
42.	<i>Bubulcus ibis*</i>	Cattle Egret	Ardeidae	Schedule-IV
43.	<i>Nycticorax nycticorax</i>	Night Heron	Ardeidae	Schedule-IV
44.	<i>Ixobrychus cinnamomeus</i>	Chestnut Bittern	Ardeidae	Schedule-IV
45.	<i>Anas crecca</i>	Common Teal	Anatidae	Schedule-IV
46.	<i>Nettapus coromandelianus</i>	Cotton Teal	Anatidae	Schedule-IV
47.	<i>Anhinga melanogaster</i>	Indian Darter	Anhingidae	Schedule-IV
48.	<i>Anastomus oscitans</i>	Openbilled stork	Ciconiidae	Schedule-IV
49.	<i>Gyps bengalensis</i>	White rumped Vulture	Accipitridae	Schedule-I
50.	<i>Tyto alba</i>	Barn owl	Tytonidae	Schedule-IV

Source: Primary survey, consultation with local people & forest department Darjeeling district

Note: *Sited during the Primary Survey

3.12.17 Reptiles

Reptiles play an important anthropogenic role in ecosystem and they may also be helpful to protect us from some diseases. In some areas, they help control the numbers of serious agricultural pests by consuming rodent and insect pests. Species identified during the survey are present in **Table 3.31**.

Table 3.31 List of Reptiles in the Study Area

S.No.	Scientific name	Common name	Family	IWPA,1972, Schedule
1.	<i>Naja naja</i>	Binocellate cobra	Elapidae	Schedule-II
2.	<i>Varanus bengalensis</i>	Monitor Lizard	Varanidae	Schedule-II
3.	<i>Xenochropis piscator</i>	Asiatic water snake	Colubridae	Schedule-II
4.	<i>Bungarus coeruleus</i>	Indian krait	Elapidae	Schedule-IV
5.	<i>Daboia russelii</i>	Russel's Viper	Crotalidae	Schedule-II
6.	<i>Ptyas mucosus</i>	Rat snake	Colubridae	Schedule-II

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7.	<i>Calotes versicolor</i>	Garden Lizard	Agamidae	Schedule-II
8.	<i>Hemidactylis brooki</i>	Brooks gecko	Gekkonidae	Schedule-II
9.	<i>Gongylophis conicus</i>	Common Sand Boa	Boidae	Schedule-II

Source: Consultation with local people & forest department Darjeeling district

3.12.18 Butterflies

Butterfly observed during the survey were belong to families Papilionidae, Pieridae and Nymphalidae. Occurance of these butterfly species were sighted from the buffer zone but not in the core zone.

Table 3.32 List of Butterflies in the Study Area

S. No.	Scientific Name & Family	Common Name	IWPA,1972, Schedule
1	Hesperiidae		
1/1	<i>Spialia galba</i>	Indian Skipper	Schedule-IV
2/2	<i>Eurema sani</i>	Chocolate Grass yellow	Schedule-IV
2	Lycaenidae		
3/1	<i>Jamides celeno</i>	Common Cerulean	Schedule-IV
3	Nymphalidae		
4/1	<i>Junonia orithya</i>	Blue Pansy	Schedule-IV
5/2	<i>Tirumala limniace</i>	Blue Tiger	Schedule-IV
6/3	<i>Junonia iphita</i>	Chocolate Pansy	Schedule-IV
7/4	<i>Euthalia garuda</i>	Common Baron	Schedule-IV
8/5	<i>Euploea core</i>	Common Indian Crow	Schedule-IV
9/6	<i>Phalanta phalantha</i>	Common Leopard	Schedule-IV
10/7	<i>Neptis hylas</i>	Common sailor	Schedule-IV
11/8	<i>Parantica algae</i>	Glassy Tiger	Schedule-IV
12/9	<i>Hypolimnas bolina</i>	Great Egg Fly	Schedule-IV
13/10	<i>Junonia atlites</i>	Grey Pansy	Schedule-IV
14/11	<i>Junonia lemonias</i>	Lemon Pansy	Schedule-IV
15/12	<i>Junonia almana</i>	Peacock Pansy	Schedule-IV
16/13	<i>Danaus chrysippus</i>	Plain Tiger	Schedule-IV
17/14	<i>Danaus genutia</i>	Striped Tiger	Schedule-IV
18/15	<i>Junonia hierta</i>	Yellow Pansy	Schedule-IV
19/16	<i>Porantica melaneus</i>	Chocolate Tiger	Schedule-IV

Source: Consultation with local people & forest department Darjeeling district

3.12.19 Rare and Endangered Fauna of Study Area

The IUCN Red List is the world's most comprehensive inventory of the global conservation status of plant and animal species. It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies as per wildlife protection Act (1972).

Study area shows the presence of Near Threatned, Vulnerable, Endangered and Critically Endangered species.

3.12.20 Schedule Species of the Study Area

During the primary survey none of the species were sighted as Schedule I but as per the secondary information collected from the internet sites, leopard falls under Schedule I in mammal's category. White rumped vulture was reported as Schedule I under Avifauna.

Among the schedule-II species, Jungle cat, masked palm civet, small indian civet, grey mongoose, golden jackal, red fox under mammals category and cobra, russel's viper, rat snake under the reptiles category were provided protection as per Schedule-II of Wild life protection act, (1972). Conservation plan for such protected species should be submitted to concerned forest department of the region

3.12.21 Interpretation on Ecology and Biodiversity

As per the land use statistics around 35.52 % & 11.39 % of the study area is covered with crop land and fallow Land respectively. Main crops in the study area are consisting of food grains such as rice, maize, wheat etc. Some farmers also grow the vegetables like cucumber, Brinjal, cabbage, cauliflower etc. The study area is dominated by floral species i.e. kalo siris, neem & kadam. Among the enumerated flora in the study area, none of them were assigned any threat category by Red data book of Indian Plants and none can be assigned the status of endemic plant of this region. None of the sighted floral species can be assigned endemic species category of the study area. Study area shows the presence of Near Threatened, Vulnerable and Critically Endangered species. Common faunal species has been noted during the primary survey. Common house crow, Common drongo, Tailor bird, Jungle myna, Rose ringed parakeet, Indian spotted dove and Cattle egret are the dominated avifaunal species in the study area. Most of the Avifaunal species reported are under the Schedule IV as per Wild Life Protection Act 1972 except white rumped vulture, which falls under the Schedule-I species. Leopard is schedule I species and among the schedule-II species, Jungle cat, grey mongoose under mammals category and cobra, russel's viper, rat snake under the reptiles category were found, which is provided protection as per Schedule-II of Wild life protection act, (1972). Conservation plan for such protected species should be submitted to concerned forest department of the region.

3.13 SOCIO-ECONOMIC ENVIRONMENT

Socioeconomics (also known as **socio-economics** or **social economics**) is the social science that studies how economic activity affects social processes. In general, it analyses how societies progress, stagnate, or regress because of their local or regional economy, or the global economy.

In order to assess and evaluate the likely impacts arising out of any new or existing projects in socio-economic environment, it is necessary to gauge the apprehension of the people in the surrounding areas. Socio-economic survey serves as an effective tool for fulfilling this requirement.

An assessment of socio - economic environment forms an integral part of an EIA study. Therefore, baseline information for the same was collected during the study period. The baseline socio – economic data collected for the study region, has been identified for the major indicators viz. demography, civic amenities, economy and social culture. The baseline status of the above indicators is compiled in forthcoming sections.

Major Objectives of the Study

- To understand the socio-economic status of the villages
- To study the perceptions of people about the impact of proposed project

Secondary information pertaining to the study area villages was collected from Government Agencies, Census data for the year 2011, and statistical abstracts to compile the socio-economic data and the selection criteria for the stockholders has been planned for the primary survey. Proper identification of stakeholders and appropriate consultation on the implementation plan and participation of affected people in decision making are of utmost importance. This helps the stakeholders in understanding the project objectives and needs; and in communicating their willingness, views and preferences.

3.13.1 Socio-Economic Survey Methodology

Socio-economic survey tools provide a means of improving understanding of local resource management systems, resource use and the relative importance of resources for households and villages. They can also be used to elicit insights on interaction with government decision-making systems, community perceptions of trends and priority issues, and community-based institutions and their role in the sustainable use and conservation of natural resources.

During the study of socio-economic aspect of the project the secondary data is being collected from sources like Government Agencies, Census data for the year 2011, and statistical abstracts and based on the secondary data the plan for the primary survey is being prepared.

Methodology for Primary Survey:

- The study area is identified before carrying out the primary survey. All the related information which could affect the prosperity, development & literacy is also collected through questionnaire interviews, focus group discussions (FGDs), and other participatory approaches.
- The study area is divided in to three major categories: influence zone, control zone and buffer zone. The selection criteria for these zones are dependent on the location of the project. For this study both qualitative and quantitative survey methods is administered
- The project is located outside the notified industrial area and hence, the zones of primary survey is defined as below:
 - The influence zone is considered up to 1 km radius from the project site
 - The control zone is considered from 1 km to 5 km radius from the project site
 - The buffer zone is considered from 5 km to 10 km radius from the project site
- The primary survey is being conducted by selecting random villages from the study area in above defined zones. The questionnaire is filled up by interacting with the local village people especially with the village Sarpanch and eminent persons.

Analysis of Data: Study is limited to the 10 km radius with purposive random sampling from the proposed project. The Project Influenced Area (PIA) for the concerned industry comprises of 1 villages in influence zone, 10 villages in control zone and 37 villages in buffer zone. The Google image presenting all the aspects is presented in **Figure 3.23**.

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The data collected by primary survey were verified with secondary data collected from sources like Government Agencies, Census data for the year 2011, and extrapolated data for the year 2021. Primary Survey datasheets were verified with the secondary data.

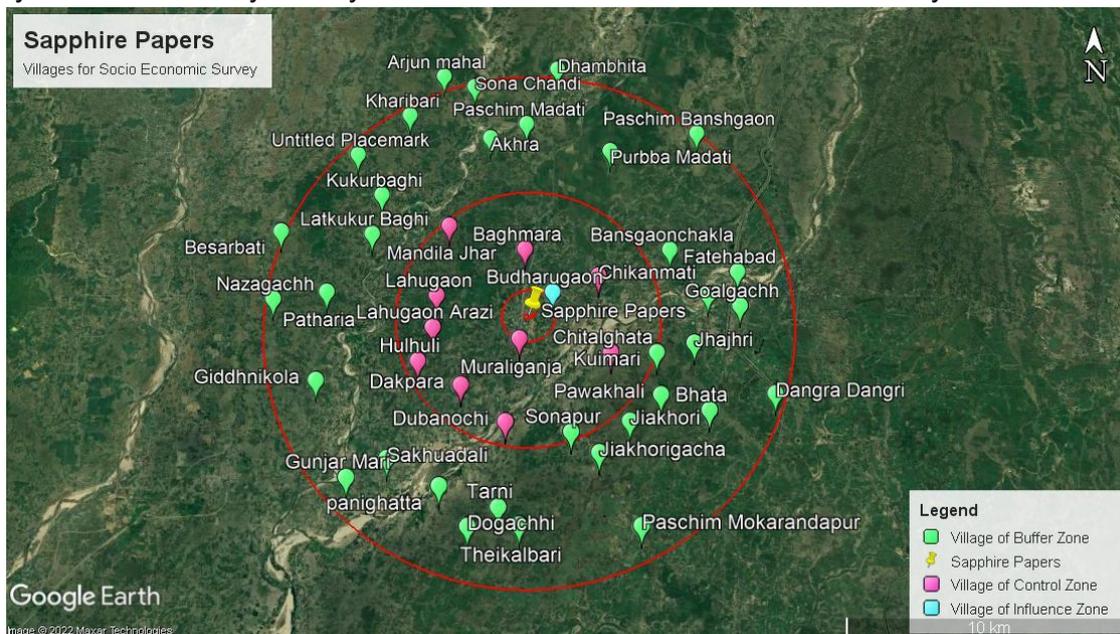


Figure 3.23: Map showing the villages covered in the project influence area



Socio Economic Survey & FGD – Lahugachh Village

Socio Economic Survey & FGD - Baghmara village

Figure 3.24: Photographs of Socio-Economic Survey

3.13.2 Demography

In 2011, Darjiling had population of 1,846,823 of which male and female were 937,259 and 909,564 respectively. In 2001 census, Darjiling had a population of 1,609,172 of which males were 830,644 and remaining 778,528 were females. Darjiling District population constituted 2.02 percent of total Maharashtra population. In 2001 census, this figure for Darjiling District was at 2.01 percent of Maharashtra population.

In 2011, Uttar Dinajpur had population of 3,007,134 of which male and female were 1,551,066 and 1,456,068 respectively. In 2001 census, Uttar Dinajpur had a population of 2,441,794 of which males were 1,259,737 and remaining 1,182,057 were females. Uttar Dinajpur District population constituted 3.29 percent of total Maharashtra population. In 2001

census, this figure for Uttar Dinajpur District was at 3.05 percent of Maharashtra population. In 2011, Kishanganj had population of 1,690,400 of which male and female were 866,970 and 823,430 respectively. In 2001 census, Kishanganj had a population of 1,296,348 of which males were 669,552 and remaining 626,796 were females. Kishanganj District population constituted 1.62 percent of total Maharashtra population. In 2001 census, this figure for Kishanganj District was at 1.56 percent of Maharashtra population.

Based on the extrapolation of incremental population expected in the year 2021 compared to the year 2011 is being forecasted and validate the same during the primary survey. Almost all villages in the study area are experiencing a rapid growth of population due to industrialization. The total population of study region is summarized in Table 3.33 as per census, 2011. Also, population is extrapolated and mentioned for the year 2021.

3.13.3 Population Density

Population density in the study area varies from 22 – 4722 person/sq. km. Details of the same are tabulated in **Table 3.33**.

Table 3.33 Details of Population in Study Area

Villages	No. of Household	Total Population	Total area (Sq.km)	Population density (Person/sq.km)	Population 2021*
0 – 1 KM					
Budharugaon	1312	6841	9.41	727.379	6933
1 – 5 KM					
Baghmara	258	1108	1.30	850.476	1131
Mandila Jhar	1313	6642	14.51	457.684	6731
Lahugaon	2534	12710	9.96	1276.694	12880
Chikanmati	478	2480	2.76	898.551	2513
Chitalghata	2411	12988	16.77	774.294	13258
Muraliganja	611	2893	0.94	3092.795	2931
Dakpara	330	1775	3.44	515.434	1824
Lahugaon Arazi	313	1525	2.41	632.780	1567
Dubanochi	117	575	0.93	617.748	591
Hulhuli	576	2995	6.16	486.217	3078
5 – 10 KM					
Kharibari	2615	11852	2.51	4721.912	12006
Paschim Madati	2705	13523	16.38	825.489	13704
Dhambhita	160	728	1.95	373.218	738

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Villages	No. of Household	Total Population	Total area (Sq.km)	Population density (Person/sq.km)	Population 2021*
Purbba Madati	1358	6424	20.22	317.732	6510
Paschim Banshgaon	272	1313	5.38	243.943	1331
Bansgaonchakla	763	3876	11.74	330.266	3928
Fatehabad	3	22	1.00	22.111	22
Goalgachh	258	1440	1.61	891.807	1470
Jhajhri	581	3017	4.09	738.140	3080
Kuimari	196	1083	3.44	314.917	1106
Dangra Dangri	1030	5378	8.06	667.478	5490
Bhata	505	2456	3.54	694.393	2507
Pawakhali	270	1458	3.40	428.950	1488
Jiakhori	1470	7335	9.06	809.522	7488
Jiakhorigacha	785	4241	1.15	3703.283	4329
Paschim Mokarandapur	286	1293	1.27	1017.549	1320
Khochabari	13	56	1.65	33.917	57
Arjun mahal	291	1488	2.63	566.102	1508
Sona Chandi	345	1751	1.11	1573.367	1774
Sonapur	445	1935	3.06	632.126	1961
Borobila	779	4185	4.38	954.891	4272
Tarni	606	3007	5.88	511.525	3090
Sakhuadali	880	4432	11.53	384.389	4555
panighatta	251	1228	1.72	714.203	1262
Giddhnikola	311	1763	3.87	455.273	1812
Akhra	29	173	0.28	617.857	178
Gunjar Mari	337	1809	4.54	398.546	1859
Modati	96	447	1.10	406.364	459
Patharia	1212	5954	13.00	458.144	6119
Kukurbaghi	432	1984	5.46	363.390	2039
Nazagachh	1892	9825	9.05	1086.151	10097
Latkukur Baghi	48	212	0.73	288.592	218

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Villages	No. of Household	Total Population	Total area (Sq.km)	Population density (Person/sq.km)	Population 2021*
Besarbati	1243	6059	10.11	599.308	6227
Kishanganj	20698	105782	30.12	3512.019	108712
Dogachhi	524	2558	2.72	940.441	2629
Theikalbari	249	1227	2.02	606.525	1261
Total	56896	287369	-	-	293747

Note: * Projection of the population-2021 is based on the population growth rate of Survey Area & Field data.

3.13.4 Sex Ratio

The sex ratio i.e. the number of females per 1000 males is in range of 841-1072 with lowest in Sambheti and highest in Ambhel. The Sex ratio i.e. the number of females per 1000 males indirectly reveals certain sociological aspect in relation to female births, infant mortality female children. Details of the same are tabulated in **table 3.34**.

Table 3.34 Details of Sex Ratio in Study Area

Zone of Study	Male Population	Female Population	Total Population	Sex Ratio (Female to 1000 Male)
Budharugaon	3498	3343	6841	956
Baghmara	593	515	1108	868
Mandila Jhar	3370	3272	6642	971
Lahugaon	6468	6242	12710	965
Chikanmati	1282	1198	2480	934
Chitalghata	6747	6241	12988	925
Muraliganja	1496	1397	2893	934
Dakpara	932	843	1775	905
Lahugaon Arazi	771	754	1525	978
Dubanochi	315	260	575	825
Hulhuli	1567	1428	2995	911
Kharibari	6044	5808	11852	961
Paschim Madati	6662	6861	13523	1030
Dhambhita	370	358	728	968
Purbba Madati	3191	3233	6424	1013

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Zone of Study	Male Population	Female Population	Total Population	Sex Ratio (Female to 1000 Male)
Paschim Banshgaon	691	622	1313	900
Bansgaonchakla	1964	1912	3876	974
Fatehabad	10	12	22	1200
Goalgachh	766	674	1440	880
Jhahhri	1551	1466	3017	945
Kuimari	563	520	1083	924
Dangra Dangri	2772	2606	5378	940
Bhata	1232	1224	2456	994
Pawakhali	741	717	1458	968
Jiakhori	3820	3515	7335	920
Jiakhorigacha	2147	2094	4241	975
Paschim Mocarandapur	672	621	1293	924
Khochabari	30	26	56	867
Arjun mahal	746	742	1488	995
Sona Chandi	862	889	1751	1031
Sonapur	1026	909	1935	886
Borobila	2166	2019	4185	932
Tarni	1573	1434	3007	912
Sakhuadali	2296	2136	4432	930
panighatta	657	571	1228	869
Giddhnikola	927	836	1763	902
Akhra	80	93	173	1163
Gunjar Mari	941	868	1809	922
Modati	210	237	447	1129
Patharia	3069	2885	5954	940
Kukurbaghi	1031	953	1984	924
Nazagachh	5025	4800	9825	955
Latkukur Baghi	104	108	212	1038
Besarbati	3085	2974	6059	964

Zone of Study	Male Population	Female Population	Total Population	Sex Ratio (Female to 1000 Male)
Kishanganj	55143	50639	105782	918
Dogachhi	1319	1239	2558	939
Theikalbari	637	590	1227	926
Total	147824	139545	287369	-

3.13.5 Literacy Rate

The literacy level of the study area is summarized in **Table 3.35** and graphically presented in **Figure 3.25**.

Table 3.35 Details of Literacy Rate in Study Area

Villages	Literate			Literacy (%)		
	Male	Female	Total	Male	Female	Total
Budharugaon	2088	1487	3575	30.52	21.74	52.26
Baghmara	410	296	706	37.00	26.71	63.72
Mandila Jhar	1717	1183	2900	25.85	17.81	43.66
Lahugaon	4258	3443	7701	33.50	27.09	60.59
Chikanmati	578	400	978	23.31	16.13	39.44
Chitalghata	3685	2586	6271	28.37	19.91	48.28
Muraliganja	895	574	1469	30.94	19.84	50.78
Dakpara	448	312	760	25.24	17.58	42.82
Lahugaon Arazi	262	203	465	17.18	13.31	30.49
Dubanochi	240	110	350	41.74	19.13	60.87
Hulhuli	782	477	1259	26.11	15.93	42.04
Kharibari	4571	3804	8375	38.57	32.10	70.66
Paschim Madati	3955	3031	6986	29.25	22.41	51.66
Dhambhita	249	169	418	34.20	23.21	57.42
Purbba Madati	1957	1473	3430	30.46	22.93	53.39
Paschim Banshgaon	504	324	828	38.39	24.68	63.06
Bansgaonchakla	1014	704	1718	26.16	18.16	44.32
Fatehabad	5	8	13	22.73	36.36	59.09

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Villages	Literate			Literacy (%)		
	Male	Female	Total	Male	Female	Total
Goalgachh	401	209	610	27.85	14.51	42.36
Jhahhri	876	661	1537	29.04	21.91	50.94
Kuimari	345	213	558	31.86	19.67	51.52
Dangra Dangri	1478	1038	2516	27.48	19.30	46.78
Bhata	782	528	1310	31.84	21.50	53.34
Pawakhali	414	274	688	28.40	18.79	47.19
Jiakhori	2622	1897	4519	35.75	25.86	61.61
Jiakhorigacha	1469	1264	2733	34.64	29.80	64.44
Paschim Mokarandapur	490	349	839	37.90	26.99	64.89
Khochabari	21	13	34	37.50	23.21	60.71
Arjun mahal	421	301	722	28.29	20.23	48.52
Sona Chandi	437	368	805	24.96	21.02	45.97
Sonapur	581	377	958	30.03	19.48	49.51
Borobila	1322	987	2309	31.59	23.58	55.17
Tarni	820	494	1314	27.27	16.43	43.70
Sakhuadali	1289	699	1988	29.08	15.77	44.86
panighatta	442	251	693	35.99	20.44	56.43
Giddhnikola	353	220	573	20.02	12.48	32.50
Akhra	36	18	54	20.81	10.40	31.21
Gunjar Mari	356	251	607	19.68	13.88	33.55
Modati	98	64	162	21.92	14.32	36.24
Patharia	1476	894	2370	24.79	15.02	39.81
Kukurbaghi	638	433	1071	32.16	21.82	53.98
Nazagachh	2506	1672	4178	25.51	17.02	42.52
Latkukur Baghi	70	67	137	33.02	31.60	64.62
Besarbati	1481	951	2432	24.44	15.70	40.14
Kishanganj	36448	28860	65308	34.46	27.28	61.74
Dogachhi	533	366	899	20.84	14.31	35.14
Theikalbari	306	254	560	24.94	20.70	45.64

Expansion of Paper production using Recycled paper and Sun-Dry Board manufacturing using secondary fibre within the existing Facility by M/s. Sapphire Papers Mill Pvt. Ltd.

Villages	Literate			Literacy (%)		
	Male	Female	Total	Male	Female	Total
Total	90084	67588	157672	-	-	-

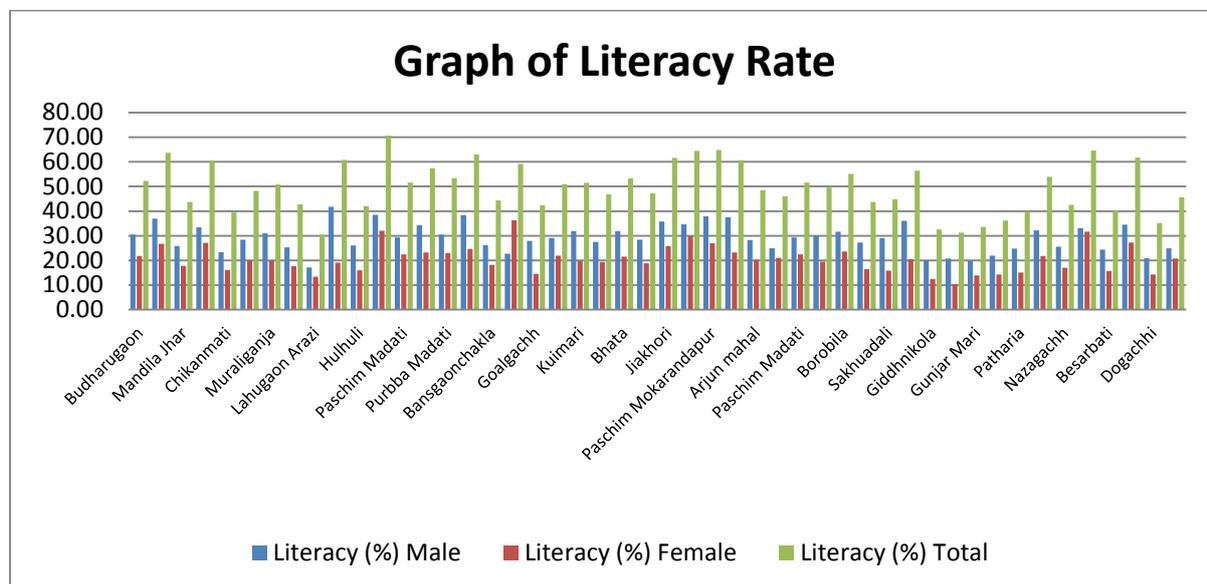


Figure 3.25: Graph of Literacy Rate

Among all the villages of study area Kharibari is having high literacy rate i.e. 70.66% in which 38.57% are Male & 32.10% are Female literacy rate. Lahugaon Arazi village accounts the lowest rate of 30.49% in which 17.18% are Male and 13.31% are Female literacy rate. In most of village difference between female literacy rate and male literacy rate in the study region. Female Literacy is one of the most essential indicators of social change and the quality of a village’s human capital.

3.13.6 Economic Aspects

Economic aspects of the study area include the economic structure of the people of the surrounding area. It can be predicted that economic structure of the study area will be improved with time, because it consists large industrial estate and hence there are more employment opportunities.

According to working status, whole population of the study area is divided into

- Marginal workers
- Non workers
- Main workers

Census department has defined 10 categories of workers in Main workers. It consists of cultivators, agricultural, labourer those engaged in livestock, forestry, fishing, mining and quarrying, manufacturing, processing and repairs in household industries and other services. Workers engaged in the work for a period less than 6 months during the reference year falls under marginal workers. Workers engaged in unpaid household duties e.g. students, retired person, dependents etc. falls under non-workers. Detail of occupational structure is shown in **Table 3.36**.

Table 3.36 Details of Occupational Structure

Zone of Study	Total Workers		
	Non-Workers (%)	Main Workers (%)	Marginal Workers (%)
Budharugaon	70.06	26.05	3.89
Baghmara	56.32	43.59	0.09
Mandila Jhar	59.24	32.54	8.22
Lahugaon	67.05	29.76	3.19
Chikanmati	65.16	29.11	5.73
Chitalghata	71.10	25.50	3.40
Muraliganja	65.50	20.43	14.07
Dakpara	69.92	23.55	6.54
Lahugaon Arazi	67.02	29.64	3.34
Dubanochi	56.17	41.39	2.43
Hulhuli	49.58	32.82	17.60
Kharibari	66.77	28.35	4.89
Paschim Madati	56.17	30.43	13.40
Dhambhita	60.16	37.36	2.47
Purbba Madati	54.87	29.34	15.78
Paschim Banshgaon	66.26	31.53	2.21
Bansgaonchakla	63.47	34.88	1.65
Fatehabad	59.09	18.18	22.73
Goalgachh	70.69	22.08	7.22
Jhajhri	70.17	25.89	3.94
Kuimari	71.65	8.86	19.48
Dangra Dangri	66.38	28.47	5.15
Bhata	55.46	39.09	5.46
Pawakhali	72.84	20.64	6.52
Jiakhori	62.89	29.12	7.99
Jiakhorigacha	69.42	28.25	2.33
Paschim Mocarandapur	55.38	38.75	5.88
Khochabari	66.07	32.14	1.79

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Zone of Study	Total Workers		
	Non-Workers (%)	Main Workers (%)	Marginal Workers (%)
Arjun mahal	66.80	31.12	2.08
Sona Chandi	56.31	38.21	5.48
Sonapur	46.56	41.81	11.63
Borobila	72.47	25.47	2.05
Tarni	58.06	14.83	27.10
Sakhuadali	67.49	28.50	4.02
panighatta	54.07	44.06	1.87
Giddhnikola	54.85	11.40	33.75
Akhra	43.35	40.46	16.18
Gunjar Mari	51.91	40.74	7.35
Modati	35.12	7.61	57.27
Patharia	61.87	32.11	6.01
Kukurbaghi	55.09	30.65	14.26
Nazagachh	70.66	22.60	6.75
Latkukur Baghi	66.98	32.55	0.47
Besarbati	60.17	30.58	9.24
Kishanganj	69.42	25.02	5.56
Dogachhi	65.48	30.45	4.07
Theikalbari	74.33	24.69	0.98

Panighatta have significant employment i.e. 44.06 % as main workers, while the lowest employment as main workers in Modati i.e. 7.61%. Almost all the villages have more than 50 % people as non-workers. Rapid industrialization in the last two decades has resulted in significant changes in the occupational profile of the local people. There is an overall trend among the youth to opt for employment in service sector and move away from traditional occupation.

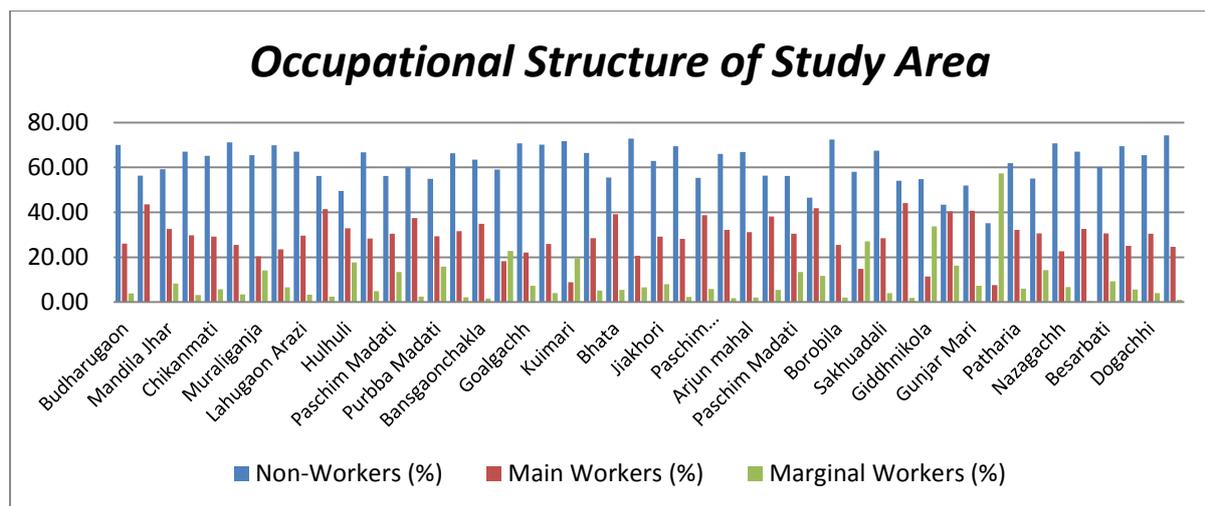


Figure 3.26: Occupational Structure of Study Area

3.13.7 Amenities

EDUCATIONAL INSTITUTES IN THE STUDY AREA

Govt. Primary School	Private Primary School	Govt. Middle School	Govt. Secondary School	Private Secondary School	Govt. Senior Secondary School	Private Senior Secondary School
42	08	15	10	02	06	00

In study area village availing Govt. Primary School in sufficient no's. Govt. Secondary School, Govt. Senior Secondary School facilities are also available in study area. For higher studies students are required to commute to the nearby larger cities.

HEALTH CARE FACILITIES IN THE STUDY AREA

Community Health Centre	Primary Health Centre	Primary Health Sub Centre	Veterinary Hospital
00	01	10	06

In the villages of the study area are facilitated with Primary Health Centre, Primary Health Sub Centre and Veterinary Hospital etc.

DRINKING WATER FACILITIES IN THE STUDY AREA

Tap Water Untreated	Covered Well	Uncovered Well	Hand Pump	Tube Wells/ Borehole	River/Canal	Tank/Pond/ Lake
03	05	28	41	27	17	14

Various types of drinking water facilities were availed in the study area e.g. Tap water, Hand pump and Tubewell/ Borewelletc.

DRAINAGE STATUS IN THE STUDY AREA

Closed Drainage	Open Drainage	No Drainage	Open Pucca Drainage Covered with Tiles Slabs	Open Pucca Drainage Uncovered	Open Kuccha Drainage
03	33	12	03	11	35

Drainage and sanitation facilities were not adequate in the study area. Mostly Open drainage, and open pucca drainage observed in the villages.

COMMUNICATION FACILITIES IN THE STUDY AREA

Post Office	Sub Post Office	Telephone	Public Call Office /Mobile (PCO)	Mobile Phone Coverage	Internet Cafes / Common Service Centre (CSC)
08	08	24	18	30	03

Post Office, Sub-post Office, Telephone (Landline), PCO, Mobile Phone Coverage, Internet Cafes/Common Service Centre were availed in village for communication purpose.

TRANSPORTATION FACILITIES IN THE STUDY AREA

Public Bus Service	Railway Station	Auto/ Modified Autos	Taxi	Vans	Tractors	Sea/River Ferry Services
13	02	10	12	25	33	00

A well planned and efficient network of transport is an essential component for a developing country. In the absence of efficient network of transport, a State's economy would suffer from major grid lock in terms of overall growth potential of that area. In village public bus facility was availed and other facilities were railway station, auto, vans and tractors etc.

ROAD FACILITIES IN THE STUDY AREA

Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam	All Weather Road	Navigable Waterways (River/Canal)	Footpath
34	40	24	33	04	32

Roads are the basic means of communication for the development of any economy. All type of roads was present in the study area.

BANK FACILITIES IN THE STUDY AREA

Commercial Bank	Cooperative Bank	Agricultural Credit Societies	Self - Help Group (SHG)
05	03	06	35

Banking facility was found in village. Self-help group activities were performed by the women groups.

POWER FACILITY IN THE STUDY AREA

Power Supply For Domestic Use	Power Supply For Agriculture Use	Power Supply For Commercial Use	Power Supply For All Users
38	12	17	11

All the villages are facilitated with power facility in the form of domestic, commercial and for agricultural uses.

Source: District Census Handbook 2011, Darjiling, Uttar Dinajpur, West Bengal and Kishanghadh, Bihar.

3.13.8 People's Prescription

In the process of Social Economic Assessment study, focus group discussion and personal interviews were scheduled with local people; it is observed that people perceive this project positively. People have expectations of generations of employment to improve better quality of life. Further, during assessment, no respondent has complained for the pollution. During the interaction, Moreover, respondents has informed that by providing necessary basic trainings and skill development programs the youth and woman of the surrounding village can get the employment in the proposed Project and this will improve the overall impact on quality of the life in surrounding villages.

All villages are having all basic infrastructural facilities but some villages are still lacking in the primary healthcare facility. The same can be improved by providing mobile health vehicle facility at regular intervals. The villagers has also informed about providing basic facilities at schools and panchayat offices by installation of solar power supply and drinking water facilities and their O&M.

3.13.9 Interpretation of Socio Economic Data

All the respondents across all socio-economic groups, age, gender and locations have expressed their views about the location. According to them, all villages are having basic infrastructural facilities but some villages need to be improved in some areas like, sanitation, road, etc. For sanitation, village panchayats can use Swachh Bharat Mission scheme. It will improve quality of life by increasing their employment opportunities and also by bringing about a positive change, like; employment, developmental activities, indirect employment, etc., while some are not having any idea about the upcoming project and its impacts. Most of the villages are having educational institutes up to secondary and higher secondary schools. Students need to commute to the main hub in nearby vicinity for further studies. The study area consisting majority of the area as an agricultural land and primary profession of the people in the study area. People's willingness and ability to be employed in the production activities need to be given importance. The respondents have suggested measures which need to be taken up for welfare of the people. The project needs to undertake various activities in education, infrastructure development, and health and environment area as a part of Corporate Social Responsibility (CSR) and Corporate Environment Responsibility (CER).

3.14 SUMMARY

Ambient air quality monitoring					
S. No.	Criteria Pollutants	Unit	Maximum Value	Minimum Value	Prescribed standard
1.	PM10	µg/m ³	87.0	51.0	100
2.	PM2.5	µg/m ³	48.8	25.9	60
3.	SO ₂	µg/m ³	18.3	7.8	80
4.	NO _x	µg/m ³	25.2	12.0	80
5.	CO	mg/m ³	--	--	2.0
<p>All the results of ambient air quality parameters have been found within the limit as per NAAQS standards. Based on comparison study of results for tested parameters with NAAQS, it is interpreted that current ambient air quality of studied locations is well within the NAAQS limits and it can be considered satisfactory based on AQI index calculated. This interpretation is considered based on the results found for particular locations during the specific study period. Due to the usage of the solid fuel in the boiler, there might be the chances of the incremental change in the current ambient air quality. The industry should adopt adequate mitigation measures to control the air emissions i.e. flue gas emissions and fugitive emissions.</p>					
Noise Monitoring					
Sr. No.	Parameter	Unit	Maximum Value	Minimum Value	
1.	Ld (Day)	dB(a)	68.6	55.1	
2.	Ln(Night)	db(a)	63.2	44.9	
<p>Out of total 8 nos. of locations for noise monitoring 4 nos. of locations are monitored in the industry premises and 4 nos. of locations are monitored in surrounding villages within 3-4 km radius from the project site. Noise level in all the locations are within the standard norms prescribed by MoEF&CC. Noise level measured at villages is mainly due to vehicular movements of local people located within and nearby the villages. The nearby village surrounding to the project site is about 1 km away from the project site and results of the same are found within the prescribed norms during the baseline survey. Due to the project activities, there might be chances of incremental value in the noise levels due to increase in vehicular movement & plant activities. The interpretation can be considered based on the baseline survey conducted during the study period.</p>					
Soil Quality and Characteristics					
Sr. No.	Parameter	Unit	Maximum Value	Minimum Value	
1.	pH	-	7.8	6.5	
2.	electrical Conductivity	dS/m	1.03	0.79	
3.	Exchangeable Sodium	meq/100gm	3.89	2.32	
4.	Exchangeable Potassium	meq/100gm	11.18	7.52	

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5.	Total Magnesium	mg/100g	37.81	17.82
6.	Total Nitrogen percentage	%	0.088	0.069

Based on soil analysis data it is concluded that surface soils are acidic to neutral in reaction, majority samples are non-saline except one and non-sodic. The soils are rich in nitrogen, very high in available phosphorus and available potassium status. The levels of total Fe, Cu, Cr, B and Zn are within the safe limits. However, for successful greenbelt development liberal quantity of organic manure (25 tons/ha) and half the recommended doses of N, P and K fertilizers should be applied. The soil should be periodically monitored for EC, pH and ESP. In the proposed project, there will be utilization of the treated wastewater generated from the process in the gardening purpose within the plant premises only. It is suggested that the treated water should be used for gardening purpose only after conforming the guideline of treated effluent discharge for gardening/ irrigation purpose.

Ground water

Sr. No.	Parameter	Unit	Maximum Value	Minimum Value	Desirable Limit	Permissible Limit
1.	pH	-	7.66	7.45	6.5-8.5	No Relaxation
2.	tds	mg/L	166	58	500	2000
3.	Total hardness	mg/L	102	28	200	600
4.	Chloride	mg/L	54	6	250	1000
5.	Total Alkalinity	mg/L	92	27	200	600
6.	Iron	mg/L	0.16	0.08	0.3	No Relaxation

Based on comparison study of test results and summary report with drinking water norms, it is interpreted that the ground water sample collected from all the locations can be used in drinking as well as all domestic purposes and irrigation as all results meet with the desirable limit for drinking water as per IS: 10500 :2012. It is suggested that, No untreated wastewater shall be discharged on land at any condition and treated water after confirming all the irrigation standard shall be used for irrigation purpose.

Surface Water

Sr. No.	Parameter	Unit	Maximum Value	Minimum Value	Permissible Limit
1.	ph	-	7.78	7.02	6.5-8.5
2.	TDS	mg/L	510	36	2000
3.	DO	mg/L	5.0	4.6	-
4.	COD	mg/L	14	4	-
5.	BOD	mg/L	7	3	-

Based on test result data comparison study with CPCB standard for inland surface water classification, it is interpreted that surface water quality of all locations meet with the criteria D and E except the samples from Budharugaon pond and Mahananda river, it means these water sources can be used for propagation of wild life, fisheries and Irrigation, industrial utilization for cooling, etc. The surface water samples are collected from all the locations presence of COD & BOD is found in the samples, which indicated the presence of organic matter in the surface water body. The DO level of all surface water sampling locations are

found >4.0 mg/L, DO level >4.0 mg/L is considered suitable for the survival of aquatic life and <4.0 mg/L is not considered suitable for aquatic life survival. The samples collected from the Budharugaon pond and Mahanada river meets with the criteria "C", it means it can be used in drinking purpose after conventional treatment with disinfection. It is suggested that no wastewater or treated water shall be discharged to the any surface water body.

Ecology and Biodiversity

As per the land use statistics around 35.52 % & 11.39 % of the study area is covered with crop land and fallow Land respectively. Main crops in the study area are consisting of food grains such as rice, maize, wheat etc. Some farmers also grow the vegetables like cucumber, Brinjal, cabbage, cauliflower etc. The study area is dominated by floral species i.e kalo siris, neem & kadam. Among the enumerated flora in the study area, none of them were assigned any threat category by Red data book of Indian Plants and none can be assigned the status of endemic plant of this region. None of the sighted floral species can be assigned endemic species category of the study area. Study area shows the presence of Near Threatened, Vulnerable and Critically Endangered species. Common faunal species has been noted during the primary survey. Common house crow, Common drongo, Tailor bird, Jungle myna, Rose ringed parakeet, Indian spotted dove and Cattle egret are the dominated avifaunal species in the study area. Most of the Avi faunal species reported are under the Schedule IV as per Wild Life Protection Act 1972 except white rumped vulture, which falls under the Schedule-I species. Leopard is schedule I species and among the schedule-II species, Jungle cat, grey mangoose under mammals category and cobra, russel's viper, rat snake under the reptiles category were found, which is provided protection as per Schedule-II of Wild life protection act, (1972). Conservation plan for such protected species should be submitted to concerned forest depart of the region.

Socio economic

All the respondents across all socio-economic groups, age, gender and locations have expressed their views about the location. According to them, all villages are having basic infrastructural facilities but some villages need to be improved in some areas like, sanitation, road, etc. For sanitation, village panchayats can use Swachh Bharat Mission scheme. It will improve quality of life by increasing their employment opportunities and also by bringing about a positive change, like; employment, developmental activities, indirect employment, etc., while some are not having any idea about the upcoming project and its impacts. Most of the villages are having educational institutes up to secondary and higher secondary schools. Students need to commute to the main hub in nearby vicinity for further studies. The study area consisting majority of the area as an agricultural land and primary profession of the people in the study area. People's willingness and ability to be employed in the production activities need to be given importance. The respondents have suggested measures which need to be taken up for welfare of the people. The project needs to undertake various activities in education, infrastructure development, and health and environment area as a part of Corporate Social Responsibility (CSR) and Corporate Environment Responsibility (CER).

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4 ANTICIPATED ENVIRONMENT IMPACT AND MITIGATION MEASURES

4.1 GENERAL

This chapter provides basis for assessment and management tool that evaluates the possible positive or negative impacts that a proposed project may have on the environment. The purpose of the assessment is to ensure that decision makers consider the ensuring environmental impacts when deciding to proceed with an expansion.

The chapter aims at controlling pollution at the source level to the extent possible with the available and affordable technology followed by treatment measures before they are discharged. The proposed project would create impact on the environment in two distinct phases:

- i. During the construction phase which may be regarded as temporary or short term and
- ii. During the operation phase which would have long term effects.

The construction and operational phase of the proposed project comprises various activities each of which will have an impact on some or other environmental parameters. Various impacts during the construction and operation phase on the environmental parameters have been studied and mitigation measures for the same are discussed briefly below and elaborated in the subsequent sections.

4.2 IMPACT IDENTIFICATION DURING CONSTRUCTION PHASE

This phase involves the activities like erection of civil structures, erection of equipment and machinery, green belt development etc. Air, Water, Noise and Land environment are likely to be affected by the activities, although aesthetics and socio-economic factors are also identified. But the impacts will be marginal and for short term only. The green belt development will have positive impacts.

4.2.1 Matrix Representation

Table 4.1: Impact Matrix with Mitigation Measures (Construction Phase)

Activities	Environmental Attributes										
	Air	Water	Soil	Noise	LU/LC	Hydro geology	Geology	SHW	Risk Hazardous	Ecology & Biodiversity	Socio Economic
Transportation of construction material and operation of machineries	✓	-	✓	✓	-	-	-	-	-	✓	✓

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Activities	Environmental Attributes										
	Air	Water	Soil	Noise	LU/LC	Hydro geology	Geology	SHW	Risk Hazardous	Ecology & Biodiversity	Socio Economic
Storage and handling of construction material	✓	-	✓	✓	-	-	-	-	-	-	-
Construction & erection of the units	✓	✓	-	✓	-	-	-	-	✓	-	✓
Disposal of Construction Debris	-	-	✓	-	-	-	-	✓	-	-	-
Wastewater-sewage Disposal	✓	✓	✓	-	-	-	-	-	-	-	-
Additional Greenbelt Development	✓	-	-	✓	✓	✓	-	-	-	✓	-

Table 4.2: Severity Criteria for Magnitude of Impacts

S. No.	Category	Description of category	Impact	
			Adverse	Beneficial
1.	No impact	-	0	0
2.	No appreciable impact	Short term reversible	-1	1
3.	Significant impact	Long term reversible	-2	2
4.	Major impact	Irreversible but of lesser extent	-3	3
5.	High impact	Irreversible but of medium extent	-4	4
6.	Permanent impact	Severe irreversible impact	-5	5

Table 4.3: Score range for beneficial and adverse impacts

S. No.	Total score	Outcome
1.	+ve / -ve	Beneficial impact / adverse impact
2.	0-150	No appreciable Beneficial impact / adverse impact
3.	151-300	Appreciable but reversible adverse impact-mitigation measures are needed

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S. No.	Total score	Outcome
4.	301-450	Significant adverse impacts: most of the impacts are reversible. Mitigation measures are crucial.
5.	451-600	Major adverse impacts; most of the impacts are reversible. Alternative site selection to be considered.
6.	>600	Permanent irreversible impact; alternatives to the project need to be explored

		Impact					
			Very low 1	Low 2	Medium 3	High 4	Very High 5
Probability	Very High	5	5	10	15	20	25
	High	4	4	8	12	16	20
	Medium	3	3	6	9	12	15
	Low	2	2	4	6	8	10
	Very Low	1	1	2	3	4	5

Figure 4.1: Impact Quantification Matrix

Table 4.4: Environmental Impact Matrix without Mitigation (Construction Phase)

Activities	Environmental Attributes											Total
	Air	Water	Soil	Noise	LU/LC	HG	Geo	SHW	RH	EB	SE	
Transportation of construction material and operation of machineries	-6	0	-4	-6	0	0	0	0	0	-4	4	-16
Storage and handling of construction material	-6	0	-6	-6	0	0	0	0	0	0	0	-18
Construction and erection of unit	-9	0	0	-9	0	-4	0	-6	-12	0	4	-36
Disposal of Construction Debris	0	0	-6	0	0	0	0	-9	0	0	0	-15
Wastewater-sewage Disposal	-4	-6	0	0	0	0	0	0	0	0	0	-10
Additional Greenbelt	3	0	0	3	0	0	0	0	0	3	0	9

Activities	Environmental Attributes											Total
	Air	Water	Soil	Noise	LU/LC	HG	Geo	SHW	RH	EB	SE	
Development												
Total	-22	-6	-16	-18	0	-4	0	-15	-12	-1	8	-86

4.2.2 Air Environment

Table 4.5: Impact on Air Environment and Mitigation Measures

Project Activity	Impact	Mitigation Measures
<ul style="list-style-type: none"> Transportation of construction material and operation of machineries 	<ul style="list-style-type: none"> Fugitive Dust Emissions due to vehicle Movement may deteriorate the quality of Air. Exhaust emissions from vehicles and equipment deployed during the construction phase is also likely to result in marginal increase in the levels of SO₂, NO_x and PM which leads to adverse impact to the human health. 	<ul style="list-style-type: none"> Excavated soil and construction debris will be sprinkled with water and kept moist. Trucks used for transportation of construction materials shall be covered with tarpaulin sheet to avoid dust dispersion at site. Only PUC certified vehicle shall be used for the transportation of materials and equipment. For control of emission from D. G. set which will be used in case of power failure. Temporary barricading will be done at construction area.
<ul style="list-style-type: none"> Storage and handling of construction material 	<ul style="list-style-type: none"> Fugitive emission generation due to handling of construction material. Dust settlement on leaf affects the plant growth. 	<ul style="list-style-type: none"> Construction materials will be covered with tarpaulin sheets throughout the construction phase to avoid dust generation. Barricading will be done at the construction area.
<ul style="list-style-type: none"> Construction and erection of the units 	<ul style="list-style-type: none"> Increase of dust and airborne particulates which is for very short period. 	<ul style="list-style-type: none"> Regular water sprinkling will be done to control dust emission. Personnel Protective Equipment (PPEs) will be provided to the construction workers.
<ul style="list-style-type: none"> Wastewater-sewage disposal 	<ul style="list-style-type: none"> Odour generation due to improper sewage disposal. 	<ul style="list-style-type: none"> Existing sanitation facilities will be provided to construction workers.
<ul style="list-style-type: none"> Additional Greenbelt Development 	<ul style="list-style-type: none"> Positive impact due to greenbelt development as it will act natural barrier for dust emission. 	<ul style="list-style-type: none"> Implementation of plantation plan for trees & plants Greenbelt of 5000.84 m² is already developed and additional 9954 m²

Project Activity	Impact	Mitigation Measures
	<ul style="list-style-type: none"> Existing greenbelt plantation would reduce the impacts during the construction phase. The impact will be confined within the project boundary and is expected to be negligible outside the plant boundaries. 	Green belt will be developed.

4.2.3 Water Environment

Table 4.6: Impact on Water Environment and Mitigation Measures

Project Activity	Impact	Mitigation Measures
<ul style="list-style-type: none"> Construction and erection of the units 	<ul style="list-style-type: none"> Surface Water resource may get depleted due to water consumption. 	<ul style="list-style-type: none"> Minor construction work will be done during the proposed expansion and water will be procured through borewell.
<ul style="list-style-type: none"> Wastewater-sewage Disposal 	<ul style="list-style-type: none"> Untreated sewage may have negative impact. 	<ul style="list-style-type: none"> Existing sanitation facilities shall be provided to construction workers. Sewage will be disposed through septic tank.

4.2.4 Soil Environment

Table 4.7: Impact on Soil Environment and Mitigation Measures

Project Activity	Impact	Mitigation Measures
<ul style="list-style-type: none"> Transportation of construction material and operation of machineries 	<ul style="list-style-type: none"> Land may get contaminated from the spillage of chemicals such as fuels, oils, paints and other construction chemicals and concrete. This normally happens when these materials are transported in open or loosely capped containers. 	<ul style="list-style-type: none"> Fuel refuelling and maintenance will take place in dedicated areas away with pucca flooring. Contaminated residues and waste oily residues will be disposed at a site as per the guideline.
<ul style="list-style-type: none"> Storage and handling of construction material 	<ul style="list-style-type: none"> Soil contamination due to handling and storage of construction material. Oil spillage can affect physical and chemical properties of the soils. 	<ul style="list-style-type: none"> The construction material & diesel /oil to be used for various construction activities shall be stored in designated storage yards to reduce the spills into unwanted areas.

Project Activity	Impact	Mitigation Measures
		<ul style="list-style-type: none"> • Good practices of storage and material handling will be carried out.
<ul style="list-style-type: none"> • Disposal of Construction Debris 	<ul style="list-style-type: none"> • Contamination of the soils of surrounding area due to construction materials such as cement, sand, oils, etc. 	<ul style="list-style-type: none"> • The construction wastes shall be utilized for PCC works, road construction and other filling requirement etc.

4.2.5 Noise Environment

Table 4.8: Impact on Noise Environment and Mitigation Measures

Project Activity	Impact	Mitigation Measures
<ul style="list-style-type: none"> • Transportation of construction material and operation of machineries 	<ul style="list-style-type: none"> • Continuous Noise pollution affects the human working efficiency. • Noise from the construction of units would not be a major consideration as construction activity will be for very short period of time. • Powered mechanical equipment can generate significant noise and vibration. The cumulative effects from several machines can be significant. 	<ul style="list-style-type: none"> • Only PUC vehicle will be used for the transportation of materials and equipment. • Construction activities shall be allowed only during day time. • Machinery used for construction will be of high standard reputed make and will adhere to International standards. These standards itself take care of noise pollution control / vibration control and air emission control. • Lubrication will be carried-out periodically for rotation machinery. • Use of well-maintained construction equipment as well as vehicles used for transportation. • Vibration control damped tools shall be used and the number of hours that a worker uses them must be limited. • Provision of PPEs like earmuffs/earplug to avoid adverse effects of noise on occupational health and hearing capacity of workers as well as planning of working hours and shift of workers.
<ul style="list-style-type: none"> • Construction and erection of units 		
<ul style="list-style-type: none"> • Storage and handling of construction material 		
<ul style="list-style-type: none"> • Additional Greenbelt 	<ul style="list-style-type: none"> • Plant parts such as stems, leaves, branches, wood, etc. 	<ul style="list-style-type: none"> • Greenbelt of 5000.84 m² is already developed and

Project Activity	Impact	Mitigation Measures
Development	absorb sound. Rough bark and thick, fleshy leaves are particularly effective at absorbing sound with their dynamic surface area for absorbing sound.	additional 9954 m ² Green belt will be developed.

4.2.6 Land Use/ Land Cover

No major impact on land use as land is already developed and expansion will be carried out in existing premises.

4.2.7 Hydrogeology

Table 4.9: Impact on Hydrology and Mitigation Measures

Project Activity	Impact	Mitigation Measures
<ul style="list-style-type: none"> Construction and erection of Unit 	<ul style="list-style-type: none"> Negligible impact on groundwater table as 10 KLD will be abstracted from bore well for construction activities and domestic activities for a very short period of time. 	<ul style="list-style-type: none"> Unit has already obtained ground water extraction permission <i>i.e.</i> 600 KLD. Site supervisor will ensure no leakage from tap and wastage of fresh water.

4.2.8 Geology

No impact is envisaged on the geology of the project area during construction phase there will be minor construction, erection and modification of existing units.

4.2.9 Solid/Hazardous Waste

Table 4.10: Impact due to Solid/ Hazardous waste and Mitigation Measures

Project Activity	Impact	Mitigation Measures
<ul style="list-style-type: none"> Disposal of Construction Debris 	<ul style="list-style-type: none"> Due to construction activity construction waste will be generated which may cause negative impact on soil, if not disposed properly. 	<ul style="list-style-type: none"> The construction wastes shall be utilized for levelling work etc.
<ul style="list-style-type: none"> Construction & erection of the units 	<ul style="list-style-type: none"> The solid wastes generated from the domestic activities of construction workforce may cause land contamination if not disposed properly. 	<ul style="list-style-type: none"> Separate bins will be provided storing Garbage/wastes. Generated solid waste will be separated at site as recyclable and non-recyclable, and then sent to authorized disposer.

4.2.10 Risk and Hazard

Table 4.11: Impact of Risk and Hazards and Mitigation Measures

Project Activity	Impact	Mitigation Measures
<ul style="list-style-type: none"> Construction & erection of the unit. 	<ul style="list-style-type: none"> Chances of collusion accident which may lead to severe injuries. Amputation, cut, hit injury to worker performing cutting, chiselling and bar bending job. 	<ul style="list-style-type: none"> All the activities will be carried out under the supervision and control of the management. Safety equipment such as helmet, goggles, ear plug, etc., shall be provided.

4.2.11 Ecology and Biodiversity

Table 4.12: Impact on Ecology and Biodiversity and Mitigation Measures

Project Activity	Impact	Mitigation Measures
<ul style="list-style-type: none"> Transportation of construction material and operation of machineries 	<ul style="list-style-type: none"> Fugitive emission from vehicle movement will form a layer in leaves thus reducing the gaseous exchange process. This ultimately affects the growth of plants. Transportation of Construction material by the trucks/dumper will disturb the movement of animal and birds. Moreover the proposed activities do not envisage destruction of habitat and feeding or breeding area of faunal species as expansion will be in existing unit. Expansion will be done in existing premises, so minimal impact envisaged. 	<ul style="list-style-type: none"> Transportation of construction material will not be carried in the early morning and night time. During the site visit, it was observed that there is no forest land, or ecologically sensitive area near the project site. Hence impact on the same is not envisaged. Study area shows the presence of REET species as per the secondary data. Conservation plan for the REET species has been prepared.
<ul style="list-style-type: none"> Green belt Development 	<ul style="list-style-type: none"> Greenbelt development 9954m² of total plot will provide habitat, food and breeding areas for small insects and avifauna. Thus a positive impact is envisaged. 	<ul style="list-style-type: none"> Trees species selection as per the CPCB guideline for Greenbelt plantation. Annual planning upto 2 years for tree plantation with specific number of trees will be done. Post plantation care will be ensured by monthly monitoring and meetings. Rs. 5.0 Lakhs allotted as capital cost and Rs. 2.4 Lakhs per Annum as a recurring cost for Green Belt.

4.2.12 Socio-Economy

Table 4.13: Impact on Socio Economic and Mitigation Measures

Project Activity	Impact	Mitigation Measures
<ul style="list-style-type: none"> Transportation of construction material and operation of machineries Construction & erection of the unit. 	<ul style="list-style-type: none"> Direct and indirect job to the local contractors. The construction phase will generate employment opportunity of in the skilled as well as unskilled categories. Although the workforce requirement will be temporary in nature, it will be met from the local populace hence there will be positive impact. 	<ul style="list-style-type: none"> The contractor will provide all existing facilities to the workers to reduce the impact on the existing facilities in the study area. Local businessmen will get opportunity to supply construction materials. Demands generated from the employees working at site for basic facilities will increase the local business activity of the area. During the construction phase approximate 20-25 Nos. of workers will be required. Any development, either temporary or permanent will support the family of many villagers. Thus, positive impacts are envisaged on socio-economic environment.

Table 4.14: Environmental Impact Matrix with Mitigation (Construction Phase)

Activities	Environmental Attribute											Total
	Air	Water	Soil	Noise	LU/LC	HG	Geo	SHW	RH	EB	SE	
Transportation of construction material and operation of machineries	-2	0	-2	-2	0	0	0	0	0	0	4	-2
Storage and handling of construction material	-3	0	-2	-3	0	0	0	0	0	0	0	-8
Construction and erection of unit	-3	0	0	-3	0	-2	0	0	-4	0	4	-8
Disposal of Construction Debris	0	0	-3	0	0	0	0	-3	0	0	0	-6
Wastewater-sewage Disposal	0	0	0	0	0	0	0	0	0	0	0	0

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Additional Greenbelt Development	3	0	0	3	0	0	0	0	0	3	0	9
Total	-5	0	-7	-5	0	-2	0	-3	-4	3	8	-15

Highest cumulative score (+9) received for Additional Greenbelt Development parameter. Highest total (+8) received for Socio Economic Development which is beneficial. Total Cumulative Score for various Environmental Parameters with implementation of adequate mitigation measures is -15 during construction phase which is not appreciable adverse impact score.

4.3 ANTICIPATED ENVIRONMENTAL IMPACTS DURING OPERATION PHASE

This phase of the project is important because it generates long-term impacts as the project implementation phase starts. The primary impacts causing likely deterioration will be in Air, Water, Noise and Land/Soil due to the gaseous emissions, vehicular movement, and discharge of liquid effluent. Identification of impacts during operation phase is given in Table 4.16 and 4.17.

4.3.1 Matrix Representation

The potential impacts during construction and operation phases are presented in the form of a matrix in Table 4.16. The scores for various parameters and activities are presented in table 4.17.

Table 4.15: Impact Matrix with Mitigation Measures (Operation Phase)

Activities	Environmental Attributes										
	Air	Water	Soil	Noise	LU/LC	Hydro geology	Geology	SHW	Risk & Hazard	EB	Socio Economic
Transportation of Materials	✓	-		✓	-	-	-	-	✓	✓	-
Storage & handling of Raw material & Product	✓	-	✓	-	-	-	-	-	✓	-	-
Coal Handling	✓	✓	-	-	-	-	-	-	✓	-	-
Operation of Boiler	✓	✓	-	✓	-	✓	-	✓	✓	-	-
Manufacturing Process	-	✓	-	✓	-	✓	-	✓	✓	-	-
Domestic & Industrial wastewater generation	-	✓	✓	-	-	-	-	-	-	✓	-

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Activities	Environmental Attributes										
	Air	Water	Soil	Noise	LU/LC	Hydro geology	Geology	SHW	Risk & Hazard	EB	Socio Economic
Solid/Hazardous Waste Disposal	-	-	✓	-	-	-	-	✓	-	-	-
Recruitment	-	-	✓	-	-	-	-	-	-	-	✓

Table 4.16: Environmental Impact Matrix without Mitigation (Operation Phase)

Activities	Environmental Attribute											Total
	Air	Water	Soil	Noise	LU/LC	HG	Geo	SHW	RH	EB	SE	
Transportation of Materials & Manpower	-6	0	0	-6	0	0	0	0	-12	-6	0	-30
Storage & handling of Raw material & Product	-6	0	-6	0	0	0	0	0	-12	0	0	-24
Coal Handling	-12	-9	0	0	0	0	0	0	-9	0	0	-30
Operation of Boiler	-12	-9	0	-12	0	-9	0	-6	-10	0	0	-58
Manufacturing Process	0	-12	0	-12	0	-12	0	-12	-12	0	0	-60
Domestic wastewater generation	0	-6	0	0	0	0	0	0	0	0	0	-6
Industrial wastewater generation	0	-9	-9	0	0	0	0	0	0	-12	0	-30
Solid Waste Disposal	0	0	-9	0	0	0	0	-9	0	0	0	-18
Recruitment	0	0	0	0	0	0	0	0	0	0	8	8
Total	-36	-45	-24	-30	0	-21	0	-27	-55	-18	8	-248

4.3.2 Air Environment

Emissions from Transportation Vehicles

Raw Material requirement for Paper

Existing-1220 TPM

Proposed-4093.5 TPM

Total – 5313.5 TPM

Coal – 38.4 TPD (1075.2 TPM)

Total Product capacity – 1040 (Existing) + 3560 (Proposed) = 4600 TPM

The other sources likely to be affecting the pollutant concentrations in project area would be vehicular and vessels emission due to transportation in proposed project. Transportation Vehicles requirement: After the expansion, approximate 9 Nos. of trucks will be required for raw material, 8 Nos. for products and 2 Nos. for coal per day. Thus, total 19 Nos. of trucks will be arriving / leaving the project site in a day after expansion. Internal RCC road network and separate entry/exit gate will be provided for smooth functioning of the traffic. Adequate parking space for trucks is provided at the project site.

Table 4.17: Vehicles required daily

S. No.	Details	Quantity	Nos. of Truck
1.	Total Trucks (Existing)		
a.	Total trucks of Finished goods	1040 TPM	1.85 ~2 trucks/day
b.	Total trucks of Raw material	1220 TPM	2.17~ 2 trucks/day
2.	Total Trucks (Proposed)		
a.	Total trucks of Finished goods	3560 TPM	6.35 ~6 trucks/day
b.	Total trucks of Raw material	4093.5 TPM	7.30 ~7 trucks/day
3.	Total trucks for Coal(EX+PR)	1075.2 TPM	1.92 ~ 2 trucks/day
Total Trucks per day after expansion		19 trucks/day	

On an average, depending on the production capacity, raw material requirement and fuel requirement, 19 trucks will be arriving/ leaving the project site on a daily basis.

Impact Due to Transport: The sources likely to be affecting the pollutant concentrations in project area would be vehicular emission due to transportation in proposed project. On account of various associated activities, there will be increased vehicular traffic on connecting roads. Generation of gaseous emissions is therefore, of primary concern. Mode of transportation of each incoming and outgoing material is presented in below and for computation of traffic modelling studies frequency of vehicles has been calculated.

Impact on Traffic Density: Enhanced Traffic on Road Adequacy: With present level of traffic and the increase in existing traffic due to the project during operational phase has been estimated by comparison with the recommendations stipulated by Indian Road Congress (IRC).

Table 4.18: Recommendations on Traffic Capacity as per IRC 2010

S. No.	Category of Road	Maximum PCU/hr	Dispatch Ratio (%)
1.	NH – 27	3000	100

Part A

It is estimated that additional 15 nos. of trucks per day will required for product and raw material. Total 19 nos. of trucks will be required after expansion. Traffic load on internal and external road is calculated as under,

Additional trucks = 15 truck/Day

Frequency of trucks (Nos. of truck x cycle x up and down) = $15 \times 1 \times 2 = 30$ Nos./Day

PCU/Day (Nos. of truck x 3) = $30 \times 3 = 90$ PCU/Day

PCU per hour = 3.75 ~4

Part B

Total No. of employee after expansion = 130 Nos.

Additional employees = 26

Cars of the employees = 5 Nos.

Two wheelers of the employees = 30 Nos.

Frequency of cars (Nos. of cars x cycle x up and down) = $5 \times 1 \times 2 = 10$ Nos./day

PCU / day (Nos. of car x 1) = $10 \times 1 = 10$ PUC/day

Frequency of two wheelers (Nos. of two wheelers x cycle x up and down) = $30 \times 1 \times 2 = 60$ Nos./Day

PCU/Day (Nos. of two wheeler x 0.5) = $60 \times 0.5 = 30$ PUC/Day

Total PCU/Day= $10 + 30 = 40$

PCU per hour = 1.66 ~2

Grand Total PCU/Hr. (A+B) = 4 + 2 = 6 PCU/Hr.

Table 4.19: Modified Traffic Scenario and LOS

#	Road	Increased PCUs	Modified V	C	Modified V/C Ratio	Modified V/C Ratio
1.	NH-27	$6 \times 100\% = 6$	$1513 + 6 = 1519$	3000	0.51	C

The LOS value from the project will be the almost same as before *i.e.* “C” “Good” for the National highway falling in the study area. So, the additional load on the carrying capacity of the concern roads is not likely to have any significant adverse effect.

Company has planned to undertake following mitigation measures for reducing impact:

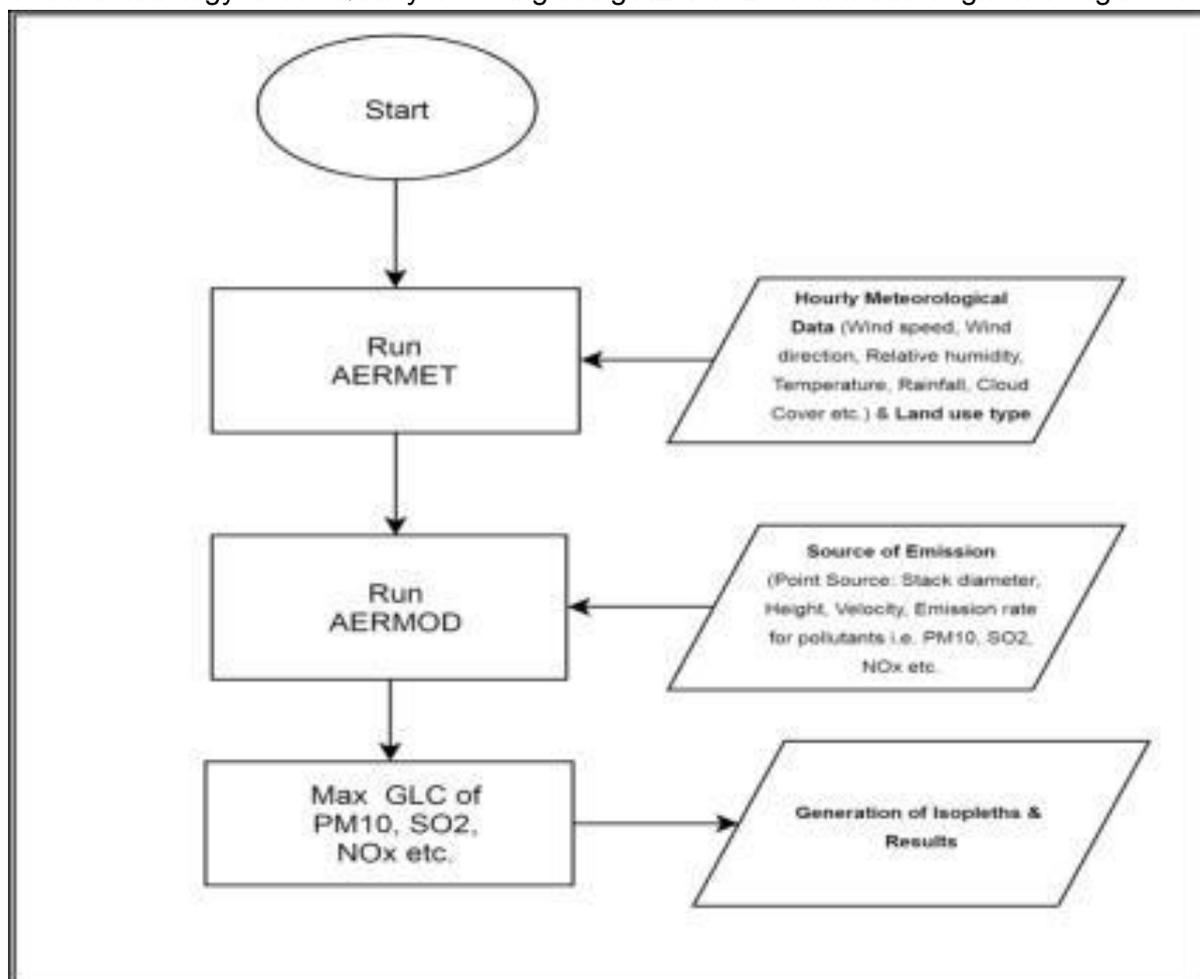
- Regular water sprinkling will be done and all vehicle will be of valid PUC.
- The high traffic congestion during peak hours only; hence the movement of trucks will be minimize in peak hours.
- The commitment “Traffic movement will not be done in Peak hours” will be included in our policy.
- All Truck drivers will be trained for the traffic rules and traffic movement.

Air Quality Modelling

The stack & vent are considered as a point source to predict the impact on ambient air quality during the operational phase. The prediction has been done by using AERMOD View model.

Methodology

The methodology for Air Quality Modeling using AERMOD View model is given in Figure 1.



Meteorological Parameters:

Surface meteorological data at the project site was collected for December 2020 – February 2021. The hourly meteorological data considered during this period were:

- Wind Speed;
- Wind Direction;
- Ambient atmospheric temperature;
- Cloud cover;
- Relative humidity.

Following parameters were considered for dispersion modeling – Point source

- Quantity of fuel;
- The Emission rate of pollutants;
- Stack & Vent:
 - Internal diameter at top of the stack;

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- Height of stack;
- Exit gas velocity;
- Exit gas temperature.
- Efficiencies of various proposed pollution control devices.

Source of Emission:

Flue gas emission of PM, SO₂, & NO_x, from the stack attached to 10 TPH boiler having Bag filter and 35meters height of chimney will be provided.

The emission estimation rates from flue and process gas are given in below table.

Table 4.20: Emission Estimation Rate from Proposed Flue Gas Stacks

Stack Details									Emission		
S. No.	Stack Attached to	Capacity	Height (m)	Diameter (m)	Gas Exit Vel. (m/s)	Gas Exit Temp. (°K)	Fuel	Fuel cons. Kg/hr	PM Emitted (gm/sec)	SO ₂ Emitted (gm/sec)	NO _x Emitted (gm/sec)
1	Boiler	10 TPH	35	3.0	5.0	415	Indian Coal/ Rice husk	120 0.0	1.67	0.07	0.95

Isopleths & Results

The maximum of 24 hourly highest GLC's of PM₁₀, SO₂, NO_x, flue gas emission & process gas emission (Point source) is summarized in below Table.

Table 4.21: Summary of Point Source Modelling

Pollutant	Maximum of 24 hourly highest Concentration (µg/m ³)	Distance (m)	Direction
PM ₁₀	1.55	500	SW
SO ₂	0.06	500	S/SW ,W/SW
NO _x	0.88	500	SW

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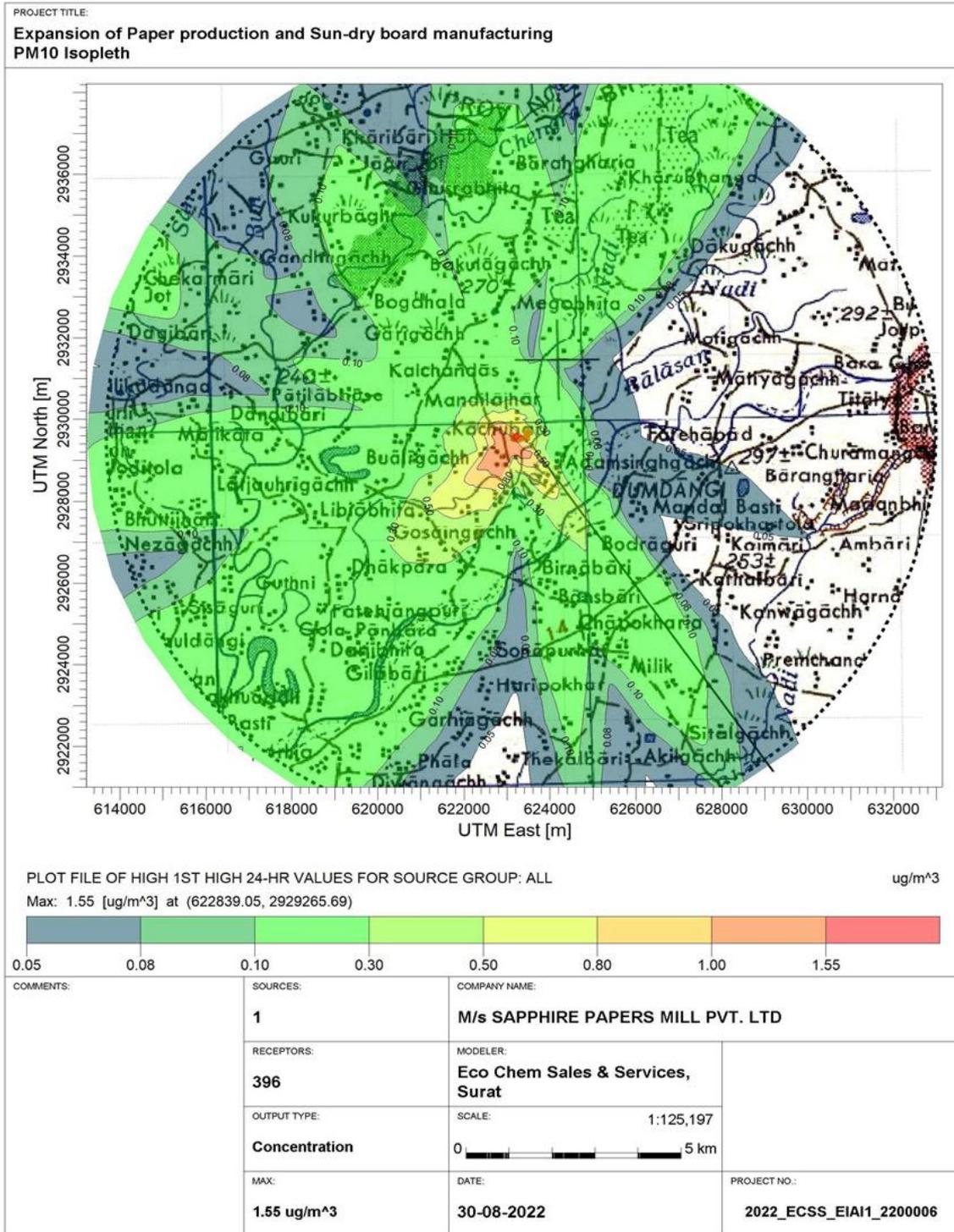


Figure 4.2: Isopleth of PM₁₀ Flue gas stack

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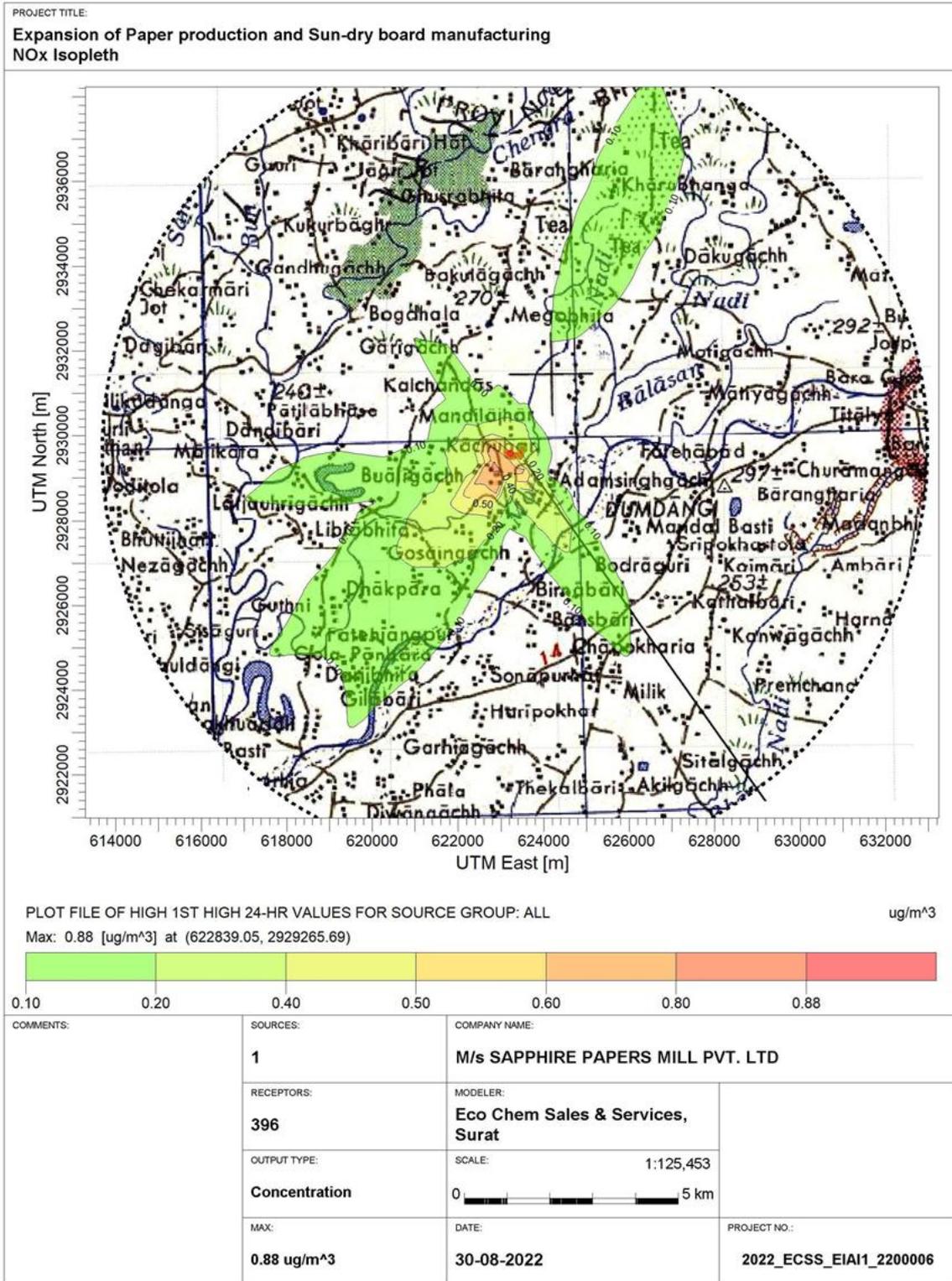


Figure 4.4: Isopleth of NO_x Flue gas stack

Table 4.22: 24 hourly maximum incremental increase in GLC

S.No.	AAQ Monitoring Location (Distance in Km/ Direction)	Pollutant	Baseline Concentration ($\mu\text{g}/\text{m}^3$)	Incremental GLC ($\mu\text{g}/\text{m}^3$)	Total Predictive GLC ($\mu\text{g}/\text{m}^3$)	NAAQS Concentration Limit ($\mu\text{g}/\text{m}^3$) ^[1]
1	Project Site	PM ₁₀	87.0	0.55	87.55	100
	Bidhan Nagar 1.35 km / N		73.5	0.22	73.72	
	Borobilla – 8.56 Km/E		62.3	0.03	62.33	
	Budharugaon-1.05km/SE		65.6	1.05	66.65	
	Chitalghata-2.76 Km/ESE		61.2	0.06	61.26	
	Dakpara-2.49 Km/S		66	0.16	66.16	
	Malgachh-1.70 km/SW		60.7	0.65	61.35	
	Sonapur-3.60 Km/SSE		56.1	0.14	56.24	
2	Project Site	SO ₂	21.4	0.01	21.41	80
	Bidhan Nagar 1.35 km / N		11.3	0.0	11.3	
	Borobilla – 8.56 Km/E		9.1	0.0	9.1	
	Budharugaon-1.05km/SE		10.2	0.03	10.23	
	Chitalghata-2.76 Km/ESE		10.2	0.0	10.2	
	Dakpara-2.49 Km/S		9.1	0.01	9.11	
	Malgachh-1.70 km/SW		9.1	0.03	9.13	
	Sonapur-3.60 Km/SSE		10.1	0.01	10.11	
3	Project Site	NO _x	28.2	0.11	28.31	80
	Bidhan Nagar 1.35 km / N		16.4	0.12	16.52	
	Borobilla – 8.56 Km/E		14.7	0.02	14.72	
	Budharugaon-1.05km/SE		14.4	0.35	14.75	
	Chitalghata-2.76 Km/ESE		16.0	0.03	16.3	
	Dakpara-2.49 Km/S		14.6	0.09	14.69	
	Malgachh-1.70 km/SW		14.8	0.37	15.17	
	Sonapur-3.60 Km/SSE		16.0	0.08	16.08	

Conclusion

- The Total predictive GLC of PM₁₀ concentration is observed in the range of 56.24– 87.55 $\mu\text{g}/\text{m}^3$, which is well within the standard limit.
- The Total predictive GLC of SO₂ concentration is observed in the range of 9.11 – 11.3 $\mu\text{g}/\text{m}^3$, which is well within the standard limit.
- The Total predictive GLC of NO_x concentration is observed in the range of 14.69– 28.31 $\mu\text{g}/\text{m}^3$, which is well within the standard limit.

Table 4.23: Impact and Mitigation Measures on Air Environment

Project Activity	Impact	Mitigation Measures
Transportation of Raw Materials and Products	<ul style="list-style-type: none"> • Ambient air contamination from Vehicle exhausts. • Settling of fugitive dust shall affect Growth of agricultural crops. 	<ul style="list-style-type: none"> • For the transportation of raw materials and products vehicles having valid PUC is/will be used. • The trucks used for transporting the goods are/will be covered by the tarpaulin.
Storage & handling of Raw material & Product	<ul style="list-style-type: none"> • Dust emissions from handling of raw material loading/unloading operations. 	<ul style="list-style-type: none"> • Regular water sprinkling is/will be done on roads to avoid dust generation from handling.
Coal Handling	<ul style="list-style-type: none"> • Coal dust generation during loading/unloading of Coal will affect the respiratory tract of workers. • High amount of dust generation will have impact on plants and will reduce their stomatal index. 	<ul style="list-style-type: none"> • Regular water sprinkling is/will be done on coal stock and on internal roads in the plant to avoid dust generation. • Coal is/will be stored in closed storage yard with arrangement of water sprinkler. • For transportation of coal to the boiler closed conveyor belt is/will be provided. • The trucks used for transporting the goods are/will be covered by the tarpaulin and overloading in trucks shall not be allowed.
Operation of Boiler	<ul style="list-style-type: none"> • Ash generation can increase fly ash dust in the premises and deteriorate air quality. • Generation of air pollutants like Particulate Matter (PM) into the atmosphere. • From the air quality modelling it can be predicted that air quality impacts are minimum on the surrounding population and within the NAAQS limit. 	<ul style="list-style-type: none"> • Bag filter will be provided to reduce the particulate matter emissions from the 10 TPH boiler. • Adequate stack height of 35 m is proposed for adequate dispersal of pollutants. • Fly Ash is/will be stored in silo and will be sent to brick manufacturing industry. • Fly ash is/will be stored in silo and directly fill up in transportation vehicles through pneumatic ash conveying system. • Mobile machines for dust cleaning from road are/will be employed to collect coal fines if any. • Moreover, from air modelling study, it has been proved that the air emission from the proposed project will not increase in significant

Project Activity	Impact	Mitigation Measures
		manner.

4.3.3 Water Environment

Table 4.24: Impact and Mitigation Measures on Water Environment

Project Activity	Impact	Mitigation Measures
Coal handling	<ul style="list-style-type: none"> Particulate matter from coal handling will affect the nearby water body. 	<ul style="list-style-type: none"> Good coal handling practices is/will be carried out. Coal stock is/will be sprinkled with water to avoid fugitive dust generation. A covered truck is/will be used for coal transportation.
Manufacturing Process Operation of Boiler	<ul style="list-style-type: none"> High quantity of water use will be used in manufacturing process and Boiler operation shall impose stress on water source. 	<ul style="list-style-type: none"> Best available technique for paper manufacturing is proposed for minimizing fresh water and increasing the recycle water. Industrial waste water generation from Process, Boiler and washing will be 929.8 KLD which will be treated in ETP. Approximately 838.2 KLD of treated wastewater will be generated out of which 452 will be resused in process and 50 KLD will be reused in quenching and remaining 336.2 will be used for land disposal in gardening and surrounding land. Evaporation losses from the boiler is/will be minimized by energy efficient coolers/condensers and evaporators.
Domestic & Industrial wastewater generation	<ul style="list-style-type: none"> Additional pollutant load on nearby surface water due to disposal or spillage/leakage/runoff of the domestic and industrial wastewater into the water body. 	<ul style="list-style-type: none"> Sewage will be sent to septic tank followed by soakpit. Treated Water is/will be reused and remaining treated water will be used for land disposal and gardening/ disposal. Separate and Closed drainage pipes with proper lined surfaces is/will be laid down for the drainage network for rainwater runoff.
Recruitment	<ul style="list-style-type: none"> Increase in fresh water demand for domestic activities will impact fresh 	<ul style="list-style-type: none"> Negligible quantity i.e. 2.6 KLD additional water will be required which will be extracted from ground

Project Activity	Impact	Mitigation Measures
	water source.	water. Proponent had applied for addition water extraction permission.

4.3.4 Soil Environment

Table 4.25: Impact and Mitigation Measures on Soil Environment

Project Activity	Impact	Mitigation Measures
Storage & handling of Raw material & Product	<ul style="list-style-type: none"> • Soil contamination due to spillage and leakage from storage of materials. 	<ul style="list-style-type: none"> • Earmarked separate storage yard with paved/lined surfaces is/will be provided for storage of fuel and other raw material. • Leachate from the storage area is/will be sent to collection tank of ETP for treatment and dilution of the same.
Domestic & Industrial wastewater generation	<ul style="list-style-type: none"> • Untreated industrial effluent if disposed haphazardly will reduce soil fertility and quality of the adjacent area. 	<ul style="list-style-type: none"> • After expansion, total industrial Wastewater Generation will be treated in adequate primary and secondary effluent treatment plant and treated effluent will be reused and remaining treated effluent will be used for land disposal in gardening and surrounding land. • Precaution is/will be taken to avoid leakage/spillage of effluent directly on land/soil.
Solid waste Disposal	<ul style="list-style-type: none"> • ETP Sludge, Plastic waste and used oil will deteriorate soil due to Spillage/leakage. 	<ul style="list-style-type: none"> • ETP primary clarifier sludge will be used for sundry board manufacturing. • Plastic waste will be disposed through authorized recyclers. • Used oil will be sold to authorized/registered recyclers. • Wastes is/will be stored in adequate storage yard with paved/lined surfaces and wastes are/will be handled/ disposed according to the Waste Management Rules, 2016.

4.3.5 Noise Environment

Table 4.26: Impact and Mitigation Measures on Noise Environment

Project Activity	Impact	Mitigation Measures
Transportation of Materials & Manpower	<ul style="list-style-type: none"> Continuous noise generation from transportation vehicles will impact on nearby population (Headache, Increased Blood pressure, lack of concentration, etc.). 	<ul style="list-style-type: none"> Transportation activity is/will be carried out only during day time. Rubber padding is/will be provided with pumps and motors to reduce the vibration. Regular maintenance & lubrication of equipment/ vehicles are/will be carried out.
Operation of Boiler	<ul style="list-style-type: none"> Exposure to continuous loud noise generated from the Boiler and lifting machines may pose health hazards to the workers working in plant premises. 	<ul style="list-style-type: none"> Acoustic enclosure to boiler is/will be provided. Provision of ear muffs and ear plugs to prevent continuous noise exposure risk to employees working on site. Regular rotation of the operators at boiler area by keeping regular shift intervals. Only PUC Certified vehicles is/will be used.
Manufacturing process	<ul style="list-style-type: none"> Hearing capacity of workers/ operator will be impacted due to continuous high noise exposure. 	<ul style="list-style-type: none"> Rotation of workers/ operators practice is/will be done. Use of earmuffs/ earplugs by workers is/will be ensured by the Site Safety officer.

4.3.6 Land use/ Land cover

No major impact on landuse as land is already developed and expansion will be carried out in existing premises.

4.3.7 Hydrogeology

Table 4.27: Impact and Mitigation Measures on Hydrogeology

Project Activity	Impact	Mitigation Measures
<ul style="list-style-type: none"> Operation of boiler Manufacturing process 	<ul style="list-style-type: none"> Groundwater table shall be impacted as fresh water 740.6 KLD will be abstracted from bore well. 	<ul style="list-style-type: none"> Sapphire paper has permission to withdraw 600 KLD of ground water. Rainwater will be sent through percolation pits by proposing RWH system to main ground water table.

4.3.8 Geology

No impact on geology, since the proposed expansion is/will be undertaken within existing project premises.

4.3.9 Solid Hazardous waste

Table 4.28: Impact and Mitigation Measures due to Solid/Hazardous Wastes

Project Activity	Impact	Mitigation Measures
Operation of Boiler Manufacturing Process Solid waste Disposal	<ul style="list-style-type: none"> Inadequate management, handling and disposal of Solid/hazardous waste (Used Oil, Rice husk ash, fly ash, ETP Sludge, Sludge from SFT, Plastic waste and Metal pins) may cause negative impact on surrounding environment. 	<ul style="list-style-type: none"> Used oil will be sent to registered recycler. Fly ash and rice husk ash is/will be sold to brick manufacturing unit. ETP primary clarifier sludge will be used for Sundry board manufacturing within facility. Sludge from SFT will be used as fuel in boiler. Plastic waste will be disposed through authorized recyclers. All the waste is/will be handled/ disposed according to the Waste Management Rules, 2016.

4.3.10 Risk and Hazard

Table 4.29: Impact due to Risk & Hazards and Mitigation Measures

Project Activity	Impact	Mitigation Measures
Transportation of Materials & Manpower Storage & handling of Raw material & Product	<ul style="list-style-type: none"> Loss of material or hit/ cut injuries due to vehicle collision accident. Health issue to worker during handling and storage of corrosive material. 	<ul style="list-style-type: none"> Trained and certified driver will be appointed for driving job. All transportation is/will be carried out directly under the supervision and control of dedicated team. Good material handling practices are/will be implemented. Workers are/will be provided with adequate PPEs like safety shoes, helmets and gloves while working in storage area to safeguard them against potential risks.
Operation of Boiler Coal Handling	<ul style="list-style-type: none"> Operator or employee working at Boiler may have severe health issues/injury. Chances of black lung 	<ul style="list-style-type: none"> Coal will be always kept in moist condition so less chances of coal dust and catch the fire. Fully equipped fire-fighting system is/will be provided.

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	disease to the worker working in coal handling area.	<ul style="list-style-type: none"> • Spark arrestors will be placed at potential places of fire hazard for early detection of spark • Onsite and Offsite DMP are/will be in place to deal with any emergencies. • Smoking is/will be strictly prohibited in fire sensitive area.
Manufacturing Process	<ul style="list-style-type: none"> • Due to machinery failure/improper function of machineries and due to carelessness/ less attention of workers during machine operation which may have pinched fingers or amputation of workers. 	<ul style="list-style-type: none"> • Guard system will be provided to the rolling machine. • For working in the machine area, strict adherence to SOPs will be implemented. • Safety Training is/will be provided to the employees. • Workers are/will be provided with adequate PPEs.

4.3.11 Ecology and Biodiversity

Table 4.30: Impact on Ecology and Biodiversity and Mitigation Measures

Project Activity	Impact	Mitigation Measures
Transportation of Materials & Manpower	<ul style="list-style-type: none"> • Fugitive emission from vehicle movement will form a layer in leaves thus reducing the gaseous exchange process. This ultimately affects the growth of plants. • Also, common animals found in the study region may get affected by the coal dust. 	<ul style="list-style-type: none"> • Vehicles with valid PUC are/will only be allowed within the premises. • Good material handling practices is/ will be followed. • As per the survey close to the proposed site and in the vicinity, REET species or wildlife is not reported at project site but study area shows presence of REET species as per secondary data. In addition to the wastes, noise generation from project operation will be minor. Hence there will not be any major adverse impact on ecology.

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Industrial wastewater generation	<ul style="list-style-type: none"> Wastewater discharge from the proposed activity can contaminate the soil and ultimately effect the growth of plants. 	<ul style="list-style-type: none"> Industrial effluent is/will be treated in the ETP and treated water will be reused in to manufacturing process, quenching and remaining will be used for land disposal in gardening and surrounding land.
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4.3.12 Socio-Economic

Table 4.31: Impact on Socio Economic and Mitigation Measures

Potential Aspect	Impacts	Mitigation Measures
Recruitment	<ul style="list-style-type: none"> Direct and indirect employment generation due to proposed project and related service sectors. Local people of nearby villages will benefit from the CER activities to be undertaken by the proponent. 	<ul style="list-style-type: none"> First preference will be given to local peoples during recruitment of 26 Nos. of additional employee for operation. Local service providers may be appointed for allied works and services. All the CER activities will be based on the needs/ requirements of the villages.

Table 4.32: Environmental Impact Matrix with Mitigation (Operation Phase)

Activities	Environmental Attribute											Total
	Air	Water	Soil	Noise	LU/LC	HG	Geo	SHW	RH	EB	SE	
Transportation of Materials & Manpower	-3	0	0	-2	0	0	0	0	-4	-3	0	-12
Storage & handling of Raw material & Product	-3	0	-2	0	0	0	0	0	-4	0	0	-9
Coal Handling	-3	-3	0	0	0	0	0	0	-4	0	0	-10
Operation of Boiler	-3	-3	0	-6	0	-3	0	-2	-6	0	0	-23
Manufacturing Process	0	-3	0	-6	0	-6	0	-3	-6	0	0	-24
Domestic wastewater generation	0	0	0	0	0	0	0	0	0	0	0	0
Industrial wastewater	0	0	-3	0	0	0	0	0	0	0	0	-3

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generation												
Solid Waste Disposal	0	0	0	0	0	0	0	0	0	0	0	0
Recruitment	0	0	0	0	0	0	0	0	0	0	8	8
Total	-12	-9	-5	-14	0	-9	0	-5	-24	-3	8	-73

Highest cumulative score (-24) received for Manufacturing process activity. Highest total (-24) received for Risk and Hazard. Total Cumulative Score for various Environmental Parameters with implementation of adequate mitigation measures is -73 during operation phase which is not appreciable adverse impact.

4.4 SUMMARY

The proposed project will not have considerable impact on surrounding environment. The Boiler is equipped Bag filter for mitigation of air pollutant source. Hazardous waste is/will be sent to authorized/ registered recyclers. Appropriate construction & operation techniques are/will be implemented to minimize the impacts on the environment. Proper upkeep and maintenance of vehicles and APCM will reduce the impact on air environment. Adequate arrangements for waste disposal from ETP are/will be undertaken. Proposed rain water recharge through percolation pits for mainting the ground water table. Greenbelt is/will be developed in surrounding of plant and common land.

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5 ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

5.1 GENERAL

As the proposed project is capacity enhancement project, alternative site has not been considered. Since, by nature, the project is an expansion project, the existing premises of operational unit is the most convenient site for the expansion project. Also, all the utilities and infrastructure facilities are available in the present set up. Moreover open land is available for construction of additional required units. Hence, the existing premise with available infrastructure and ease of operation is the best option available for the expansion.

5.2 Alternative for Sites & other Aspects

Some alternatives considered during EIA study are discussed below:

Table 5.1 - Alternative for other Parameters

S. No.	Particular	Alternative Option 1	Alternative Option 2	Remarks
1.	Site Selection	Existing Site	New Site	Existing site is preferred as proposed project is capacity enhancement project along with modernization in existing plant facilities. Benefits: <ul style="list-style-type: none"> Existing plot was already in possession of proponent. No additional land cost. All common infrastructure and utilities of existing unit can be shared. Site selection criteria are given in 2.4.1 in chapter-2.
2.	Technology	Wood based	Waste paper based	Waste Paper based technology is/will be preferred. Benefits: <ul style="list-style-type: none"> Waste paper based technology will help in conserving forest cover from reduction. Using waste paper will be cheaper as compared to wood based technology. Waste paper based technology will be more environmental friendly

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S. No.	Particular	Alternative Option 1	Alternative Option 2	Remarks
				compare to wood based.
3.	Employment	Local employment	Outsource employment	Local employment is/will be preferred. Benefits: <ul style="list-style-type: none"> • Provides employment to local people along with financial benefit. • No residential building/housing is required. • Improvement of socio economic status of the region.
4.	Labour Transportation	Public transport	Private transport	Private transport is/will be preferred. Local labours will be deployed so they will either reach plant by bicycle or by foot or by own vehicle. Benefits: <ul style="list-style-type: none"> • Cost of transportation for men will be negligible.
5.	Water Requirement	Water withdrawal from surface water bodies	Bore well water	Borewell water will be utilized. Benefits: <ul style="list-style-type: none"> • Borewell is already available in plant premises. • No Surface water resource depletion.

5.3 SUMMARY

No alternative site has been proposed for the proposed expansion project because expansion will be done at factory premises only and all the infrastructure are readily available for industrial development. However, some alternatives were considered for planning and designing of the various facilities proposed.

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6 ENVIRONMENTAL MONITORING PROGRAM

Environmental monitoring is the measurement of environmental parameters at regular intervals over an extended period of time. Monitoring allows the assessment of environmental and biological changes in an ecosystem. All the project activities shall be monitored to ensure that appropriate environmental mitigation activities are being implemented and to identify areas where Environmental Management Plan compliance is not satisfactory. Hence, Environmental quality monitoring of critical parameter is very essential in the routine activity schedule of project operation. An Environmental Monitoring Programme shall be scheduled for the following major objectives:

- To verify the result of the impact assessment study in particular with regards to new developments.
- To follow the trend of parameters which have been identified as critical.
- To check or assess the efficiency of controlling measures.
- To ensure that new parameters, other than those identified in the impact assessment study, do not become critical through the commissioning of project.
- To monitor effectiveness of control measures.
- Regular monitoring of environmental parameters to find out any deterioration in environmental quality.

6.1 POST PROJECT ENVIRONMENTAL MONITORING PROGRAM

Environmental Monitoring Parameters and Frequency

After the commissioning of the project, monitoring parameters and frequency for operation phase shall be as follows:

Table 6.1: Environmental Monitoring Parameters and Frequency

S. No.	Particular	Parameter for Monitoring	Frequency of Monitoring
1.	Ambient Air quality 1. Near Main gate 2. Near Utility area	PM ₁₀ , PM _{2.5} , SO ₂ and NO _x	Monthly
2.	Stack Emissions Quality	On-line Measurement of PM, SO ₂ and NO _x	Continuous
		Third Party Analysis of PM, SO ₂ , NO _x	Monthly
3.	Raw & Treated Effluent	pH, TDS, TSS, BOD, COD, Oil & Grease, Color, etc.	Monthly
4.	Ground & Surface water	pH, TDS, TSS, Sulphate, Hardness, metal analysis, etc.	Half Yearly
5.	Noise 1. Near ETP 2. Near Boiler House 3. Near Main Gate 4. Outside of production	Equivalent noise level - dB (A) (min. 10 locations)	Monthly

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S. No.	Particular	Parameter for Monitoring	Frequency of Monitoring
	Plant		
6.	Green Belt	Number of trees planted, Number of Survived Plants/Trees, Number of Poor Plant/Trees	Half Yearly
7.	Haz. Waste management	Maintaining records of generation, receipt & disposal	Routine
8.	Renewal of Consents and Authorization	Renewing consent to operate under applicable acts	3 months before expiry of validity
9.	Compliance of EC conditions	Submission of 6 monthly compliance reports	Half yearly
10.	Medical surveillance program	The health status of all the workers in respect of occupational health hazards.	Half yearly

Monitoring of the above parameters will be carried out to assess the performance of pollution control equipment installed to achieve the statutory norms. In case emissions/pollutant will be found to exceed the norms, the 'on duty' personnel will check the relevant parameters and take appropriate corrective actions. A record of corrective and preventive action will be maintained as per requirement.

6.2 ENVIRONMENTAL MONITORING METHODOLOGIES

Monitoring of environmental components will be done as per the guidelines provided by MoEFCC/CPCB/WBPCB. The following methods are recommended/standard methods approved/recommended by MoEFCC/CPCB.

Table 6.2 - Method of Environmental Sampling & Analysis

S. No.	Attributes	Method	
		Sampling / Preservation	Analysis
1.	Ambient Air Quality	As per IS: 5182, CPCB & AWMA.	As per IS:5182,CPCB & AWMA
2.	Micro meteorological data	Data collected on hourly basis using wind monitor as per CPCB Guideline.	NA
3.	Water & Waste Water I. Ground Water II. Surface Water III. Effluent Sample	Standard Methods for Examination of Water and Wastewater, 23 rd edition, APHA 2017.	IS 3025 & Standard Methods for Examination of Water and Wastewater, 23 rd edition, APHA 2017.

S. No.	Attributes	Method	
		Sampling / Preservation	Analysis
3.	Noise	Instrument : Sound level meter	Survey carried out as per CPCB guideline.
4.	Soil Quality	IS: 2720 & Laboratory Standard Methods	IS: 2720 & Laboratory Standard Methods

6.3 LABORATORY FACILITIES

Laboratory within plant premises is already established for basic analysis of Air, Stack and wastewater parameters. The monitoring results of the different environmental components will be analysed and compiled report will be sent to concerned authorities every six months.

6.4 DOCUMENTATION AND RECORDS

The environmental department in respect of operation of pollution control facility is/will maintain following records:

Monthly and annual progress reports: Immediately upon the completion of monitoring as per the planned schedule, report is/shall be prepared & necessary documents shall be forwarded to the concerned person.

- Instruction manual for operation and maintenance of pollution control equipments.
- Instruction manual for monitoring of gaseous parameter & hazardous waste management.
- Records of medical check-up of employees.
- Regularly all documents & records is/shall be reviewed for necessary improvement of the monitoring plan/mitigation measures/environmental technologies as well as for necessary actions of Environmental Management Cell.

6.5 BUDGETARY PROVISION FOR ENVIRONMENTAL MANAGEMENT SYSTEM

On regular basis, environment management cell will inspect the necessity & availability of the materials, technologies, services, maintenance works and make appropriate budget for these purposes. Regular record review for change in financial requirement of environment management will be done and appropriate budgetary provisions shall be made and revised regularly on requirement.

Table 6.3 - Budgetary Provision for Environmental Monitoring

S. No.	Description	Amount in Lakhs/ Annum
1.	Air Environment	1.10
2.	Water Environment	1.00
3.	Noise Environment	0.20
4.	Six monthly compliance report	1.20
5.	Environmental Audit & others	1.50

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S. No.	Description	Amount in Lakhs/ Annum
	Total	5.00

The above budget will include for the provisions of:

- Environmental Monitoring Program
- Operation & Maintenance of Environmental Technologies/Equipment
- Laboratory works for Environmental management activities
- Emergency Purchase of necessary material, equipment, tools, services, etc.
- Six monthly compliance monitoring
- Annual Environmental Audit.

6.6 SUMMARY

Project proponent has/will develop an environmental and safety department, which is/will undertake measures for environmental protection and mitigation of environmental impacts. Sample for environment monitoring are/will be collected as per the guidelines provided by MoEFCC/CPCB/WBPCB. Monitoring of environmental parameters within the plant premises will be carried at selected location as per guideline. Hazardous waste is/will be disposed/off as per Hazardous Waste Management Rules 2016. Pre-medical check-up is/will also be carried out at the time of employment. For environmental monitoring a budget of **5** Lakhs/Annum has allocated.

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7 ADDITIONAL STUDIES

7.1 GENERAL

Additional studies based on Public Consultation, Risk Assessment (RA), Disaster Management Plan, Occupational, Health and Safety has been carried out for the proposed project. The study has been incorporated in the EIA report to support the Environmental Management Plan.

7.2 PUBLIC CONSULTATION

The applicability of the S.O. 1533 for the proposed project was explored by considering different possibilities and provisions described in the said notification. Considering the products and project location of the proposed project, it is noticed that the proposed project falls under the item no. 5 (i) Category 'B' but treated as "A" according to EIA Notification, S.O. 1533 amended on 14th September 2006. Public hearing is applicable and it shall be carried out as per the procedure of West Bengal Pollution control Board and Minutes of the meeting for the same will be incorporated in the final EIA/EMP report.

7.3 RISK ASSESSMENT STUDY

Industrial accident results in great personal & financial loss. Managing these accidental risks in today's environment is the concern of every industry, because either real or perceived incidents can quickly jeopardize the financial viability of a business. Many facilities involve various manufacturing processes that have the potential for accidents which may be catastrophic to the plant, work force and environment or public. The main objective of the risk assessment study is to propose a comprehensive but simple approach to carry out risk analysis and conducting feasibility studies for planning & management of industrial prototype hazard analysis in Indian context.

7.3.1 Scope of this Study

The Qualitative Risk Assessment (QRA) study in this report has specifically been conducted considering the Terms of References (TORs) given by the State Expert Appraisal Committee for Environment Clearance (EC).

The study has been carried out with a view to comply the following TORs:

- Objectives and methodology of risk assessment
- Details of raw material and finished products' storage facilities
- Process safety, fire-fighting systems, safety features and emergency capabilities to be adopted
- Identification of hazards
- Recommendations
- Disaster Management Plan

7.3.2 General

The company will deal with Indigenous Waste Paper, Caustic, Hydrogen Peroxide, Soapstone powder, Sodium Silicate, Starch etc., some of which are combustible in nature by virtue of their intrinsic chemical properties. Fire and combustion are the hazards associated with the unit. Comprehensive, systematic and sophisticated methods of Safety Engineering, such as, Hazard Analysis and Quantitative Risk Assessment have been developed to improve upon the integrity, reliability and safety of the industrial plant.

7.3.3 Objective of Risk Assessment

Risk analysis involves an extensive hazard analysis. It involves the identification and assessment of risks to which the plant personnel, neighboring populations and the surrounding environment are exposed as a result of the hazards present. This requires a thorough knowledge of failure probability, credible accident scenario, vulnerability of population etc. Much of this information is difficult to get or generate. Consequently, the risk analysis is often confined to maximum credible accident studies. It provides basis for what should be type and capacity of its on-site and off-site emergency plan and the types of safety measures to be required for the same.

Objectives of risk assessment are:

- To identify risks resulting from the hazards
- To study and foresee the effects of such risks on the workers, public, property and the environment
- To find out necessary control measures to prevent or minimize risk
- To comply the legal requirement by various safety and environment laws of the country
- To get the necessary information for Emergency planning and evacuation

The Risk Assessment presented in this report has been conducted with a view to cover risks arising from the following:

- Storage and handling of combustible materials like waste paper and fuel i.e. coal.
- Operation of Boiler, ETP, Utility section, etc.
- Process operations carried out by personnel

7.3.4 Methodology Adopted

Method adopted: As a conservative approach, we have analysed the risk qualitatively. In Qualitative Risk Assessment, risk has been analysed using the Hazards Identification & Risk Assessment (HIRA) methodology. In HIRA, major manual activities carried out by the plant personnel as well as contract labors have been considered. For Qualitative Risk Assessment, the Risk Matrix given in 7.2.5 has been used.

The comprehensive methodology adopted for various kinds of risks is summarized below:

Table 7.1: Methodology adopted for various kinds of risks

Risk Source	Methodology Adopted for Risk Assessment
Construction Hazards	Hazards Identification and Risk Assessment based on Risk Matrix
Process related Hazards	Hazards Identification and Risk Assessment based on Risk Matrix

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Risk Source	Methodology Adopted for Risk Assessment
Physical Hazards	Hazards Identification and Risk Assessment based on Risk Matrix
Chemical Hazard	Impact Identification and Mitigation Measure

Risk Matrix

LIKE HOOD/ PROBABILITY		SEVERITY				
		Catastrophic (Death/ System Loss)	Major/ Critical (Serious injury/ Illness)	Moderate (Less Serious Injury/ Illness)	Minor/ Marginal (Minor Injury/ Illness)	Insignificant/Negligible (No injury /illness)
		5	4	3	2	1
Almost Certain	E	H	H	H	M	M
Likely	D	H	H	M	M	L
Possible	C	H	M	M	M	L
Unlikely	B	M	M	M	L	L
Impossible	A	M	M	L	L	L

Risk Range	Risk Acceptability Criteria	Remarks
H	Unacceptable/ High	Management's Decision/Action Plan Required. Potential off-site Impact.
M	Medium	Generally Minor Impact. Acceptable with Management's Review. Specific monitoring or SOP to be followed.
L	Low	Acceptable without Review. Manage through Routine Procedure.

7.3.5 Details of Storage Facilities

The locations of storage of various chemicals have been marked on layout map. Details of the same have been given in the Table no 7.2.

- Finished Goods Storage Area
- Waste Paper Storage Area (Raw Material)
- Coal Storage
- Chemical storage area

Table 7.2: Storage Details of Materials

S. No.	Item	Requirement	Max. Storage capacity at site (tons)	Mode of Storage	Storage Location	Hazards	Mode of transfer from storage to process plant	Safety Features/Fire Fighting arrangements
1.	Waste Paper	5107.5 TPM	6000	Bales	Waste paper Storage Area	Combustible	Forklift/ JCB/ Loader	<ul style="list-style-type: none"> • Fire Hydrant • Fire extinguisher • Hot work permit policy • No smoking
2.	Coal/ husk	1600 kg/h	3000	Loose	Coal Storage Yard	Combustible	Conveyor belt system	Water sprinklers will be used to control the dusts. Greenbelt will be provided in and around the coal stack.

7.3.6 Qualitative Risk Assessment and Mitigation Measures

Risks involved in various process equipment and some processes cannot be addressed by consequence analysis. As a conservative approach, these risks have been considered separately under this topic. The approach is to identify hazards associated in the operation of equipment as well as processes, utilities, ETP *etc.*, assessing its impacts, ranking the risk posed by it and finally to propose remedial actions/mitigation measures such that risk is minimized to tolerable level. All the precautions will be undertaken to minimize the risks arising at the plant unit. The Risk Matrix presented under the section 7.2.5 should be referred in evaluating this assessment.

Table 7.3: Risk and Mitigation measures Manufacturing Process

S. No.	Process Or Activity	Associated Hazards	Health & Safety Impact (Risk)	Initial Risk			Control / Mitigation Measures	Residual Risk		
A. Hazard involving during Construction & Erection										
1.	Construction & Erection of Plant machinery	Fall in pit during excavation Fall of objects due to breaking of pulley or chains of cranes, fall from height during lifting of equipment.	Risk of injury to workers / labours	4	C	M	<ul style="list-style-type: none"> Understanding of soil to the workers and use of PPEs, Examine ropes, hooks for defects before putting into service, Use chains or cables to suspend tackle over tonners, Display of carrying capacity/load of Hoist and Pulley. 	2	B	L
2.	Heavy fabrication work	Heat radiation due to flame from the use of LPG / Acetylene gas.	Eye or body injury	2	C	M	<ul style="list-style-type: none"> Provision of PPEs' such as Welders goggles, heat resistant goggles, face shield 	2	B	L
B. Process Related Hazard										
1.	Boiler Operation & Maintenance	<ul style="list-style-type: none"> Entrapment between Rotating parts Contact with hot surfaces/ substance during boiler maintenance. Fire/ Explosion due to leakage, spillage Exposure to carbon monoxide 	<ul style="list-style-type: none"> Cuts/ Severe bodily injury, may be severe. Severe burns to skin\ Risk of severe bodily injury. Asphyxiation can be severe health issue. Imbalance, fatigue, disk orientation due 	5	C	H	<ul style="list-style-type: none"> Guarding of the rotating parts will be ensured. Check for leaks/hotness of the body parts will be ensured before starting work. Work permit system will be followed. Ensure the working of Safety valves, Water-level control and low-water fuel cut off, Water-gauge glass by periodical 	2	B	L

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S. No.	Process Or Activity	Associated Hazards	Health & Safety Impact (Risk)	Initial Risk			Control / Mitigation Measures	Residual Risk		
		due to incomplete combustion. <ul style="list-style-type: none"> • Thermal Radiation in case of poor lagging of boiler walls, ducts flues etc. • Noise & Vibration exposure due to turbine operation. 	to vibration <ul style="list-style-type: none"> • Heat stress/ cramps to workers • Noise induced hearing loss. 				maintenance. <ul style="list-style-type: none"> • Periodic internal and external inspection & maintenance shall be carried out as per Boiler Rules & Regulations. • Water hardness shall be checked on shift wise. • The work will be carried out by fully trained and certified engineers only. • Flue gases will be passed through Electrostatic Precipitator to collect the fly ash associated with flue gases and there by discharging the clean flue gases in to an open atmosphere through the Chimney. • Periodic rotation of operators will be ensured by providing adequate resting hours. • Periodic Noise Survey and medical examination of employees. • PPE's like ear plugs, ear muffs, light weight cotton clothing shall be provided for protection from High noise level and heat stress/ Thermal 			

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S. No.	Process Or Activity	Associated Hazards	Health & Safety Impact (Risk)	Initial Risk			Control / Mitigation Measures	Residual Risk		
							Radiation. • Proper SOP will be followed during firing of the boiler.			
2.	Coal Storage Area	<ul style="list-style-type: none"> Coal Dust Exposure Coal Fire/ Coal dust explosion 	<ul style="list-style-type: none"> Anthracosis Pulmonary disease Burn Injury & damage to Property 	4	C	M	<ul style="list-style-type: none"> For transportation, loading & unloading of coal, closed conveyor belt system will be provided. Water sprinklers will be used to control the fugitive dust. Housekeeping will be maintained properly and surrounding area will be made free from obstructions, heat and ignition sources. Sufficient nos. of Fire extinguishers/ Sprinklers will be made available in the storage area. Dust mask, Goggles and hand gloves will be provided meeting IS standards. Periodic Health checkup of worker will be done. 	2	B	L
3.	Paper Storage area	<ul style="list-style-type: none"> Fire due to unsafe act and unsafe condition. 	<ul style="list-style-type: none"> Burn Injury & loss of property 	4	C	M	<ul style="list-style-type: none"> Unsafe act like smoking will be strictly prohibited. Work permit system will be adopter for welding activity if any. All electrical fitting will be 	2	B	L

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S. No.	Process Or Activity	Associated Hazards	Health & Safety Impact (Risk)	Initial Risk			Control / Mitigation Measures	Residual Risk		
							concealed at paper storage area. • Adequate fire system will be provided in the entire unit.			
4.	Electrical maintenance work/ Generation of static electricity charge	• Electricity	• Burn injury/ possibility of fatality due to electric shock.	5	C	H	• Thermographic inspection of electrical equipments will be done. • Earthing & Bonding will be provided to all the equipments. • Flameproof and water proof fittings will be used. • Access to such unit under maintenance will be restricted.	2	B	L
5.	Paper Finishing area	• Nip points	• Cut Injury to body parts.	3	C	M	• Appropriate guard will be provided for nip points and running equipments. • Use of PPEs like – Face mask, hand gloves, eye protection etc., will be ensured.	2	B	L
6.	ETP Operation and Maintenance	• Slips, Trips and Falls in pits, clarifier.	• Severe body injury, drowning away	3	C	M	• Grit cover will be provided on top of clarifier, pits etc. • It will be made mandatory for engineers/operators to wear suitable safety footwear with non-slip soles at all times. • Access to and from site will be used via designated routes only.	1	B	L

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S. No.	Process Or Activity	Associated Hazards	Health & Safety Impact (Risk)	Initial Risk			Control / Mitigation Measures	Residual Risk			
C.	Physical Hazard										
1.	Handling machines with	<ul style="list-style-type: none"> Slip 	<ul style="list-style-type: none"> Cut injury, pinched injuries. 	3	C	M	<ul style="list-style-type: none"> Guards will be provided to Machine. Job safety training will be provided. Use of PPE's. 	1	B	L	
2.	Working in height	<ul style="list-style-type: none"> Fall 	<ul style="list-style-type: none"> Fracture, cut injury, Severe health issue. 	5	C	H	<ul style="list-style-type: none"> Safety Harness will be provided. Height jobs will be performed under Engineer Supervision. 	1	B	L	
3.	Plant area working	<ul style="list-style-type: none"> Skidding due to Oils spills, Water leaks, stagnation of chemicals on floors. 	<ul style="list-style-type: none"> Hit injury, cramps etc. 	3	C	M	<ul style="list-style-type: none"> Good housekeeping will be ensured. Proper signboards will be used and displayed. Use of helmet will be ensured. 	1	B	L	
4.	Machine operations	<ul style="list-style-type: none"> Noise 	<ul style="list-style-type: none"> Headache, Loss of hearing after long duration exposure, Poor communication among workers will cause accident. 	3	C	M	<ul style="list-style-type: none"> Periodical maintenance of machineries, Work rest will be provided at regular intervals, Ear plugs will be provided to the workers. 	1	B	L	

D. Chemical hazard

S. No.	Chemical Name	Exposure Limit	Impacts	Mitigation Measures
1.	Hydrogen Peroxide	1.0 ppm (ACGIH TWA)	<ul style="list-style-type: none"> Corrosive to the eyes and causes severe burns. Gastrointestinal irritation with nausea, vomiting and diarrhoea. Prolonged or repeated skin contact may cause dermatitis Non-combustible but may contribute to the combustion when it interacts with other substances and causes violent and explosive reactions as it is a strong oxidizer. 	<ul style="list-style-type: none"> Will be Kept away from heat, sparks, and flame. Will be kept away from alkalies, oxidizable materials, finely divided metals, alcohols, and permanganates. Stored only in light-resistant containers fitted with a safety vent. Local exhaust ventilation will be provided to keep airborne concentrations below the permissible exposure limits. Will provide proper fire fighting measures (Water Sprinkler).
2.	Caustic Soda	2.0 mg/m ³ (ACGIH Ceiling)	<ul style="list-style-type: none"> Severe eye and skin burns Irritation may lead to chemical pneumonitis and pulmonary edema. Reactive, Contact with metals may evolve flammable hydrogen gas. Corrosive 	<ul style="list-style-type: none"> Storage containers should be dry, cool and keep it in a well-ventilated area. Will avoid usage of combustible materials in nearby storage area. Will kept away from corrosive area and metals. Use suitable fire extinguisher agent (do not use water). Usage of proper PPE like gloves, face masks etc.

7.3.7 Safety Precautions

Recommendations for the proposed project based on Risk Assessment are summarized as below along with other safety measures.

A. For Manufacturing Process:

- Should ensure that all works are carried out by qualified and trained person.
- Should ensure working of firefighting equipment through periodical checks.
- Proper Housekeeping will be ensured by Safety Officer.
- Personal vigilance will be carried out strictly.
- Effective process controls will be implemented thereby, minimizing the use of deinking and other chemicals.
- Proper Implementation of an inspection and maintenance program will be done to prevent and identify leaks, equipment failure, etc.
- Proper training will be imparted to the workers.
- Ensure complete safety of the work/equipment (from mechanical and process point of view) before starting any maintenance work.
- Automate pulping operations to the extent possible, such that operators can monitor and operate the processes from control rooms isolated from potential chemical exposures and other health - safety hazards.
- PPEs like Helmets, Non-slip sole Safety Shoes, Safety goggles, Acid-Alkali Proof Gloves chemical resistant clothing etc. will be provided to the employees and the use for the same will be made mandatory.
- Proper guarding of the rotating parts will be ensured to protect the employees from injuries.
- Flameproof and water proof fittings will be used.
- All the vessels and equipment will be earthed, grounded and protected against Static Electricity.
- Safety Valve and pressure gauge will be provided on the machineries at required places.
- To control various parameters and avoid degradation of the product, utility like Chilling water, cooling water, vacuum lines, steam supply and its alternatives will be made available.
- All emergency valves and switches and emergency handling facilities will be made easily accessible.
- Steam valves and dryer parts will be checked properly before carrying out maintenance.
- Hot objects/surfaces shall be labeled as "Hot".

B. For Boiler Safety Precautions to Avoid Explosions

On the basis of steam boiler explosions history & analysis there are few common failures and causes of boiler explosion;

- Failure of the safety valve, corrosion in boilers
- Irresponsible management is the main cause of every accident

Precautions to be carried out before starting Steam Boilers

- Hydraulic should be carried out at a defined pressure before the start of a boiler.
- Check if the pump inlets are open at the start of a boiler.
- All loose and wrong connections must be checked and make sure to rectify the connections before starting your boiler.
- Pump priming must be done at the start of the boiler.
- Increase in ash removal frequency to prevent the accumulation of ash in a furnace or other equipment. The accumulation may result in the blockage or excessive heating of boiler parts resulting in its failure.

Precautions to be carried out regularly

- Follow boiler manual for safe and efficient working of your boiler.
- Never operate boiler above the design pressure and check for the safe operation of Safety valves as well as fusible plugs.
- Strainer must be installed before the pump & check for its proper functioning to remove dirt particles from boiler feed water as this prevents the blockage of a feed line.
- Water must be treated before feeding it to the boiler to prevent the accumulation of dirt in a Boiler shell.
- Make sure that the boiler vents are not restricted by any kind of obstruction such as cloth etc.
- Always check for the leakages of steam, water, air and flue gases from any suspicious place.
- Regular inspection and maintenance of boiler including its accessories and valves to check for possible failures and cracks are necessary.
- The panel should be cleaned regularly and should be kept in a cool and an isolated place away from your boiler.
- Check if all the hot parts of the boiler are insulated, do not touch the parts with bare hands where the insulation is not provided.
- Pressure switch, Mobrey and Pressure Gauge should be checked for their proper functioning.
- Maintenance of both FD Fan and ID Fan is important and regularly check for greasing in all the movable parts for the ease of operation.
- Regular cleaning of movable mechanical parts is necessary.
- Regular cleaning of the perforated line is necessary.

Precautions to be carried out occasionally

- Occasionally clean the boiler tubes to prevent any ash deposition or scaling inside or outside the tubes. Failure to do so will affect the boiler efficiency and will eventually overheat the tubes leading to the tube leakage problems.
- The ratio of primary and secondary air must be maintained in accordance with fuel feeding.
- Periodically check burner operation back pressure and line pressure to prevent any thermal hazards.

C. For ETP Safety

- Units will be regularly tested for electrocution; care will be taken not to plug any item with power on.
- No cables will be unplugged with running unit. Flameproof and water proof fittings will be used.
- Access to the maintenance unit will be restricted.
- Access to and from the site will be gained via designated routes only.
- It will be made mandatory for engineers/operators to wear suitable safety footwear with non-slip soles at all times.
- Guard rails with adequate height will be provided for inspection on the unit.
- Grit cover will be provided on top of ponds, clarifier, pits etc.
- Screen will be placed before the discharge pump to retain the fallen person.
- Spills /Leaks will be cleaned immediately or it will be neutralized/soaked in sand.
- Housekeeping will be maintained properly and surrounding area will be made free from obstructions, heat and ignition sources.
- Use of PPEs like face mask, hand gloves, wear chemical resistant clothing, safety goggles will be made mandatory etc.
- Hazardous waste will be treated/ handled separately with great care.

D. For Material Handling/Transportation/Storage

- Closed conveyor belt system will be provided.
- Housekeeping will be maintained properly and surrounding area will be made free from obstructions, heat and ignition sources.
- Coal and Lignite wetting will be done before unloading from truck to reduce the dust levels significantly.
- Use of proper PPEs like face mask, hand gloves, chemical resistant clothing, and safety goggles will be ensured.
- Asphalt road network will be provided in the whole area for truck movement to prevent dust emission.
- Trucks used for transporting the goods will be covered by the tarpaulin and overloading in truck will be avoided to prevent the dusting and spillage of goods from the truck.
- Sprinkler system will be installed in storage area.
- Fire extinguishers and fire hydrants will be made available in close proximity.
- Fire/smoke detectors will be made available to detect small fires so as to take immediate action.
- Air monitoring will be carried out to check for any dust/fume emissions.

E. Other safety measures to be employed during the proposed project

To maintain high standards in Health, Safety and Environment, various activities will be undertaken at the site.

The following key safety measures will be a part of the proposed project to be implemented by SPML.

- Personnel Safety Measures

- Safety Training will be regularly provided to the employees.
- Safety Sirens with Alarm System in case of emergency will be provided.
- Emergency Control Room will be established.
- Assembly point will be predetermined and provided as per the requirement.
- Sprinkler Systems will be provided as per the need.
- Fire Hydrant System will be installed.
- Fire Extinguishers are also proposed to be provided.
- Mock drills will be periodically conducted and factors like response time to be evaluated.
- Fire squad team will be formed for handling any emergency situation.
- First Aid Facility and training will be regularly provided.
- Personal protective gears and equipment will be provided to the employees.
- Health checkups will be organized at regular intervals.
- Safety / Health records and MSDS will be maintained

7.4 DISASTER MANAGEMENT PLAN

A disaster is a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its own resources. Though often caused by nature, disasters can have human origins. (VULNERABILITY+ HAZARD) / CAPACITY = DISASTER. A disaster occurs when a hazard impacts on vulnerable people. The combination of hazards, vulnerability and inability to reduce the potential negative consequences of risk results in disaster.

Types of Disaster

- Man-made disaster (On site and Off site)
- Natural Disaster

A. Man Made Disaster

Probable disasters that can occur On-site are as follows:

- Plant failure
- Rupture or damage of the line, vessel or tank
- Excessive leakage of flammable material

Probable disasters that can occur Off-site are as follows:

- Exposure to pollutants released from offsite/ storage/related activities
- Contamination due to accidental releases or normal release in combination with natural hazard
- Deposition of toxic pollutants in vegetation / other sinks and possible sudden releases due to accidental occurrences

B. Natural Disaster

- Cyclone
- Earthquake
- Flood
- Fire

Emergency preparedness plan for natural and man-made disasters:

A) Emergency Planning for Disaster due to fire

The pulp and paper industry has been experiencing problems with fire for a long time. Some of the parts in pulp and paper industry are most prone to fire such as flash driers, Slab presses, IR-Drier, filters, packaging yard, paper storage area, Coal storage yard, electrical rooms and transformer area etc. and the provisions have to made to control the same primarily. A small spark of fire may result into loss of machines and the damage by fire may cause high economic losses and loss of life. This type of losses can be avoided by preventing and controlling the fire instantly for which fire-fighting group is established which keeps in readiness, the following types of equipment and arrangements.

- CO₂ extinguishers
- Dry powder chemical extinguishers
- Foam extinguishers
- 80 mm spray hoses
- Fire brigade
- Fire hydrant
- Protocol (chemical to combat oil fires).
- In order to avoid fire in cable galleries, all the power and control cables of FRLS type (Fire Resistant Low Smoke) will be used.

B) Inspection

Fire alarm panel (electrical) will cover the entire plant. The inspection group inspects/ will periodically inspect fire extinguishers in fire stations and machines and other places. The company has displayed emergency telephone number boards at vital points. The Company regularly carries out general inspection for fire.

C) Fire Fighting with Water

Adequate and reliable arrangement is required for fighting the fire with water such as:

1. Provision for Fire brigade and Fire hydrant.
2. Arrangement of pipelines along and around all vulnerable areas.
3. Provision of valves at appropriate points to enable supply of water at the required place/area or divert the same to another direction/pipe line.
4. Provision of overhead tanks which will be providing water during power failure and it would work by the gravitational force.

D) Sources of water for Fire Fighting

The following two sources of water have been considered for fire fighting:

- Overhead Tank
- Raw Water Reservoir

E) Fire fighting with Fire Extinguishers

To deal with fire – other than carbonaceous fires, which can be dealt with by water – suitable fire extinguishers are required to do the job effectively. It is therefore, necessary to keep adequate number of extinguishers in readiness at easily approachable places.

- Further, other spray groups from the system will be diverted to the spot.

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- In case of fire in the belt, belt will be cut near the burning portion to save the remaining parts.
- After extinguishing the fire, the area will be well prepared for reuse.
- Foam or water or Dry powder or wet chemical fire fighting system will be provided to control fire from the paper storage yard. CO₂ is not suitable to suppress fire due to paper.
- Fire should be suppressed in initial stage itself otherwise it may become uncontrollable so automatic fire fighting system should be provided.

General Emergency preparedness plan for all man-made disasters pertaining to pulp and paper industry

A. Alarm System

A siren has been provided under the control of Security office in the plant premises to give warning. In case of emergencies this is used on the instructions to shift in charge that is positioned round the clock. The warning signal for emergency is as follows:

- Emergency Siren: Waning sound for 3 minutes.
- All clear signal: Continuous siren for one minute.

B) Communication

Walkies & Talkies are located at strategic locations; internal telephone system EPBX with external P & T telephones are provided.

C) First Aid

A first aid centre with adequate facilities is provided. It will be maintained round the clock by a compounder cum dresser and a doctor. An ambulance is also provided at site to carry affected people to hospital.

D) Security

The security requirements of the company premises will be taken care of by CSO assisted by a fire in charge. The team, apart from the normal security functions will manage the role required during a disaster management operation as a part of the crisis control team.

E) Safety

The safety wing led by a Safety Manager will meet the requirement of emergencies round the clock. The required safety appliances will be distributed at different locations of the plant to meet any eventualities. Poster/placards reflecting safety awareness will be placed at different locations in the plant area.

F) Evacuation Procedure

As the major hazard is only due to fire, which has more or less localized impact no mass evacuation procedures are required. Evacuation would involve only the people working very close to the fire area.

G) Emergency Control Centre

The ECC is always ready for operation and provided with the equipment and supplies necessary things during the emergency such as:

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- Updated copies of the On-site Disaster Management Plan.
- Emergency telephone numbers.
- The names, phone number, and address of external agencies, response organizations and neighbouring facilities.
- The adequate number of telephone (more than two).
- Emergency lights, Clocks, Personal protective equipment.
- List of fire extinguishers with their type no. and location, capacity, etc.
- Safety helmets – List of quantity & location.
- Status boards/message board.
- Material safety data sheets for chemicals handled at the facility.
- Several maps of the facility including drainage system for surrounding area showing:
 - Areas where hazardous materials are stored.
 - Plot plans of storage tanks, routes of pipelines, all water permanent lines etc.
 - The locations where personal protective equipment is stored.
 - The position of pumping stations and other water sources.
 - Roads and plant entrances.
 - Assembly areas & layout of Hydrant lines.

H) Duties and Responsibilities of Key Personnel

S. No.	Name of Person Responsible	Duties and Responsibilities
1.	Site Main Controller	<ul style="list-style-type: none"> • To co-ordinate with external and internal coordinator and give some necessary instructions. • To put the disaster control plan into action. • To mobilize help from outside agencies to ensure supply of fire fighting equipment. • In case of disaster of high magnitude, the chief controller will inform district magistrate, local police station, and district health authorities for additional help and evacuation. • Continuous review and assess possible developments to determine the most probable course of events. • Direct the shutting down of plants and their evacuation in consultation with the incident controller and key personnel.
2.	Incident Controller	<ul style="list-style-type: none"> • Direct the shutting down and evacuation of the plant areas likely to be affected. • Rescue and fire- fighting operations, until the arrival of the fire brigade, when he/she should hand over control to a senior fire officer. • Search for casualties. • Evacuation of non-essential workers to assembly area. • Brief the site main controller and keep him informed of developments
3.	Security Officer	<ul style="list-style-type: none"> • To coordinate fire-fighting operation and replenish the

S. No.	Name of Person Responsible	Duties and Responsibilities
		fire-fighting equipment. <ul style="list-style-type: none"> • To rescue the injured persons. • To provide first aid/medical assistance. • Remove tank lorry/other vehicles to safe location.
4.	Maintenance Manager	<ul style="list-style-type: none"> • Maintenance squad will plug the leak, isolate the hazardous area and ensure the safety of the remaining part of the factory. • The team will mobilize any repair work on an emergency basis.
5.	Shift In charge after office hours	<ul style="list-style-type: none"> • Will establish the emergency control center. • Mobilize all coordinators assembled at the Emergency Control center and put the disaster control plan into action. • Mobilize the fire- fighting operations. • Mobilize help from ambulance services and hospitals for medical assistance. • Mobilize help from the outside agencies for fire fighting. • Inform the police and request to control traffic and maintain law and order. • Inform site controller, incident controller and appraise the situation. • Direct the shutting down of plants and their evacuation. • Give adequate attention to the casualties and send them to hospital.

I) Communication Equipment's and Alarm System

This kind of equipment is absolutely vital for notifying accident; make the emergency known both inside and outside of the facility, and coordinating, the response actions among the various groups involved in response operations.

J) Sirens

These are audible alarm systems commonly used in facilities. In case of any emergency siren will be operated short intermittently for 1.5 minutes.

An alarm does more than just emergency warning. It also instructs people to carry out specific assignments, such as reach to assembly point for further instructions and actions or carry out protective measures; this can be achieved only if the people are familiar with the alarm systems and are trained to respond to it.

K) Personal Protective Equipment

This equipment is used mainly for three reasons; to protect personnel from a hazard while performing rescue/accident control operations, to do maintenance and repair work under hazardous conditions, and for escape purposes. The list of Personal Protective Equipment provided at the facility and their locations are available in ECC.

Effective command and control accomplish these functions necessitates personal trained in

this on-site Disaster Management Plan with adequate facilities and equipment to carry out their duties and functions.

7.4.1 Procedure for testing and updating the Plan

Simulated emergency preparedness exercises and mock fire-fighting exercises including mutual aid scheme resources and in conservation with district emergency authority to be carried out time to time.

Disclosure of Information to Worker and Public Awareness System Anticipated

- Safety awareness among workers by conserving various training programs and Seminars, competition, slogans *etc.*
- Practical exercise.
- Distribution and practices of safety Instructions.
- Safety Quiz contests.
- Display of Safety Posters & Safety Slogans.
- Developing Safety Instructions for every Job and ensuring these instructions/booklets or manuals by the workers.

Emergency preparedness Plan for natural disasters pertaining to Dargeling District

Earthquake:-

As per the country seismic zoning map of Geological Survey of India (GSI), it is seen that West Bengal is broadly divided in to two Earth quake Risk Zones- High Damage Risk Zone- IV and Moderate Damage Risk Zone III. Darjeeling lies in Zone IV as per the Seismic zoning map.

The adverse effects of disasters can be minimised developing mitigation policies and plans. Building design shall be done as per the IS standards for structural stability.

Employee Information

During an emergency, employees would be warned by raising siren in specific pattern. Employees are given training on escape routes, taking shelter, protecting from toxic effects. Employees are provided with information related to fire hazards, and first aid measures. The key personnel and essential employees are given training in responding to emergency (emergency response). Essential personnel list and their contact numbers will be displayed at site.

Co-ordination with Local Authorities

Keeping in view the nature of emergency, two levels of co-ordination are proposed. In case of an On-site Emergency, resources within the organization would be mobilized and, in the event of an extreme emergency, local authority's help would be sought.

In the event of an emergency developing into an off-site emergency, local authorities and District Emergency Authority would be appraised and under his supervision, the Off-site Disaster Management Plan would be exercised.

7.4.2 Occupational Health and Safety Hazards identification and risk assessment

Work place plays a vital role in people lives, since most of workers spend at least eight hours a day in the work place. Therefore, work environment should be safe and healthy. Some of the occupational hazards and its mitigation measures are listed below.

Type of Hazard	Work Place	Effect		Mitigation Measure	Exposure Limit
		Acute Exposure	Chronic Exposure		
Noise	<ul style="list-style-type: none"> • Paper machine • Boiler Recovery 	<ul style="list-style-type: none"> • Irritation • Raised Blood pressure • Accelerating Heartbeat • Headache 	<ul style="list-style-type: none"> • Temporary or Permanent hearing impairment. • Affects Immune system 	<ul style="list-style-type: none"> • Usage of Ear Plugs • Administrative Controls 	85 dB(A)
Heat	<ul style="list-style-type: none"> • Pulp Cooking • Pulping Chemical Recovery • Paper drying 	<ul style="list-style-type: none"> • Increased Irritability • Loss of ability to do skilled tasks • Dizziness • Feeling Faint 	<ul style="list-style-type: none"> • Heart stroke • Heat cramps • Sleeping illness 	<ul style="list-style-type: none"> • Work rests • Cold water baths • Electrolyte supply to the workers 	--
Dust	Raw material handling, transportation and storage	<ul style="list-style-type: none"> • Irritation of eyes, nose • Coughing • Sneezing • Hay fever 	<ul style="list-style-type: none"> • Asthma • Irritation, Lung Diseases • Carcinogen 	<ul style="list-style-type: none"> • Proper nose and face masks. • Dust control systems • Water sprinkling 	<ul style="list-style-type: none"> • Suspended Particulate matter 500 µg/m³ for 24 hours. • Respirable Particulate matter 150 µg/m³ for 24 hours
Hydrogen Peroxide	<ul style="list-style-type: none"> • Bleaching 	Causes Irritation		Store in a cool and well-ventilated areas	1.0 ppm
Caustic Soda	<ul style="list-style-type: none"> • Pulp Cooking • Pulp Bleaching 	<ul style="list-style-type: none"> • Irritation • Toxic 		<ul style="list-style-type: none"> • Avoid incompatible substances 	2.0 mg/m ³

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Type of Hazard	Work Place	Effect		Mitigation Measure	Exposure Limit
		Acute Exposure	Chronic Exposure		
				<ul style="list-style-type: none"> • Use of appropriate face masks. 	
Mechanical	<ul style="list-style-type: none"> • Storage area • Rotating equipment's • Nip points • Falling and Tumbling • Objects • Handling of Paper rolls, • Raw material, Chemicals 	<ul style="list-style-type: none"> • Injuries 		<ul style="list-style-type: none"> • Usage of Proper PPE • Machine Guarding • Usage of ropes (Working in heights) • Proper training to the workers • Good house keeping 	--
Vibration	<ul style="list-style-type: none"> • Pulp Machine, Paper Machine 	<ul style="list-style-type: none"> • Irritation 	<ul style="list-style-type: none"> • HAVS (Hand Arm Vibration Syndrome) • Sleeping sickness 	<ul style="list-style-type: none"> • Keeping tools well maintained • Grip the tools as lightly as possible • Use gloves (That should cover fingers) • Administrative Controls 	--
Emergency situations	<ul style="list-style-type: none"> • Breakdown of Air Pollution Control Equipment • Leakage of Chemicals • Unexpected Fire 	<ul style="list-style-type: none"> • Un healthy to workers • Irritation to workers Injuries • Loss of lives 		<ul style="list-style-type: none"> • Regular Maintenance • Automatic control systems • Usage of Standby equipment 	--

7.4.3 Occupational Health Surveillance

In paper plant, the occupational health surveillance of the employee is/will be done on a regular basis and records of the same are/will be maintained as per the Factories Act.

A. List of Equipment for Occupational Health Monitoring

ECG	Audiometric device
Glucometer	Chest X Ray
Laryngoscope	Complete Medical Laboratory Set up
Suction Machine	D.C. Shock and Cardiac Monitor
Autoclave	Endoscopic Ear & Throat
Sterilizer	Urine Analyzer
Spirometer	TMT

Pre Placement and Periodical Health Status

Pre /post-employment checkup will be carried out and following tests will be conducted:

1.	Chest x rays
2.	Vision testing (Far and Near vision, color vision and any other ocular defect)
3.	ECG
4.	Haemogram (examination of the blood)
5.	Blood Sugar Fasting
6.	SGOT and SGPT
7.	Urine (Routine and Microscopic)
8.	Complete physical examination
9.	Post-employment occupational health check up such as lung function, audiometry, spirometry, CBC, Blood Sugar, Lipid Profile etc.
10	Medical records of each employee will be maintained separately and will be updated as per finding during monitoring

Frequency of Medical Examination: Yearly

Personal Protective Equipment

S. No.	Personnel Protective Equipment	Quantity (Nos.)
1.	Safety Goggles	150
2.	Safety Hand Gloves for Electrical use	10
3.	Safety Hand Gloves for Chemical use	40
4.	Safety Helmets	150
5.	Safety Shoes	150
6.	Eye Shower	As per requirement
7.	Ear Plugs	150
8.	Welding Glass	2
9.	SCBA	As per requirement

Safety Committee

A safety committee is formed and manned by equal participation from management and workers with the following functions:

- a) Accident prevention and control including ensuring the use of safety appliances,
- b) Publicity, propaganda, education and training,
- c) Assisting and cooperating with the management in achieving the aims and objectives outlined in the "Health and Safety Policy" of the occupier,
- d) Carrying out health and safety surveys for identifying unsafe working condition/practices, which causes accident.

Plan and Fund allocation for Occupational and Safety Hazards

Plan and fund allocation to ensure the occupational health and safety of all workers is given in Table below:

Particular	Amount (Lakhs/Annum)
Employee's health check-up	3.60
Doctor fees, medicine, antidotes, etc.	3.00
Safety training, Safety equipment's, PPE's etc.	3.60
Fire Hydrant System	1.20
Total Safety Budget	11.40

Sapphire Papers Mill Pvt. Ltd. has proposed **Rs. 70 Lakhs** as capital cost and **Rs. 11.40 Lakhs/Annum** has been proposed as Recurring Cost.

7.4.4 Conclusion

The hazard identification and risk assessment procedure has analyzed the possible hazards and mitigation measures pertaining to emergency situations and disaster. The Company has well designed plan regarding safety procedures and it has the capability to deal with any kind of emergency situation.

7.5 SUMMARY

As a part of the EIA study, the Public Hearing details will be added after conducting the same and additional study including Risk Assessment (RA) has been carried out for the proposed project. The Risk Assessment addresses major hazards and reviews the effectiveness of selected safety measures and to expand the safety measures in order to achieve a safety culture at the industry. The Risk Assessment also encompasses Disaster Management Study and Occupational Health & Safety.

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8 PROJECT BENEFITS

8.1 GENERAL

M/s Shah Paper Mills Ltd. managed by a professional board of directors proposes the proposed project. The project envisages expansion in manufacturing capacity of paper production at Plot No. 97, Notified Industrial Area, GIDC Vapi - 396195, District – Valsad, Gujarat. The proposed expansion project will transport raw materials, coal, construction materials, equipment and machineries.

8.2 IMPROVEMENTS IN THE PHYSICAL AND SOCIAL INFRASTRUCTURE

Since the proponent is a well-established entrepreneur, the proponent is well aware of the social engagements. The proponent has always engaged its efforts in social welfare activities & programs. It directly organizes various programs for social welfare & up-liftment or indirectly contributes in such activities conducted by other organizations and other local bodies by providing financial, physical and social aid.

- **Infrastructure:** For the proposed project, the proponent is committed to contribute in social welfare & upliftment activities on regular basis. The proposed site is well situated & connected by road. The proponent is environmentally conscious and constantly focuses on water and energy conservation techniques. It will help to protect the valuable environment of the area. Thus the resource is available to other stakeholders (Local community / Agricultural Units / Ecological beings as well as Industrial Units) and this availability will lead to their improved living habits. The proponent will also undertake infrastructure development activities for the locality.
- **Green Belt Development:** Additional 9954 m² greenbelt will be developed by the proponent during the expansion project. The greenbelt landscape plan provides benefits to improve beautification and green spaces.

8.3 EMPLOYMENT POTENTIAL

Employment Potential: Total 26 nos. of additional persons will be employed directly & indirectly during the operation phase.

Local Employment: Tourism, Tea and timber cultivation is the main occupation of Darjeeling. With greater concern for the environment, trade in Timber has fallen sharply over the years. After COVID 19 tourism business has fallen down. In the absence of any high employment potential activities, the people are unable to find livelihood sources in non-agricultural. Thus, the proposed project facility will provide alternative employment to local people.

Direct Employment: As cited above, the project will generate direct employments in the

skilled, semi-skilled and unskilled areas.

The following measures will be taken to provide basic facilities to the workers:

- Temporary housing will not be required as workers will be hired from local population.
- Basic facilities like tap water, sanitation, drinking water, lunch space *etc.* will be provided.
- First aid box, free medicines, *etc.* will be available within the project site.
- Adequate PPEs will be provided to new employees during construction as well as operation phase.
- W. C. Policy and Insurance will be provided to new recruited employees.

8.4 ECONOMICAL BENEFITS

The proposed project will serve as a source of financial benefits to the company as well as to other allied developments.

- The proposed project will prove to be a blessing for reducing the cost in paper production, hence cost associated with the paper production and its import from other countries.
- By providing employment to local people, the proposed project will significantly contribute to the economic development of the locality.

8.5 PAST CSR (CORPORATE SOCIAL RESPONSIBILITY) ACTIVITIES

The proponent has been actively involved in social and welfare activities from the last years. SPMPL had contributed for Health care i.e. Rs. 10 Lakhs to Maharaja Agrasen Hospital (Khudiarpally, Siliguri) for the required medical aids in hospital.

Corporate Environment Responsibility (CER) Plan for the proposed project has been proposed and Rs. 31 lakhs has been allocated as CER budget to be spent within a period of three years for social welfare activities. Detailed CER plan is given in Section 10.9 of Chapter – 10.

8.6 SUMMARY

The proponent is very enthusiastic in promoting various welfare activities as a part of moral & social responsibility. SPMPL had contributed for Health care i.e. Rs. 10 Lakhs to Maharaja Agrasen Hospital (Khudiarpally, Siliguri) for the required medical aids in hospital. Even after the proposed project, the proponent will give physical, social, economic and ecological benefits to the local population such as development of infrastructure, green cover, employment, *etc.* The proponent has allocated a budget of Rs. 31.00 lakhs for CER Plan. Through local employment and various CER activities it will also give social benefit to the local people and due to resource conservation it will also give environmental benefit.

9 COST BENEFIT ANALYSIS

9.1 GENERAL

Project Cost Benefit Analysis (CBA) is an analytical way to make an educated decision. This involves a comparison of the costs of an action with considerations of the benefits associated with that action. CBA assists the regulators to evaluate the benefits and challenges imposed by the upcoming activity in commercial terms with respect to the impact on the environmental scenario such as human wellbeing, quality of life and environmental wellbeing.

An important component of a CBA is a base situation which is a situation when no changes take place. All decisions are then compared to the base situation. Once the base and a relevant time period are established, benefits and costs can be calculated in terms of human and environmental well-being. In this case, a benefit is defined as anything that increases human well-being, and a cost is anything that decreases it. CBA aims to maximize economic efficiency at a point where marginal benefits and marginal costs are equal.

9.2 APPLICABILITY OF CBA AND SUMMARY

During the scoping/ToR stage, no recommendation of environmental cost benefit analysis was suggested by the appraisal committee.

Moreover, Proposed expansion of paper manufacturing project of capacity 4500 TPM will be developed at Plot No. 2565, 4257, 4260, 4261, 4262, 4263, 4265, 4327, 4328, 4329, 4330, 4338, 4326, 4334, 4331, 4333, 4322, 4336, 4337, 4339, NH – 31, Jagannathpur, Bidhannagar, Darjeeling, West Bengal – 734426. Hence, conducting a detailed CBA is deemed not necessary for this particular project.

10 ENVIRONMENTAL MANAGEMENT PLAN

10.1 GENERAL

The Environmental Management Plan (EMP) constitutes an important part of the EIA report. The main purpose of EMP is to minimize the identified potential environmental impacts to be generated from the proposed project and to mitigate the consequences. On the basis of impacts identified, SPMP sets targets to reduce the negative impacts, plans and decides action plan to achieve the target effectively and efficiently. EMP ensures an effective implementation methodology and alternatives for mitigation measures planned/recommended to reduce or eliminate the adverse impacts to maximum possible extent during the operation of the proposed project.

10.2 OBJECTIVE OF THE EMP

In order to develop an EMS, an organization has to identify the impacts, set targets to reduce the negative impacts, plan and decide the targets as well as set proper and appropriate steps to achieve the targets effectively and efficiently.

- To comply with all the regulations stipulated by Central /State Pollution Control Boards related to applicable laws.
- To create good working conditions.
- To encourage support and conduct developmental works for the purpose of achieving environment standards and to improve methods of environment management.
- Streamline environmental activities to add value to efficiency and effectiveness.
- To encourage and achieve highest performance and response from individual employees and contractors.
- To plan out the complete strategy to take care of stakeholder engagement.
- To contribute significantly for sustainable development.

10.3 ENVIRONMENTAL MANAGEMENT PLAN

10.3.1 Air Environment Management

Construction Phase

Potential sources of air pollution during project construction will be (i) dust emissions due to vehicle movement and (ii) exhaust emissions from construction equipment. The impact on air quality during construction phase will be minimized by adopting following mitigation measures:

- Regular spraying of water on roads and work sites will be practiced for dust suppression.
- Wetting or covering stockpiles, the proper location of material stockpiles and covering loaded trucks during the transportation of material will be ensured.
- Loading/Unloading of construction materials technique training will be provided to minimize dust generation.

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- Construction equipment powered by electricity will be preferred wherever feasible and use of low-emission vehicles.
- Maintenance of engines and use of vehicles with PUC Certificates.
- Engines of idle vehicle machineries/equipments shall be turned off.
- Periodical inspection for proper implementation of mitigation measures will be done.
- Barricading will be done at the construction site.

Operation Phase

Company is/will adopt the following mitigation measures to reduce the impact on air environment:

- A vehicle with valid PUC is/will be used for the transportation of materials and Machinery.
- Strict adherence is/will be implemented for maintenance schedule including lubrication for various machinery/ equipment.
- Good material handling practices is/will be carried out.
- Regular water sprinkling is/will be done on roads and stock yards (if any) to avoid coal dust generation from handling.
- Bagfilter is/will be provided to reduce the flue gas emissions from the Boiler.
- Online monitoring station for regular ambient air quality monitoring is/will be provided within the premises for PM, SOx and NOx.
- Regular ambient air quality monitoring through third party is/will be carried out within premises and in the nearby area for PM, SOx and NOx.
- No ordour is/will be generated as proposed project is waste paper based. However general measures like good housekeeping, proper disposal of effluent and sewage, donot allow water to be stagnant, etc.
- Good house-keeping is/will be maintained in the premises.
- Periodic monitoring of work area is/will be carried out to check the secondary emission.

Coal and Fly ash handling practices:

Following practice shall be followed for transportation, storage and handling of coal and fly ash to reduce the fugitive emission.

- Coal is/will be transferred to boiler through closed conveyor belt to reduce the chance of fugitive emission.
- Coal with low Sulphur and fly ash content is/will be utilized.
- Bag filter is/will be provided as APC device with boiler.
- Adequate stack height of i.e. 35 m with Stack Monitoring Facilities (SMF) is/will be provided for better dispersion of pollutants.
- No ash pond is/will be constructed for storage of fly ash. Fly ash is/will be stored in closed silo.
- Dense pneumatic system shall be provided for handling of fly ash and 100% it is/will be sent to brick manufacturer.

Technical Details of Bag Filter:

S. No.	Particulate	Specifications
1.	Size of Bag Filter	2.475 x 2.3 x 8.61 m
2.	MOC	Mild steel
3.	Size of Gas inlet	0.81 x 0.64 mm
4.	Size of gas out let	2.716 x 0.346 mm

5.	Total unit weight	7.6 MT
6.	Hopper volume	9.72 m ³
7.	Designed gas volume	12750 Am ³ /hr
8.	Max. Designed temp.	180 OC
9.	Number of filter bags	120 Nos. (500 gms/m ² filter glass)
10.	Size of filter bags	149 mm dia x 3.65 m length
11.	No. of cages	120
12.	Pressure drop	150 mm
13.	Air to cloth ratio	1.03 m ³ /min/m ²

10.3.2 Water Environment

Construction Phase

- Water requirement during the construction phase will be obtained from existing borewell which will be for short period of time.
- Further the site supervisor will ensure no leakages from common washroom/Toilets of the construction workers.
- Site supervisor will ensure that no formation of stagnant pools, which may cause damage to the aesthetic condition as well as other environmental & socioeconomic factors.
- Adequate sanitation facility will be provided for construction worker during the construction phase and wastewater will be treated in existing septic tank/ soak pit system.

Operation Phase

- During the operation phase of proposed project, total 740.6 KLD water will be met through existing borewell.
- Adequately designed sewerage network system and storm water runoff system is/ will be provided for conveyance of sewage and storm water respectively.
- Generated Wastewater will be will be treated in augmented ETP (450 KLD to 1000 KLD) then 452 KLD will be recycled back in manufacturing process, 50 KLD for quenching on raod, rice husk & ash and remaining 336.2 KLD wastewater will be utilized for the land disposal/ gardening/ irrigation.
- Adequate storage for treated effluent with 8 hrs retention period will be provided for unforeseen circumstances.
- Bleaching and decolourization of pulp will be accrued out with the help of oxidative and reductive deinking agents like Sodium Hydroxide, Sodium silicate, Hydrogen Peroxide. Unit will not at all using chlorine based bleaching compounds.
- Online flow meter will be provided to the outlet of the treated effluent which will be utilised for land disposal/ gardening/ irrigation.
- Regular monitoring of water, wastewater and sewage shall be done as per the monitoring schedule planned as a part of Environmental Monitoring Plan.
- Rain water harvesting schemes will be included as part of water conservation measures.
- Maintaining records of water consumption, water characteristics and sewage characteristics will be ensured by the Site Supervisor.

Details of Effluent Treatment Plant with proposed modification

❖ Description of the ETP:

The existing ETP is capable to handle daily wastewater generation of about 194.39 KLD. Due to the proposed expansion, the wastewater generation is expected to increase to 929.8 KLD. Hence augmentation of existing ETP is proposed as a part of the proposal. The existing ETP consists of following units;

- a. Equalization tank of capacity 385 KL with coarse bubble diffusers for homogeneous mixing;
- b. Primary Clarifier of capacity 300 KL;
- c. Aeration Tank I of capacity 1223 KL with fine bubble diffusers for proper aeration;
- d. Secondary Clarifier of capacity 182.5 KL;
- e. Tertiary Treatment (Dual Media Filter of capacity 50 KL/hr);
- f. Centrifuge(Decanter) of capacity 30 KL/hr;
- g. Clarified Water Tank of capacity 24 KL.



Figure 10.1: Photographs of Existing ETP

❖ Proposed ETP modifications Pollution load on ETP

During the post expansion scenario, process backwater will be filtered first in IDF (Infiltration disc filter) where maximum fibre content in backwater will be filtered out for reuse back in process thus reducing load on ETP. The pollution load on the ETP during post expansion scenario has been studied based on the existing data as per the test reports and the details of inlet characteristics (existing v/s post project scenario) are presented in the table.

After maximum use of process back water, the remaining water will be collected in an equalization tank for homogenization of water and pH adjustment, from where it will be pumped to Primary clarifier. Fine suspended fibres will settle down in primary clarifier which will be pumped to centrifuge system for dewatering and sludge will be sent to manufacturing of sundry board. Clear effluent overflow from Primary clarifier will be sent to Aeration Tank for aerobic treatment, the aeration tank is diffused aeration based and the tubular diffusers are placed in the aeration tank at bottom. The air is diffused through twin-lobe type root blowers that create a positive pressure in the system and the air, in the form of fine bubbles, diffusing the oxygen while travelling from bottom to tank top. Before, bubbles reach top

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surface, it diffuses almost 95% of the oxygen into the water in order to maintain the required D.O. level in the aeration tank. Also, the aeration tank is supplied with the N & P nutrients for bacteria. Together with nutrients, food and oxygen, the bacteria start degrading the complex organic molecules and thus causing COD and BOD reduction in the wastewater.

After proper time of retention this effluent will then overflow into secondary clarifier where bacterial mass will settle down which will then be pumped partially back to aeration tank for recirculation and balance will be taken to centrifuge for dewatering and sundry board manufacturing. Treated effluent from secondary clarifier will then be subjected to Tertiary treatment in Pressure Sand Filter and Activated Carbon Filter to meet the prescribed discharge standards. Part of the treated effluent will be further treated in RO plant & reuse back in the process.

Table 10.1: Treated wastewater characteristics existing v/s post expansion scenario

S. No	Parameter	Units	Existing Scenario	Post expansion Scenario	WBPCB Limits	Ganga Action plan CPCB Charter for RCG industries
1.	pH	-	7.36	7-7.5	5.5-9.0	6.5 to 8.5
2.	TSS	mg/l	20-80	<30	100	30
3.	BOD	mg/l	20-28	<20	30	20
4.	COD	mg/l	150-230	<150	250	150
5.	Oil and grease	mg/l	<5	<4	10	-
6.	TDS	mg/l	<1400	<2100	not prescribed	1600

Treated Wastewater utilization and Discharge

After proposed expansion total Industrial wastewater generation from Process, Cooling Tower, washing & Boiler Blow Down will be 929.8 KLD. Existing wastewater generation is 194.39 KLD and Proposed will be 735.41 KLD. After proposed expansion, additional effluent will be treated in modified effluent Treatment Plant. Existing ETP capacity is 450 KLD and after proposed expansion it will be augmented to 1000 KLD with required equipment to handle additional hydraulic load post expansion operations.

Generated wastewater will be treated in ETP and 452 KLD treated water will be recycled back in to manufacturing process, 50 KLD will be utilized for coal, husk and ash quenching and remaining 336.2 KLD wastewater will be directly use for gardening purpose within the existing premises and other agriculture land. The treated wastewater quality will be maintained within the standards prescribed by CPCB/SPCB and Consent conditions.

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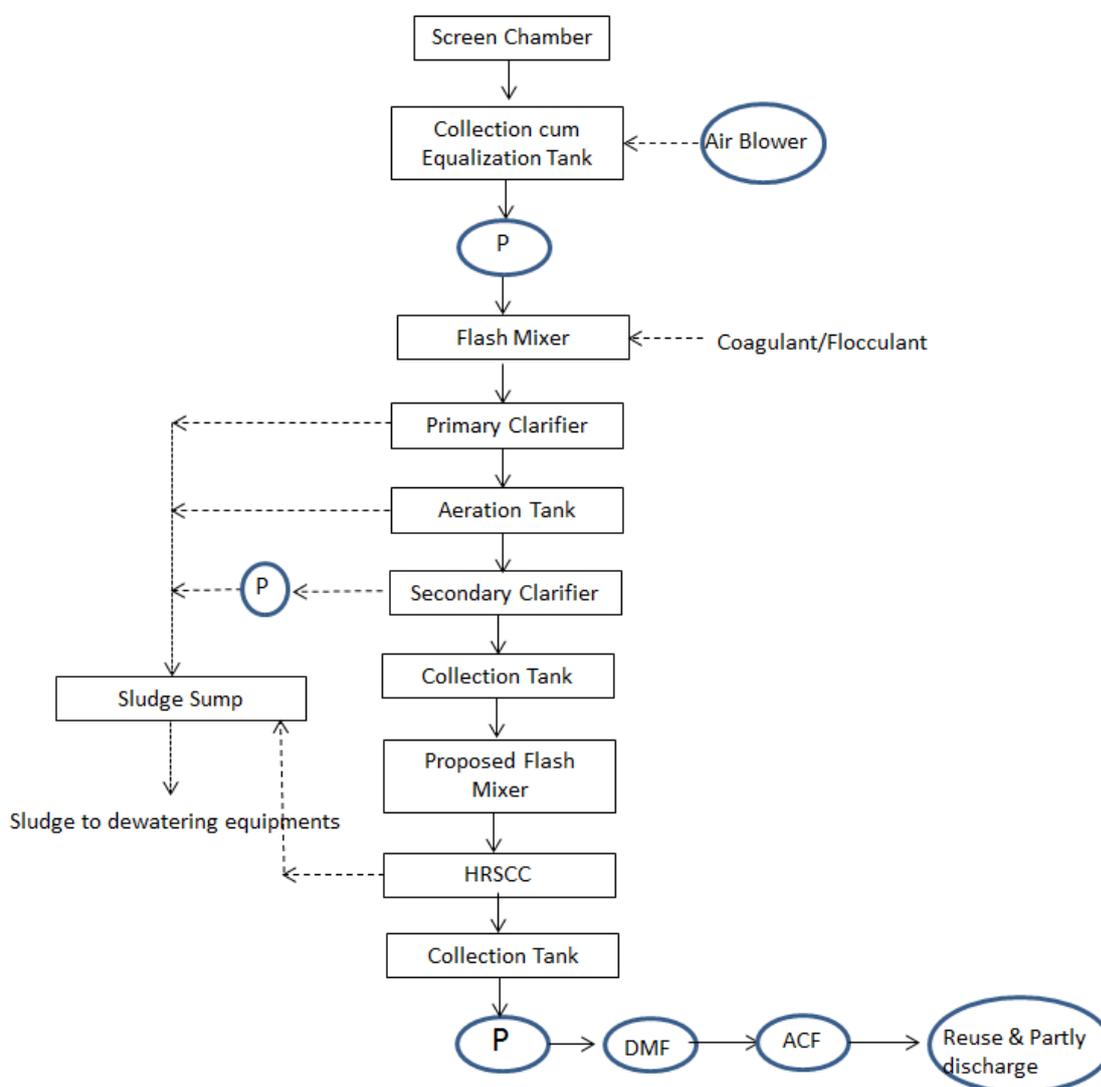


Figure 10.2: Flow Diagram of ETP

Measures for minimizing water impacts: Regular monitoring of water, wastewater shall be done as per the monitoring schedule planned as a part of Environmental Monitoring Plan.

- Efficient arrangement & designing of recycling system for recycling/reuse of treated wastewater.
- Water from the ETP partly reused in process and remaining will be used for land disposal including gardening.
- Reduction of water consumption by recycling of water to process and continuous attempts to reduce wastewater generation rate.
- Periodical operation & maintenance of ETP for efficient treatment of effluent generated.
- Regular quality assessment of treated effluent from ETP before recycling and discharge.
- Maintenance of good housekeeping to avoid contamination of storm water.

10.3.3 Noise Environment

Construction Phase

Following measures will be taken for abatement of noise during construction phase:

- The proponent will ensure reduction in noise by providing acoustic enclosures to high noise generating stationary machines.
- Further, it will also be ensured that periodic and regular maintenance of the equipment, machines and spare parts is carried out which shall include lubrication, replacement of defective parts *etc.* in order to bring down the decibel of noise to maximum possible extent.
- Will ensure that the workers are provided with ear muffs or ear plugs in areas with high exposure to noise.
- Construction activities will not be carried during the night hours.

Operation Phase

The fact that the proposed project is situated at a 1 km distance of human settlement, significant impact on human settlement is not envisaged. The volume of transport vehicles to be handled is low. The company has/ will develop green belt around the periphery of the premises, which will act as a barrier to the propagation of noise from the factory premises. This will further reduce the noise levels appreciably. It is recommended to measure and maintain records of noise level at various places within and outside the factory premises. Following measures will be adopted for abatement of noise during the operation phase:

- Turbine, Pumps, fans, compressor, *etc.* are major noise producing equipment which will be statically and dynamically balanced also rubber padding will be provided, wherever possible.
- A well formulated Traffic Management Plan will be in place to mitigate noise impacts due to transportation vehicles and strictly implemented.
- Regular lubrication & preventive maintenance shall be done to tools/ equipment's/ machinery/ vehicles reduce noise generation.
- Boiler operations creates high noise level conditions will be felt only near the active working areas.
- Owing to the above fact, use of PPE like ear plugs and ear muffs is/will be made compulsory near the high noise generating machines.
- The personnel shall be provided breaks in their working hours, with the continuous exposure not increasing three hours.
- Periodic monitoring of noise levels as per post-project monitoring plan shall be done on regular basis.

10.3.4 Land Environment & Solid/Hazardous Waste Management

Construction Phase

- The proposed project will be carried out in existing premises with few constructions and modification hence no vegetation clearance is required.
- The major problem will be disposal of construction debris generate during construction phase which will be utilized within premises for backfilling and other requirements.
- Good waste handling and housekeeping practices will be implemented.

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- Separate earmarked storage area with pucca floor/lining will be provided for the storage of fuel.
- Domestic sewage of construction workers is not disposed off on land; it will only be disposed off in septic tank/soak pit.
- Existing sanitation facilities will be provided to the workers for maintaining clean and hygienic surroundings.
- Regular monitoring/ checking/ inspection of the sewage network system is been/will be done to avoid clogging of sewers and thereby sewer overflow is avoided.

Operation Phase

For storage and handling of Non-hazardous solid waste and Hazardous waste; adequate storage area with pucca flooring has been/will be provided. All the waste shall be disposed as per Hazardous waste disposal Rules 2016.

- A separate earmarked storage area is/shall be provided with sign boards/labels for storage of hazardous waste.
- The storage area is/will be properly lined to prevent mixing of waste spillages into the soil/land.
- A storage silo is/will be provided for fly ash and dense pneumatic system is/will be provided for fly ash collection.
- Coal is/will be stored in closed storage yard with pucca flooring, closed conveyor belt shall be provided for coal transfer.
- Plastic waste is/will be disposed through authorized recyclers.
- Regular training is/will be carried out for employees engaged in Solid & hazardous Waste Management Works.
- Good Housekeeping will be ensured by the Site Supervisor.

10.3.5 Biological Environment

Construction Phase

Proposed expansion is in existing land area which is away from forest and no ecological sensitive habitats were found in the study area, hence no major harm will be caused to the ecology.

- During the construction phase no impacts on flora and fauna are envisaged as expansion within existing premises.
- The upbringing of Green Belt will maintain the aesthetic beauty and will generate habitat for avifauna, hence regular care for maintenance & protection shall be taken by the proponent for planted trees.

Operation Phase

During the operation of the proposed project, no major harm will be caused to the ecology as there will be no major source of pollution after implementation of mitigation measures for pollution control using necessary technology/method/system. Further, the greenbelt development in the project area shall improve the existing ecological condition of the area. Thus no special mitigation measures are required for ecology conservation during the operation phase. As it is already discussed in previous chapters that no impact will be caused to the ecology as the project site is free from any form of human settlement, forests, national parks, etc. Following care shall be taken within plant premises:

- Site Supervisor shall ensure periodical cutting, trimming, watering to maintain healthy greenbelt within plant premises.

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- Tree guards will be provided for the planted trees.
- Regular irrigation, fertilization & pest control program shall be a part of routine activity during the operation phase.
- Regular records of greenbelt development activities with necessary statistics will be maintained.

Greenbelt Development Plan:

The company has developed extensive greenbelt within the premises. During the proposed expansion, the company proposes additional 9954 m² of area for greenbelt. The company will develop green belt along the periphery of the proposed site (*i.e.* roadside) and within the premises.

A greenbelt will be developed around the periphery and within the plant premises. The greenbelt landscape plan will provide benefits to improve beautification. It will also result in the prevention of land degradation due to construction activities; enhancing the canopy cover as a wind breaker wall and restrict the carry away of the Particulate Matter (PM) outside the premises as well as for noise abatement. After the project implementation, regular assessment will be done to make sure that greenbelt is growing adequately with all necessary works like thick plantation, rearing, irrigation, fertilization, re-plantation (if required), pest control and other factors. Regular records of the greenbelt development as suggested in environmental monitoring plan will be maintained.

Multi-layered plantation comprising of medium height trees (6-8m height) and shrubs (3-5m height) will be proposed for the green belt. The plan comprises of a four year program from 1st year to 4th year for greenbelt development.

(i) Plan for 1st year (Trees/Saplings Plantation)

- The work plan for the first year, during the construction phase
- Digging of pits and soil conditioning
- Planting of saplings
- Surveillance maintenance and irrigation of the saplings to achieve maximum survival

(ii) Plan for 2nd year (Additional Trees/Saplings Plantation + Replacing Dead Trees)

The work plan for the second year

- Maintenance and irrigation of species planted earlier.
- Survey of the area to identify the locations for replantation and causality replacement
- Removal of dead trees and replantation based on specific location requirements
- Maintenance and irrigation of plants to achieve a targeted survival rate of 75%.

(iii) Plan for 3rd and 4th year (Replacing Dead Trees + Maintaining the Greenbelt)

The work plan for the third and fourth year

- Maintenance and irrigation of species planted earlier.
- Survey of the area to identify the locations for replantation and causality replacement
- Removal of dead trees and replantation based on specific location requirements
- Maintenance and irrigation of plants to achieve the targeted rate at 100%.

(iv) The work plan for subsequent years comprises (Maintenance)

- Maintenance of plantation.
- Clearing of afforested areas to remove undesirable species
- Replacement of dead and diseased/malformed species with new ones

Selection of Species for Greenbelt

Selection of plants for green belt plantation will be made on following criteria:

- The plant should be a fast growing species.
- It should have deep root system.
- Should bear the leaves for a longer period.
- Should be a local species.
- Should have good survival rate

Table 10.2: Species Selection for Pollution Control

Plant Species	Habit	Tolerance Limit	Stomatal Index	Mode of Regeneration
<i>Ailanthus altissimo</i>	Tree	T	13	Seeds
<i>Albizia lebbek</i>	Tree	T	19.72	Seeds
<i>Alstonia scholaris</i>	Tree	T	15.23	Seeds
<i>Anthocephalus chmensis</i>	Tree	T	19.63	Seeds
<i>Bauhinia varigata</i>	Tree	T	27.41	Seeds
<i>Bougainvillea spectabilis</i>	Shrub	T	32.53	Cutting
<i>Ficus benghalensis</i>	Tree	T	21.72	Cutting seeds
<i>Ficus religiosa</i>	Tree	T	18.70	Stem cutting / Seeds
<i>Ficus bengalensis</i>	Tree	T	21.72	Stem cutting / Seeds
<i>Hibiscus rosa-sinensis</i>	Shrub	T	23.2	Stem cutting
<i>Lantana camara</i>	Shrub	T	12.13	Seeds / cutting
<i>Lagerstroemia parviflora</i>	Tree	T	17.01	Seeds
<i>Lagerstroemia speciosa</i>	Tree	T	13.9	Seeds
<i>Mangifera indica</i>	Tree	S	30.77	Seeds, transplanting, grafting, budding, a1r lalyering, root cutting and marcotting
<i>Nerium indicum</i>	Shrub	T	15.7	Cutting
<i>Tamarindus indica</i>	Tree	T	18.4	Seeds
<i>Terminalia bellerica</i>	Tree	T	19.06	Seeds, Cutting

Source: Guidelines for Greenbelt Development, CPCB, March, 2000.

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All the above mentioned species are ideally suited for the ecological habitat of Darjeeling district, West Bengal. Their planting should be interspersed with each other to create mixed canopy of the plants and the ideal distance for planting all trees is 3 m X 3 m. Greenbelt of 5000.84 m² is already developed and additional 9954 m² green belt will be developed. Considering 90% survival rate approx. 1650 Nos. of trees and 2000 Nos. of shrubs will be planted within the next two years.

The plantation will be in this recommended pattern:

Table 10.3: Year wise Tree Plantation

Year	No. of Trees/Plants to Be Planted In Plant Area	No. of Shrubs to be planted in plant area
1 st Year	1000	1300
2 nd Year	650	700

Preservation and Maintenance of the Green Cover

The success of a designed greenbelt/landscape depends upon the growth of vegetation over an extended period of time; therefore maintenance of greenbelt/landscape is also a design component. The following steps will be followed for maintaining a healthy green belt and landscape:

- Regularly watering the plant depending on the rainfall, wind conditions, moisture and drainage pattern. Too much or too little water can also damage a plant.
- Watering shall be done such that there is time to allow the water to percolate deeply and uniformly.
- Grasses and landscapes will be watered with the help of sprinklers, so as to avoid wastage of water.
- Adequate mulching must be maintained near the roots of the plants or even on the soil to retain moisture, suppress weeds, increase water percolation and reduce soil erosion.
- Plants must be regularly fed with organic manure to fulfill their nutrient requirement.
- Regular hoeing, cutting, trimming, mowing and removing weeds should be carried out for maintaining the greenbelt.

For the Calculation of Cost for Green belt Development, following parameters have been considered.

For Capital Cost

Cost of Sapling (Trees), Shrub/Herbs, Transportation Charges, Planting cost (Including soil workings, pits etc.), Fencing Cost.

For Recurring Cost:

Cost of drip irrigation, Annual weeding and soil working, Req. of water for irrigation, Fertilization Cost, Security and Vigilance.

A budget of **Rs. 5.0 Lakhs** as a capital cost and **Rs. 2.4 Lakhs per Annum** as a recurring cost has been allocated for green belt development.

10.3.6 Occupational Health & Safety

Construction Phase

Sapphire Papers Mill Pvt. Ltd. has planned to appoint/hire construction firms and the construction work will be carried out by well-known contractors. However, occupational health & safety will be the prime focus during the construction stage. Occupational health & safety of the construction workers will be ensured with the following measures:

- The management shall ensure that all workers/employees shall be provided with basic Personnel Protective Equipments (PPEs) like ear plug/muff, safety helmet, safety gloves, safety goggles, safety shoes *etc.*
- The management shall also ensure that the quality of these PPEs will properly checked before providing to the workers. It shall also be ensured that all the safety equipment are placed properly and are available instantaneously when required.
- Management will also ensure to have safety and first aid facility for the workers/employees engaged in the working of the plant in order to provide them with necessary treatments in case of accidental mishaps or their health breakdown.
- Necessary training will be imparted to the required workers/ employees in various aspects, viz. handling of the materials, precautionary measures to be taken while working, how to use the safety equipment, *etc.* so as to make all workers literate, thus minimizing the chances of any accidental mishaps.

The following measures shall be taken to provide basic facilities to the workers:

- All the basic facilities like tap water, sanitation, drinking water, lunch space will be provided.
- First aid box, free medicines, *etc.* will be available within the project site.

Operation Phase

The proponent is very much concerned in terms of health, safety and environment protection. The proponent is committed towards safety and proponent has already prepared 'Health, Safety & Environment Policy' which attached as Annexure 7.

The company has engaged a qualified Safety Manager and a Doctor for regularly checking health of the employees. Additionally, medical aid will also be arranged with the help of local hospital. Annual health check of the employees will also be carried out and records will be maintained. Regular training to the employed personnel in safety, firefighting and first aid will be provided.

The following key safety measures will be implemented in the proposed project:

1. Safety Training is/ will be provided to the employees.
2. Safety Sirens with Alarm System in case of emergency is/ will be provided.
3. Emergency Control Room is/ will be established.
4. Assembly points is/will be defined for safe gathering of the employees during the times of emergency.
5. Fire Hydrant System is/ will be installed.
6. Fire Extinguishers is/will be provided.
7. Mock drills is/will be periodically conducted and factors like response time will be evaluated.
8. Fire squad team is/ will be formed for handling any emergency situation & regular training of squad team will be conducted.
9. First Aid Facility and training is/ will be provided.
10. Personal protective gears and equipment's is/ will be provided to employees.

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- 11. Health check-ups is/ will be organized at regular intervals.
- 12. Safety/ Health records are/ will be maintained.

Housekeeping

Proper housekeeping is an essential part of sound environmental management. Good housekeeping practices is/ will be carried out during the operational activities of the proposed project. It is/ will be rigorously seen that there is no accumulation of wastes, especially combustible wastes inside the plant area.

In summer dry grasses & vegetation growing inside the plant area will be cut and removed. All firefighting equipment and warning devices is/ will be kept in perfect working conditions at all the times. It is/ will be seen that all personnel are aware of the implications of environmental pollution and simple practices to avoid pollution and untidy workplaces.

Budget of **Rs. 70 Lakhs** as capital cost and **Rs. 11.4 Lakhs per annum** has been allocated for OHS.

General DOs and DON'Ts for preventive maintenance:

DOs

- Store fuel and hazardous waste in isolated space
- Covered confine area by personnel enclosure,
- Immediately report leaks, spills or failures of the engineering controls.
- Post "NO SMOKING" signs in area.

DON'Ts

- Don't enter hazard prone area without PPE.
- Do not use with incompatible materials.
- Do not take any flammable material inside the fuel storage area.

10.4 TRANSPORTATION/TRAFFIC MANAGEMENT PLAN FOR VEHICLES

According to the proposed requirement of the project, the material handled at the project site is large. As discussed in the table 4.17 of Chapter – 4, 19 nos. of vehicles will be required on a daily basis. The proponent shall develop a good network of internal peripheral roads with separate entry and exit for the safety and access requirements to various buildings and yards and same shall be maintained throughout the year.

As a part of EIA study the EMP for traffic management is presented in the following table:

Table 10.4 - Traffic Management Plan

Objective	To ensure that there is smooth traffic within and outside the facility for the duration of the construction phase and operation phase			
Concern	Trucks, lorries, tankers/dumpers and other vehicles may cause traffic jam outside and within the premises.			
Impacting activity	Mitigation measures	Measures for management		
		Location & Timing	Responsibility	Monitoring
Vehicular	Controlled	Within and	Contractor/	Security-in

movement	vehicular movement (preferably with clearly demarcated entry/exit) with adequate supervision	immediately outside the site - Construction & operation phase	Project Manager during construction phase. Security and concerned departments during operation phase.	charge and security team
	Demarcation of separate vehicular lanes and pedestrian routes/footpaths	Within the site - Construction & operation phase	Contractor/ Project Manager during construction phase. Security and concerned departments during operation phase.	Security team
	Vehicle entry and exit scheduling so that traffic congestion is not created on the external road leading to the site	Within and immediately outside the site - Construction & operation phase	Contractor/ Project Manager during construction phase. Security and concerned head of department during operation phase.	Security-in charge and security team

Separate entry & exit shall be provided for the smooth movement of vehicles and layout plan for the same is given in Chapter - 2.

10.5 CLEANER PRODUCTION PRACTICES

Cleaner Production (CP) is defined as the continuous application of an integrated preventive environmental strategy applied to processes, products and services to increase overall efficiency and reduce risks to the environment including human beings. Unlike the pollution control which is an after event 'react and treat', CP is a forward looking approach, 'anticipate and prevent'.

The following CP actions have been defined for the proposed project as a part of their integrated preventive environmental strategy:

Conservation of Water

Water Conservation and Rainwater Harvesting:

- Multi-circulation of process water to bring down overall water consumption from 10 cub M/MT to 5 cub M/MT.
- Mechanical seal instead of conventional gland packing. It allows us to recirculate the fresh water and reuse same water after cooling.
- Flow meters is/ will be installed at the inlet, ETP and the outlet of both.
- For conservation of water maximum water is/ will be reused in process.
- Treated sewage will be used for gardening purpose and coal quenching purpose.

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- Low volume water sprinklers is/ will be installed for gardening and water sprinkling purposes.
- Use of more native plants for greenbelt development that require little water to thrive in the locality.
- Watering the landscapes in the morning to prevent water loss due to evaporation.
- Adding mulch surrounding the trees to prevent water loss through evaporation.
- Conduct regular surveys and awareness programs for water conservation at an employee level.
- Regular inspection, checking and maintenance of valves, taps, flow meters and other equipment.
- Provision of low flush toilets in the administrative building.
- Rain water harvesting (RWH) shall be implemented for water conservation.

10.5.1 Conservation of Raw Material & Fuel

- A designated earmarked material storage area is/ will be provided for better handling of raw material, products and wastes.
- Proper handling, loading and unloading practices is/ will be followed for reducing material wastage.
- Indian coal is/ will be used to avail higher efficiency and low pollution potential by reducing SOx emissions.
- Use of closed trucks for transportation of material to avoid material loss.
- Material recovery during the paper production, excess water from the disc filter shall be removed and fibers retaining on the filter will be used back on the paper machine.

10.6 DRAINAGE AND RAIN WATER HARVESTING PLAN

The effectiveness of the drainage system depends on proper cleaning of drainage pipes/channels *etc.* Regular checking before & during the monsoon will be done to see that none of the drains/drainage facilities are clogged and are efficient to collect the rainwater under rain water harvesting program. The clogged drains will be cleaned up immediately on report of any clogging or blockage. This checking and cleaning will be meticulous during the monsoon season, especially if heavy rains are forecasted.

10.6.1 Rainwater Harvesting (Recharging) System

As a part of the proposed expansion project, the proponent has proposed a rainwater harvesting system for collection of rainwater for utilization in the project activities. Rain water from plant processing area and storage area of the industrial premises will be collected. The effectiveness of the system depends on proper cleaning of drainage pipes/channels *etc.* Regular checking before & during the monsoon shall be done to see that none of the rainwater drains/facilities are clogged and are efficient to collect the rainwater under rain water harvesting program. The clogged drains shall be cleaned up immediately on report of any clogging or blockage. This checking and cleaning shall be meticulous during the monsoon season, especially if heavy rains are forecasted.

The first rainwater will not be collected and it will be allowed to be discharged as storm water. The subsequent rainwater will be conveyed to the rainwater collection system. Rainwater falling on the entire main roof will be transferred to storage tank through closed pipes/separate drain channels. This water shall be utilized for ancillary purposes (such as

dust suppression, fire-fighting and gardening) thereby reducing the water consumption.

Table 10.5: Rainwater Harvesting Calculation

S. No.	Area		Particulars
1.	Total Area available for Water Harvesting	:	Roof Top Area: 8683.88 m ² Paved Area: 5718.43 m ² Green Belt area/open area: 25479.55 m ²
2.	Average annual Rainfall	:	3092 mm
3.	Total Rain Water that can be harvested per year	:	(8683.88) * (3.092) * (0.8) = 21480.44 (5718.43) * (3.092) * (0.5) = 8840.69 (25479.55) * (3.092) * (0.3) = 23634.83
Total		:	53955.96 m³

Considering the area available, 21480.44 m³ of rainwater can be conserved. All of the rainwater will be stored in underground storage tanks and use for ancillary purposes.

OR

Rain water harvesting pit will be made to collect the rain water from roof top, open area and paved area based on the above data consideration.

A budget of Rs. **30 lakhs** is allotted for Rain Water Harvesting.

10.7 BUDGETARY PROVISIONS FOR EMS

The expansion cost for the project will be Rs. 31.00 Crores. The capital cost of environmental control measures, Solid/Hazardous waste management facility, greenbelt development, safety, monitoring etc. would be Rs. 5.00 Crores. The greenbelt, safety measures and other components of the EMP shall be implemented along with the commissioning of the proposed project. The annual recurring cost of environmental control for the proposed project has been estimated to be Rs. 417.36 Lakhs/annum of the total EMS cost. The Budgetary Provision made for environmental management is briefly illustrated below:

Table 10.6 - Cost Break-Up for Environment Management System (EMS)

S. No.	Name of the unit	Capital Cost Rs. Lakhs	Operating cost Rs. Lakhs/ Month	Maintenance Cost Rs. Lakhs/ Month	Total Recurring Cost Rs. Lakhs/ Month
1.	Water Environment				
	Primary, secondary & tertiary ETP	205	15.28	8.5	23.78
	Laboratory & Monitoring	150	2	0.5	2.5
	Total Water environment	355	17.28	9	26.28
2.	Air Environment & Noise				
	APCM	70	2.15	0.75	2.9
	Air & Noise monitoring	0	0	0.45	0.45

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S. No.	Name of the unit	Capital Cost Rs. Lakhs	Operating cost Rs. Lakhs/ Month	Maintenance Cost Rs. Lakhs/ Month	Total Recurring Cost Rs. Lakhs/ Month
	Total Air environment & Noise	70	2.15	1.2	3.35
3.	Hazardous waste				
	Membership fees & disposal charges	0	0.5	0	0.5
	Storage facility	0	3.5	0	3.5
	Total	0	4	0	4
4.	Occupational Health and Safety				
	OHC & Medical kits & antidotes	0	0.3	0	0.3
	Medical check up	0	0.25		0.25
	Safety training, safety equipment like PPE's & Fire equipment like fire extinguishers, fire proximity suits, PLC System	30	0	0.3	0.3
	Fire hydrant system	40	0	0.1	0.1
	Total	70	0.55	0.4	0.95
5	Green belt Development				
	Gardener	0	0.1	0	0.1
	Plants & fencing	5	0	0.1	0.1
	Total	5	0.1	0.1	0.2
	Total (1 to 5)	500	24.08	10.7	34.78
6	CER Activity (1 % of Proposed Investment)	31.00	0	0	0
	Grand Total	531.00	24.08	10.7	34.78

10.8 ENVIRONMENT MANAGEMENT CELL (EMC)

Sapphire Papers Mill Pvt. Ltd. has formulated an Environmental Management Cell for its industry and same shall be responsible after proposed expansion, which involves personnel of plant level as well as corporate level for interaction with technical & statutory bodies to deal with environmental requirements/issues at all level. Sr. Vice President heads the Environmental Management Cell with personnel involving Environmental Manager and Subordinates. The EMC carries out the monitoring of the noise level, analysis of water etc. and keeps the regional / local statutory body informed about the status of pollution control.

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The periodicity of monitoring will be governed by the directives from statutory authorities and prevailing regulations. The action plan of EMP will be updated every year with respect to the results achieved and to plan activities for the next year.

Implementation of EMP and responsibility

Various measures have been suggested in the EMP for mitigation of impacts. These have to be implemented according to the suggestions and monitored regularly to prevent any lapse. It is the prime responsibility of Head of EMC to ensure that any non-conformity are addressed, the EMP is implemented & operated efficiently to prevent/control pollution during operational phase of proposed project as well as to improve the environmental health of the area. The head of EMC shall be responsible for reporting any non-compliance to higher authority and stakeholders. It is the responsibility to each personnel of EMC & to ensure that the subordinates function efficiently as per their responsibility to proper implementation of EMP to practice ideal methodology/procedures for prevention /control of pollution as well as improvement of environmental health.

Qualified and experienced person in the field of Environment either environmental engineer or environmental scientist will be appointed for overall responsibility as mention below for the management of all the issues related to Environment, Health and Safety within the plant. In consultation with in-charge of the plant, he will directly report to the CEO of the company for issues related to the Environment Management System of the unit.

- Effective implementation of environmental monitoring program as per suggested schedule
- Collect information from regular monitoring and create a database.
- Analyze the data and decide the critical areas for immediate attention and corrective actions to control the pollution levels below the prescribed limits.
- Work out action plan for implementation of the recommendations made under Environment Management Plan
- Prepare budget for environment management program and proper allocation of the funds for the same.
- To rectify the problem areas in the EMS, if any and provide necessary assistance in the form of replacement of any equipment or by improving performance of the same
- To ensure compliance with the stipulated statutory standards & norms as well as condition of statutory clearances & approval like EC and CC & A.

ENVIRONMENTAL MANAGEMENT CELL

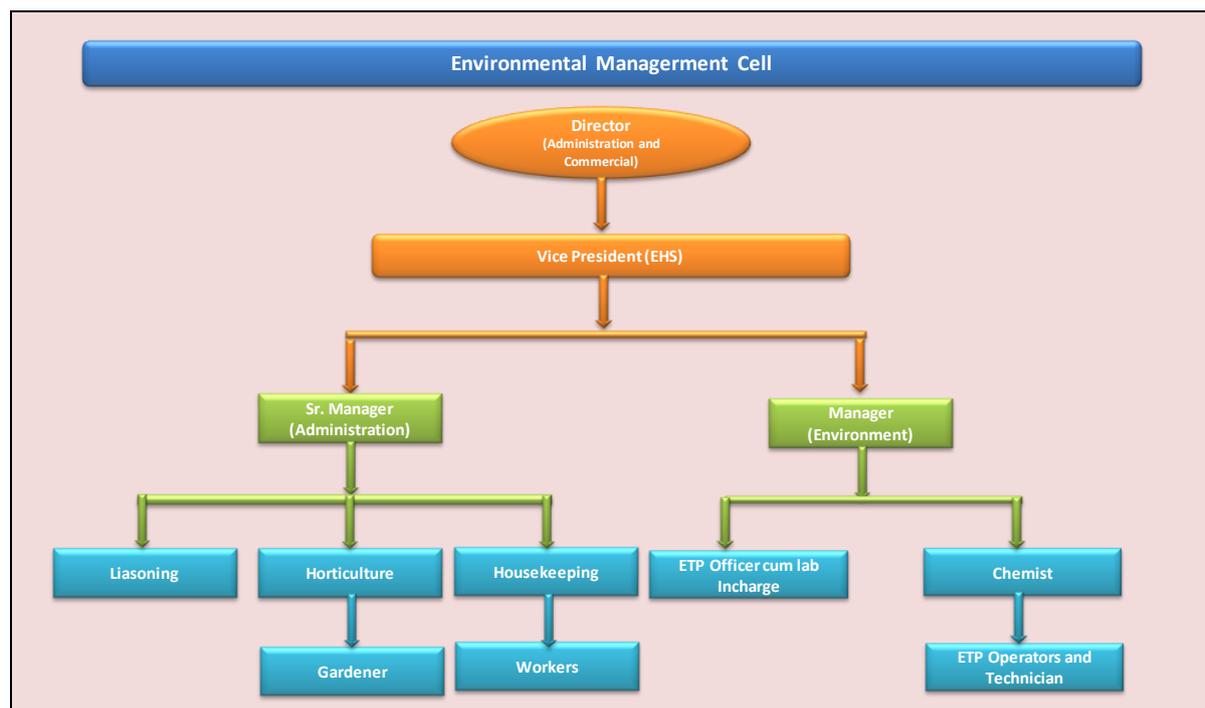


Figure 10.3: Organogram of Environmental Management Cell

10.9 CORPORATE ENVIRONMENTAL RESPONSIBILITY

The company also proposes to carry out social welfare activities for the welfare of local community. The company has proposed a detailed CER Plan. Under this plan, the proponent has allocated a budget of Rs. 31.00 Lakhs i.e. 1% of the expansion cost of Rs. 31.00 crore to be spent within a period of 3 years. Activities under the following areas have been identified during socio economic survey and shall be carried out:

- Necessary equipments and Kits distribution in shools/aanganwadi
- Soil conservation program
- Boosting tea plantation
- Moderns tools for farmers

Table 10.7: CER Plan with 3 Years Breakup

S. No	Description	Years			Total
		1	2	3	
1.	Necessary equipments and Kits distribution in shools/ Pre-primary schools.	2.5	2.5	2.5	7.5
2.	Soil conservation seminars for farmers	1.0	1.0	1.0	3.0
3.	Promoting tea plantation & production by distributing seeds and organic fertilizer	2.0	2.0	2.0	6.0
4.	Supply of improved tools to farmer for tea plantation	3.0	5.5	6.0	14.5
	Total (Rs. in Lakhs)	8.5	11.0	11.5	31.00

10.10SUMMARY

Thus, the proponent will carry out above mentioned activities under the Environmental Management Plan for various Environmental attributes like Air Environment, Water Environment, Biological Environment, Noise Environment and Occupational Health & Safety. Apart from this, measures like Traffic Management Plan, Cleaner Production Practices, Greenbelt Development Plan, Rainwater Harvesting Plan and Drainage/Sewage Network have been proposed. An Environment Management Cell (EMC) will be formulated for addressing the different environmental aspects of the proposed project. A budget of Rs. 5.00 crores has been allocated for the Environment Management System (EMS). Also, the proponent will carry out social welfare activities in the nearby villages for the local population. The budget allocated for the same is Rs. 31.00 lakhs which will be spent within a time frame of 3 years. Thus, the project will also entail positive benefits to the society in terms of economic and social upliftment of the same.

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11SUMMAY & CONCLUSION

11.1 GENERAL

Sapphire Papers Mill Private Limited is a manufacturer of quality finished paper products by recycling of waste paper and marketing in domestic and international markets. The unit is operated by technocrats having experience in manufacturing and marketing of pulp and paper industries worldwide. The company has established well equipped production plant which is being managed by dedicated, qualified & skilled persons. The EIA report includes description of the baseline environment, anticipated environmental impact with the mitigation measures, the proposed environmental monitoring program, and risk assessment along with the disaster management plan, project benefits, environmental management plan and summary of the EIA study.

11.2INTRODUCTION

M/s Sapphire Papers Mill Private Limited is a large Scale manufacturing unit of Printing/ Writing/ News/ Print Paper from Waste Paper Based Mills located at Plot No. No 2565, 4257, 4260, 4261, 4262, 4263, 4265, 4327, 4328, 4329, 4330, 4338, 4326, 4334, 4331, 4333, 4322, 4336,4337, 4339, NH – 31, Jagannathpur, Bidhannagar, Darjeeling, WestBengal – 734426. M/s Sapphire Papers Mill Private Limited proposes to enhance the production capacity of Writing and Printing Paper/Newsprint/Kraft Packaging Paper from 1000 TPM to 4500 TPM and Sundry Board from 40 TPM to 100 TPM. the existing and proposed expansion products (i.e. Pulp & Paper Industries) are covered under the Category-5 (i) – Category “B” – treated as category “A” due to applicability of General Condition as Bihar state Boundary is within 5 km radius. EIA/EMP report has been prepared in line with approved TOR conditions stipulated by MoEFCC vide letter No. IA-J-11011/234/2022-IA-II(IND-I) dated 20th July 2022. The EIA document has been prepared as per the generic structure of the EIA report and as per the guidelines provided by MoEF & CC.

11.3PROJECT DESCRIPTION

The proposed project envisages enhancement of existing paper manufacturing unit by Sapphire Papers Mill Private Limited located Plot No. No 2565, 4257, 4260, 4261, 4262, 4263, 4265, 4327, 4328, 4329, 4330, 4338, 4326, 4334, 4331, 4333, 4322, 4336,4337, 4339, NH – 31, Jagannathpur, Bidhannagar, Darjeeling, WestBengal – 734426. Production capacity will be increased from 1000 TPM to 4500 TPM. Existing total land area of the project is 44248.32 m². Additional land 11765.72 m² will be required for proposed expansion which will be utilized from the vacant land 22290.43 m² of the existing total land area. Estimated project cost for proposed expansion shall be approximately 31 Crore. There will be additional 26 numbers of employees, thus total 130 numbers of employees after proposed expansion. The existing fresh water requirement is about 256 KLD whereas fresh water requirement will be increased to about 740.6 KLD after proposed expansion which will be fulfilled through ground water. Solid/Hazardous wastes generated from the project will be handled and managed as per Hazardous Wastes Rules, 2016. The project proponent is

committed towards the health and safety of workers. All the necessary measure is/ will be planned for occupational health of the employees.

11.4 DESCRIPTION OF THE ENVIRONMENT

Ambient air quality monitoring					
S. No.	Criteria Pollutants	Unit	Maximum Value	Minimum Value	Prescribed standard
1.	PM10	µg/m ³	87.0	51.0	100
2.	PM2.5	µg/m ³	48.8	25.9	60
3.	SO ₂	µg/m ³	18.3	7.8	80
4.	NO _x	µg/m ³	25.2	12.0	80
5.	CO	mg/m ³	--	--	2.0
<p>All the results of ambient air quality parameters have been found within the limit as per NAAQS standards. Based on comparison study of results for tested parameters with NAAQS, it is interpreted that current ambient air quality of studied locations is well within the NAAQS limits and it can be considered satisfactory based on AQI index calculated. This interpretation is considered based on the results found for particular locations during the specific study period. Due to the usage of the solid fuel in the boiler, there might be the chances of the incremental change in the current ambient air quality. The industry should adopt adequate mitigation measures to control the air emissions i.e. flue gas emissions and fugitive emissions.</p>					
Noise Monitoring					
Sr. No.	Parameter	Unit	Maximum Value	Minimum Value	
1.	Ld (Day)	dB(a)	68.6	55.1	
2.	Ln(Night)	db(a)	63.2	44.9	
<p>Out of total 8 nos. of locations for noise monitoring 4 nos. of locations are monitored in the industry premises and 4 nos. of locations are monitored in surrounding villages within 3-4 km radius from the project site. Noise level in all the locations are within the standard norms prescribed by MoEF&CC. Noise level measured at villages is mainly due to vehicular movements of local people located within and nearby the villages. The nearby village surrounding to the project site is about 1 km away from the project site and results of the same are found within the prescribed norms during the baseline survey. Due to the project activities, there might be chances of incremental value in the noise levels due to increase in vehicular movement & plant activities. The interpretation can be considered based on the baseline survey conducted during the study period.</p>					
Soil Quality and Characteristics					
Sr. No.	Parameter	Unit	Maximum Value	Minimum Value	
1.	pH	-	7.8	6.5	
2.	electrical Conductivity	dS/m	1.03	0.79	
3.	Exchangeable Sodium	meq/100gm	3.89	2.32	

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4.	Exchangeable Potassium	meq/100gm	11.18	7.52
5.	Total Magnesium	mg/100g	37.81	17.82
6.	Total Nitrogen percentage	%	0.088	0.069

Based on soil analysis data it is concluded that surface soils are acidic to neutral in reaction, majority samples are non-saline except one and non-sodic. The soils are rich in nitrogen, very high in available phosphorus and available potassium status. The levels of total Fe, Cu, Cr, B and Zn are within the safe limits. However, for successful greenbelt development liberal quantity of organic manure (25 tons/ha) and half the recommended doses of N, P and K fertilizers should be applied. The soil should be periodically monitored for EC, pH and ESP. In the proposed project, there will be utilization of the treated wastewater generated from the process in the gardening purpose within the plant premises only. It is suggested that the treated water should be used for gardening purpose only after conforming the guideline of treated effluent discharge for gardening/ irrigation purpose.

Ground water

Sr. No.	Parameter	Unit	Maximum Value	Minimum Value	Desirable Limit	Permissible Limit
1.	pH	-	7.66	7.45	6.5-8.5	No Relaxation
2.	tds	mg/L	166	58	500	2000
3.	Total hardness	mg/L	102	28	200	600
4.	Chloride	mg/L	54	6	250	1000
5.	Total Alkalinity	mg/L	92	27	200	600
6.	Iron	mg/L	0.16	0.08	0.3	No Relaxation

Based on comparison study of test results and summary report with drinking water norms, it is interpreted that the ground water sample collected from all the locations can be used in drinking as well as all domestic purposes and irrigation as all results meet with the desirable limit for drinking water as per IS: 10500 :2012. It is suggested that, No untreated wastewater shall be discharged on land at any condition and treated water after confirming all the irrigation standard shall be used for irrigation purpose.

Surface Water

Sr. No.	Parameter	Unit	Maximum Value	Minimum Value	Permissible Limit
1.	ph	-	7.78	7.02	6.5-8.5
2.	TDS	mg/L	510	36	2000
3.	DO	mg/L	5.0	4.6	-
4.	COD	mg/L	14	4	-
5.	BOD	mg/L	7	3	-

Based on test result data comparison study with CPCB standard for inland surface water classification, it is interpreted that surface water quality of all locations meet with the criteria D and E except the samples from Budharugaon pond and Mahananda river, it means these water sources can be used for propagation of wild life, fisheries and Irrigation, industrial

utilization for cooling, etc. The surface water samples are collected from all the locations presence of COD & BOD is found in the samples, which indicated the presence of organic matter in the surface water body. The DO level of all surface water sampling locations are found >4.0 mg/L, DO level >4.0 mg/L is considered suitable for the survival of aquatic life and <4.0 mg/L is not considered suitable for aquatic life survival. The samples collected from the Budharugaon pond and Mahanada river meets with the criteria "C", it means it can be used in drinking purpose after conventional treatment with disinfection. It is suggested that no wastewater or treated water shall be discharged to the any surface water body.

Ecology and Biodiversity

As per the land use statistics around 35.52 % & 11.39 % of the study area is covered with crop land and fallow Land respectively. Main crops in the study area are consisting of food grains such as rice, maize, wheat etc. Some farmers also grow the vegetables like cucumber, Brinjal, cabbage, cauliflower etc. The study area is dominated by floral species i.e kalo siris, neem & kadam. Among the enumerated flora in the study area, none of them were assigned any threat category by Red data book of Indian Plants and none can be assigned the status of endemic plant of this region. None of the sighted floral species can be assigned endemic species category of the study area. Study area shows the presence of Near Threatened, Vulnerable and Critically Endangered species. Common faunal species has been noted during the primary survey. Common house crow, Common drongo, Tailor bird, Jungle myna, Rose ringed parakeet, Indian spotted dove and Cattle egret are the dominated avifaunal species in the study area. Most of the Avi faunal species reported are under the Schedule IV as per Wild Life Protection Act 1972 except white rumped vulture, which falls under the Schedule-I species. Leopard is schedule I species and among the schedule-II species, Jungle cat, grey mongoose under mammals category and cobra, russel's viper, rat snake under the reptiles category were found, which is provided protection as per Schedule-II of Wild life protection act, (1972). Conservation plan for such protected species should be submitted to concerned forest depart of the region.

Socio economic

All the respondents across all socio-economic groups, age, gender and locations have expressed their views about the location. According to them, all villages are having basic infrastructural facilities but some villages need to be improved in some areas like, sanitation, road, etc. For sanitation, village panchayats can use Swachh Bharat Mission scheme. It will improve quality of life by increasing their employment opportunities and also by bringing about a positive change, like; employment, developmental activities, indirect employment, etc., while some are not having any idea about the upcoming project and its impacts. Most of the villages are having educational institutes up to secondary and higher secondary schools. Students need to commute to the main hub in nearby vicinity for further studies. The study area consisting majority of the area as an agricultural land and primary profession of the people in the study area. People's willingness and ability to be employed in the production activities need to be given importance. The respondents have suggested measures which need to be taken up for welfare of the people. The project needs to undertake various activities in education, infrastructure development, and health and environment area as a part of Corporate Social Responsibility (CSR) and Corporate Environment Responsibility (CER).

11.5 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

The proposed project will not have considerable impact on surrounding environment. The Boiler is equipped Bag filter for mitigation of air pollutant source. Hazardous waste is/will be

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sent to authorized/ registered recyclers. Appropriate construction & operation techniques are/will be implemented to minimize the impacts on the environment. Proper upkeep and maintenance of vehicles and APCM will reduce the impact on air environment. Adequate arrangements for waste disposal from ETP are/will be undertaken. Proposed rain water recharge through percolation pits for maintaining the ground water table. Greenbelt is/will be developed in surrounding of plant and common land.

11.6 ANALYSIS OF ALTERNATIVES

No alternative site has been proposed for the proposed expansion project because expansion will be done at factory premises only and all the infrastructure are readily available for industrial development. However, some alternatives were considered for planning and designing of the various facilities proposed.

11.7 ENVIRONMENTAL MONITORING PROGRAM

Project proponent has/will develop an environmental and safety department, which is/will undertake measures for environmental protection and mitigation of environmental impacts. Sample for environment monitoring are/will be collected as per the guidelines provided by MoEFCC/CPCB/WBPCB. Monitoring of environmental parameters within the plant premises will be carried at selected location as per guideline. Hazardous waste is/will be disposed/off as per Hazardous Waste Management Rules 2016. Pre-medical check-up is/will also be carried out at the time of employment. For environmental monitoring a budget of 5 Lakhs/Annum has allocated.

11.8 ADDITIONAL STUDIES

As a part of the EIA study, the Public Hearing details will be added after conducting the same and additional study including Risk Assessment (RA) has been carried out for the proposed project. The Risk Assessment addresses major hazards and reviews the effectiveness of selected safety measures and to expand the safety measures in order to achieve a safety culture at the industry. The Risk Assessment also encompasses Disaster Management Study and Occupational Health & Safety.

11.9 PROJECT BENEFIT

The proponent is very enthusiastic in promoting various welfare activities as a part of moral & social responsibility. SPMPL had contributed for Health care i.e. Rs. 10 Lakhs to Maharaja Agrasen Hospital (Khudiarpally, Siliguri) for the required medical aids in hospital. Even after the proposed project, the proponent will give physical, social, economic and ecological benefits to the local population such as development of infrastructure, green cover, employment, etc. The proponent has allocated a budget of Rs. 31.00 lakhs for CER Plan. Through local employment and various CER activities it will also give social benefit to the local people and due to resource conservation it will also give environmental benefit.

11.10 ENVIRONMENTAL COST BENEFIT ANALYSIS

During the scoping/ToR stage, no recommendation of environmental cost benefit analysis was suggested by the appraisal committee.

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Moreover, Proposed expansion of paper manufacturing project of capacity 4500 TPM will be developed at Plot No. 2565, 4257, 4260, 4261, 4262, 4263, 4265, 4327, 4328, 4329, 4330, 4338, 4326, 4334, 4331, 4333, 4322, 4336,4337, 4339, NH – 31, Jagannathpur, Bidhannagar, Darjeeling, West Bengal – 734426. Hence, conducting a detailed CBA is deemed not necessary for this particular project.

11.11 ENVIRONMENTAL MANAGEMENT PLAN

Thus, the proponent will carry out above mentioned activities under the Environmental Management Plan for various Environmental attributes like Air Environment, Water Environment, Biological Environment, Noise Environment and Occupational Health & Safety. Apart from this, measures like Traffic Management Plan, Cleaner Production Practices, Greenbelt Development Plan, Rainwater Harvesting Plan and Drainage/Sewage Network have been proposed. An Environment Management Cell (EMC) will be formulated for addressing the different environmental aspects of the proposed project. A budget of Rs. 5.00 crores has been allocated for the Environment Management System (EMS). Also, the proponent will carry out social welfare activities in the nearby villages for the local population. The budget allocated for the same is Rs. 31.00 lakhs which will be spent within a time frame of 3 years. Thus, the project will also entail positive benefits to the society in terms of economic and social upliftment of the same.

11.12 CONCLUSION AND RECOMMENDATION

The proposed project of Sapphire Papers Mill Pvt Ltd. proposes to enhance the the production capacity of Writing and Printing Paper/Newsprint/Kraft Packaging Paper from 1000 TPM to 4500 TPM and Sundry Board from 40 TPM to 100 TPM at No 2565, 4257, 4260, 4261, 4262, 4263, 4265, 4327, 4328, 4329, 4330, 4338, 4326, 4334, 4331, 4333, 4322, 4336, 4337, 4339, NH – 31, Jagannathpur, Bidhannagar, Darjeeling, WestBengal – 734426. The proposed expansion will be beneficial to the already running business of the company.

The EIA study has been carried out with respect to the TORs awarded by MoEFCC, New Delhi. All the impacts likely to have an effect on the environment have been identified and efficient/adequate mitigation measures have been proposed for the same. Moreover, the project focuses on Environmental friendly production of paper by recycling used paper instead of using wood as the raw material which is the key project benefit.

Considering the probability of likely impacts, the proponent has planned adequate mitigation measures and EMP. Measures like rainwater harvesting and greenbelt development are also noteworthy. Looking to the overall project scenario, employment potential and allied development plans; it has been noticed that the proposed project would significantly help in the improvement of the society and state at large. The proponent has/will provide ETP for adequate treatment. Utmost care has been taken while planning the drainage network to ensure that there is no possibility of runoff, spillage or disposal of water on land/water body. Adequate methodology for collection, handling and transportation of solid waste will be in place to ensure that there is no adverse impact of solid waste on the environment. Adequate Air Pollution Control Device such as bagfilter is attached to the boiler for controlling air pollution. The boiler stack of adequate height is also provided for pollutant dispersion. All the

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relevant safety norms with latest technology have been incorporated in the proposed project. Hazards and associated risks, safety and security provision associated with the project activities appear to be acceptable. Hence the project in totality may be considered environmentally safe.

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12DISCLOSURE OF CONSULTANT ENGAGED

12.1 GENERAL

M/s. Sapphire Paper Mill Pvt. Ltd. has appointed Eco Chem Sales and Services (ECSS) for carrying out this Environmental Impact Assessment Study as per the EIA notification, 2006 as amended till date. ECSS has approved EIA coordinators and Field Area Experts for undertaking Environmental and related studies in twenty two (23) approved sectors by NABET, Quality Council of India, New Delhi.

12.2 BRIEF RESUME AND NATURE OF CONSULTANCY

ECO CHEM SALES & SERVICES (ECSS) is one of the leading companies in the field of Environmental Consultancy Service providers in India. We are NABET Accredited consultant for conducting Environmental Impact Assessment Studies (EIA) and obtaining Environmental Clearances. We also take up services which include and are not limited to Environment Monitoring & Testing, Environment Audit, Risk Assessment Studies, Turnkey solutions, Operation and Maintenance contracts and obtaining various statutory clearances from Ministry of Environment, Forest and Climate Change (MoEFCC) and State Pollution Control Boards. ECSS also has branch offices in Vapi, Dahej and Vadodara, Gujarat.

The accreditation certificate number NABET/EIA/2023/SA 0156 is valid up to 15th March 2023.

12.3 EIA TEAM MEMBER

Work presented in this report was carried out by Eco Chem Sales & Services with active co-operation from Sapphire Paper Mill Pvt. Ltd. The name of the team members associated in the preparation and studies of EIA/EMP is mentioned in Table 12.1.

Table 12.1: EIA Team Members (TM)

Name of Internal Team Member	Activity / Area	Involvement	Under Approved Expert
		Actual Work Performed	
Mrs. Dipti Patel	Quality Check & Project Coordinator	Project planning; team framing, work distribution, technical discussion with client, data collection, Review of each chapters in EIA report; Guidance in writing and modification in contents.	EIA Coordinator
Mr. Vinay S. Patil	Assisting in EIA Report writing and Solid and Hazardous Waste	Coordination for data collection, data analysis, coordination with FAEs, team members; compiling the primary & secondary data for EIA report; EIA/EMP report preparation. Assistance in site visit and report preparation to FAE.	EC, All FAEs

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Name of Internal Team Member	Activity / Area	Involvement	Under Approved Expert
		Actual Work Performed	
Mr. Meet Shah	Air Quality Modeling & prediction (AQ)	Coordination for data collection, data analysis, coordination with FAEs, team members;	FAE AQ
	Water Pollution, Prevention and Control (WP)	Assisted FAE for Identification of water sampling stations; identification of impacts and relevant mitigation measures; preparation of management plan and report writing	FAE WP

12.1 LABORATORY INVOLVED FOR BASELINE MONITORING AND OTHER ANALYSIS

One season baseline monitoring and analysis has been done by Ecosystem Management Resource Pvt. Ltd., NABL accredited Laboratory, Certificate No. TC – 6603, dated 15/11/2019 which is valid upto 14/11/2022. MoEFCC Recognition letter no. 15018/46/2015-CPW dated 08/03/2018 valid for five years.