1 SUMMARY AND CONCLUSIONS

This executive summary provides overall justification for implementation of the project, explains how adverse effects shall be mitigated. It summarizes the findings of the EIA study and is structured in accordance with the Appendix III A of EIA Notification, 2006 as amended till date.

1.1 PROJECT DESCRIPTION

The proposed project is for Proposed Capacity Expansion of Existing Chlor Alkali Plant and establishment of New Flaker Plant, Stable Bleaching Powder Plant, Hydrogen Peroxide Plant & Captive Power Plant at Naya Nangal, Dist. Rupnagar, Punjab.

As per the EIA notification dated 14th September, 2006, as amended till date, the proposed project falls in category including Project / Activity: 4(d) – Chlor Alkali industry along with 1(d) – Thermal Power Plants and categorized under "A", due to the following reasons:

- Project is outside the notified industrial area/estate and overall Chlor-Alkali capacity is ≥300 TPD;
- Inter-state boundary between Punjab & Himachal Pradesh is ~1.0 km NNW of the site.

1.1.1 Proposed Project

The proposed project is for Proposed Capacity Expansion of Existing Chlor Alkali Plant and establishment of New Flaker Plant, Stable Bleaching Powder Plant, Hydrogen Peroxide Plant & Captive Power Plant at Naya Nangal, Dist. Rupnagar, Punjab.

The total plot area is 85.6 Acres i.e. 34.64 Hectare (~3,46,408 m^2) [Total plot area is 88.86 (82.43 + 6.43) Acres out of which 3 Acre is given on lease to M/s. Flowtech Chemicals (P) Limited] to manufacture Chlorinated Paraffin Wax (CPW). Around 1,13,856 m^2(~ 33 %) of total plot area will be developed as greenbelt. The project cost is estimated to be around INR 1,240 crores.

Details of existing and proposed products are listed in ***Table 1-1***. Details of proposed power plant is given in ***Table 1-2.***

Table 1-1: Products Capacity (Existing & Proposed)

Sr. No.	Product	CAS No.	Capacity (MTPA)			End Use of the Product
			Existing	Additional Proposed	Total after expansion	
Products						
1	Caustic Soda Lye	1310-73-2	99,000	1,65,000	2,64,000	Pulp, Paper, Pharmaceuticals, Textile, ETP & other organic & inorganic chemicals
2	Hydrogen Gas	1333-74-0	277.20 Lac Nm^3	462 Lac Nm^3	739.2 Lac Nm^3	In house usage: used as fuel in flaring and process boilers, will be used in Hydrogen Peroxide plant. It will be also sold to Petroleum refining and Pharmaceuticals units
3	Liquid Chlorine	7782-50-5	87,714	1,46,190	2,33,904	Dyes intermediates & Pharmaceuticals
4	Caustic Flakes*	1310-73-2	0	66,000	66,000	Pulp, Paper, Pharmaceuticals, Textile, ETP & other organic & inorganic chemicals
5	Stable Bleaching Powder*	7778-54-3	0	33,000	33,000	Water treatment plants, paper industries

Sr. No.	Product	CAS No.	Capacity (MTPA)			End Use of the Product
			Existing	Additional Proposed	Total after expansion	
6	Hydrogen Peroxide*	7722-84-1	0	16,500	16,500	Bleaching agent for Pulp, Paper, Textiles, Sugar, Coir & Tobacco Industries, Antiseptic agent, Sterilizing agent, Effluent treatment, Propellant for Rockets & Aircrafts, Chemical reagent for extraction of different metals like Cobalt, Uranium, Tungsten, etc.
By Products						
1	Hydrochloric Acid	7647-01-0	39,600	66,000	1,05,600	ETP, other organic & inorganic chemicals
2	Sodium Hypo Chloride	7681-52-9	2,000	4,000	6,000	Water purification, textile dyes
3	Dilute Sulphuric Acid	664-93-9	2,100	3,500	5,600	SSP, manufacturing of hydrochloric acid, nitric acid, sulphate salts, synthetic detergents, dyes and pigments, explosives, and drugs; Petroleum refining to wash impurities out of gasoline and other refinery products; Metal processing metals; Rayon manufacturing).

*Indicates Products that does not require EC, but are part of the proposed project.

Table 1-2: Power Generation Capacity (Proposed)

Sr. No.	Type of Unit	Unit	Existing Capacity	Additional Proposed Capacity	Total after expansion	End Use of the Product
1	Captive Power Plant	MW	0	75	75	Captive Use

1.1.2 Utilities

Power

The power requirement of 40 MW for the existing project is being met from existing grid supply from Government of Punjab. A new Coal & biomass based Captive power plant will be established at the site of 75 MW capacity to cater the requirement of existing & proposed units. The balance power required will be met from grid supply. The existing DG sets of 1.5 MW capacity are being used during power failures for emergency purpose only. The DG set of 2.5 MW capacity (1.5 MW existing and 1 MW new D.G. set) shall also be required for meeting the existing and additional emergency load.

Fuel

Details of fuel to be used is given in ***Table 1-3.***

Table 1-3: List of Fuel Requirement

S. No.	Utilities / Fuel	Unit	Existing	Proposed	Total	Source
1	Coal	MTPA	0	3,67,500	3,67,500	Local Depot
2	Biomass (like rice husk)	MTPA	0	88,000	88,000	Local Market
3	Limestone	MTPA	0	36,750	36,750	Local Market
4	Hydrogen Gas	Nm^3/day	87,000	1,45,000	2,32,000	In-House
5	FO	LPD	6,000	10,000	16,000	Local depot
6	HSD	LPD	500	833	1,333	Local depot

Water

The water is supplied from river Sutlej by the Irrigation Department, Government of Punjab, through the existing Bhakra-Nangal dam project located nearby.

The raw water is conveyed to a reservoir located in the adjacent Fertilizer manufacturing facility of Punjab National Fertilizer Corporation (PNFC) which is now closed. The water is then piped to PACL's raw water and fire storage tank within the facility.

The existing agreement between PACL & Irrigation Department, Govt. of Punjab is for a drawl of 2 cusecs (~4,983 KLD). The present agreement between PACL & Irrigation Department, Govt. of Punjab is increased from drawl of 2 cusecs to 5.3 cusecs (~12,967 KLD) vide letter dated 11.01.2019 attached as ***Annexure 12.***

Manpower

The existing manpower deployed at PACL's Naya Nangal site is 400 persons direct and about 500 indirect. The existing manpower will be sufficient to operate the plants after expansion in Caustic Soda Plant. However, 200 person will be required for operating Power Plant. Local skilled and semi-skilled workers will be preferentially hired for the purpose.

1.1.3 Air Emissions & Control

Point Source

Likely air pollutants from proposed project shall be HCl, Acid mist and Cl_2 from process vents and PM, SO_2, NO_x from proposed flue gas stacks, as point sources. These are in addition to the existing Flue Gas stacks & Process Vents.

Line Source

PM emissions from movement of vehicles on paved roads & vehicular emissions like SPM, CO & HC's from exhaust of the vehicles are envisaged as line source emissions.

Fugitive Emissions

Fugitive emissions of chlorine due to storage & handling of chlorine as well as that of PM due to storage of coal are envisaged in the project.

1.1.4 Waste Water Treatment & Disposal

After proposed expansion total wastewater generation will be 1,536 KLD. Out of which industrial effluent will be 1,428 KLD and domestic effluent will be 108 KLD.

New power plant will be installed in proposed expansion. So wastewater will be generated mainly form cooling tower and boiler as well as chlor alkali plant.

The domestic sewage is directly disposed into sewage line. The industrial effluent is treated in ETP followed by RO & MEE as like as existing unit. RO permeate and MEE condensate is reused in plant to reduce fresh water demand.

ETP, RO & MEE will be augmented as per proposed effluent flow. There will be a Zero Liquid Discharge facility after proposed expansion of Chlor alkali plant and for installation of new captive power plant.

1.1.5 Noise

From the proposed project, noise will be generated from the various activities. Source of noise generation are:

- The heavy machinery like crane, dumper, roller, bulldozers etc. will be used during daytime during construction phase;

- Operation of Boilers, Turbine, DG sets, Cooling Towers, Pumps, FD-ID Fans & Compressors;
- Vehicle movement for transportation of raw material & finished goods.

1.1.6 Hazardous & Solid Waste

Hazardous Waste

Details of hazardous wastes are as tabulated in ***Table 1-4.***

Table 1-4: Hazardous Waste Generation and Disposal

				Existing	**Proposed**	**Total**	
1.	Brine sludge (mercury based)	16.3	Erstwhile mercury cell based Chlor-alkali process	26,642	0	-	Disposed of in Secured Landfill Facility (ON DRY BASIS) within PACL premises
2.	Used or spent oil	5.1	Entire Site	1.0	1.7	2.7	Sold to authorized recyclers
3.	MEE sludge	35.3	MEE	450	1,400	1,750	Disposed to authorized TSDF

Note: In 1998, PACL changed the Chlor-Alkali process from Mercury cell based process to Membrane cell based process. However, the brine sludge generated till 1,998 was disposed of in Secured Landfill facility developed within PACL site.

1.1.7 Solid Waste

The details of solid waste is given in ***Table 1-5.***

Table 1-5: Solid Waste Generation & Disposal

Sr. No.	**Solid Waste**	**Quantity (MTPA)**			**Mode of Disposal**
		Existing	**Proposed**	**Total**	
1.	Brine Sludge	2,300	3,833	6,133	Although Brine sludge is not hazardous waste[2], the same is disposed to secured landfill facility developed inside PACL premises.
2.	Fly Ash[3]	0	55,000	55,000	Fly Ash is given to nearest Cement plant (Gujarat Ambuja Cement) & Brick manufacturing units (Baljinder Pal Soni).

Apart from the wastes mentioned above, Construction & demolition waste will be generated due to demolition of clarifier and other old / unused structures in the area. The list of other wastes generated at the site due to various operations are tabulated in ***Table 1-6.***

Table 1-6: Other wastes generated

Sr. No.	**Waste Type**	**Source**	**Physical State**	**Applicable Rule**	**Quantity (MTPA)**	**Storage Method**	**Management Method**
1.	Municipal Solid Waste	Canteen, Office blocks	Solid	Solid Waste Management Rules, 2016	As and when generated	HDPE Drums	Shall be handled as per the Solid Waste Management Rules, 2016 as

[1] As per the Hazardous and other wastes (Management and Trans boundary Movement) Rules, 2016.

[2] As per OM No. 23-206/2014-HSMD by MoEF&CC (HSM Division) dated 02-05-2016.

[3] Considering worst case, i.e. Ash Content as 15% in coal.

Sr. No.	Waste Type	Source	Physical State	Applicable Rule	Quantity (MTPA)	Storage Method	Management Method
							amended from time to time
2.	Biomedical Wastes	On-site Occupational Health centre	Solid	Bio-Medical Waste Management Rules, 2016 as amended	As and when generated	Storage will be done as per Bio-Medical Waste Management Rules, 2016 as amended from time to time	Shall be handled as per the Bio-Medical Waste Management Rules, 2016 as amended from time to time
3.	Used Lead Acid Batteries	Company owned vehicles, other devices (such as UPS) being operated within the site	Solid	The Batteries (Management & Handling Rules), 2001 as amended	As and when generated	Common Waste storage areas in the site	Shall be handled as per the Batteries (Management & Handling) Rules, 2010 as amended from time to time
4.	Electronic wastes	Entire Site	Solid	The E-Waste (Management) Rules, 2016 as amended	As and when generated due to equipment obsolescence	Waste Storage areas within the site	Shall be handled as per the E-Waste (Management) Rules, 2016 as amended from time to time
5.	Plastic wastes	Entire Site (Office blocks, Canteen etc.)	Solid	The Plastic Waste Management Rules, 2016 as amended	Generated during use of plastic items	Waste storage areas at site	Shall be handled as per the Plastic Waste Management Rules, 2016
6.	Non-Hazardous metallic scrap, wooden & paper scrap	Entire Site	Solid	None	Generated during equipment obsolescence and discarding of such items as wastes	Scrap storage areas in the site	Sold to scrap dealers duly approved by the company
7.	Waste Glass wool	Project and maintenance activities	Solid	None	As and when generated	Storage area	Sold to scrap dealers duly approved by the company
8.	PVC/FRP waste	Project and maintenance activities	Solid	None	As and when generated	Storage area	Sold to scrap dealers duly approved by the company

Secured Landfill Facility Disposal System for Brine Sludge

To dispose off brine sludge generated, PACL has developed a Secured landfill facility inside the factory premises for solid waste disposal as recommended by Punjab Pollution Control Board (PPCB). The design/construction of SLF constructed in the premises is approved by Punjab Pollution Control Board (PPCB).

1.2 DESCRIPTION OF ENVIRONMENT

1.2.1 Study Period, Area & Monitoring/Sampling Locations

Baseline environmental study was done for 12 weeks of year 2018-19, from 1st November, 2018 to 20th January, 2019 within 10 Km radius of the project site.

Air monitoring was carried out at 8 locations. Noise measurement was carried out at 8 locations. Surface water samples from 9 locations, ground water samples from 10 locations were collected and analysed.

1.2.2 Land Use and Land Cover

Land use of study area is classified as Agricultural land (~37.06%), Vegetation cover (~46.59%), Builtup Land & Habitation (~7.25%), Water bodies (~3.24%) & Waste land (~3.59%).

1.2.3 Meteorology

The climate of the study area is based on information from the most recent published long-term climatological tables (1961-1977) published by Indian Meteorological Department (IMD), for Chandigarh (Station ID: 42105).

For the 12 weeks period i.e from November to January, first predominant wind direction is from NW direction (23.7 %), second predominant wind direction is from SE Direction (8.2 %) and third predominant wind direction is from SW Direction (5.7 %).

Site-specific meteorological data shows average temperature recorded was 15.5°C, relative humidity was 72.4% & wind speed was 1.1 m/sec; Wind blows predominantly from NW direction (~39.7%) followed by WNW direction (~23.8%) & W direction (~4%). Calm condition is ~ 18.43%.

1.2.4 Ambient Air Quality

The broad findings of the ambient air quality monitoring are:

- At various locations, average concentration of PM_{10} was observed to be varying from 79 µg/m^3 (at Dayapur) to 94 µg/m^3 (at site);
- An average concentration of $PM_{2.5}$ levels was observed to be in range of 17 to 27 µg/m^3 which is well within NAAQS by CPCB;
- The average concentration of SO_2 (8.9 – 9.4 µg/m^3), NO_x (18.3 – 19.5 µg/m^3), CO (0.99 – 1.11 mg/m^3) are within permissible limits as prescribed by CPCB;
- The average concentration of HCs were found to be in range of 1,237 – 1,322 µg/m^3;
- The average concentration of Cl_2 were found to be in range of 5.4 – 10.1 µg/m^3;
- Acid mist & Hg were found below detectable limit of 1.0 µg/m^3 at all locations.
- All results are within norms.

1.2.5 Noise Quality

- Noise level during day time & night time, in Industrial area were observed within the CPCB standards i.e. Industrial area (75 dBA (d) & 70 dBA (n));
- Noise level during day and night time in Residential area were observed within the CPCB standards i.e. residential area (55 dBA (d)) & 45 dBA (n)).

1.2.6 Water Quality

- The quality of River water is good i.e. SW1, SW2, SW4, SW8, and SW9 and it is compared with class C as per classification of inland surface water and it can be used as drinking purpose after conventional treatment followed by disinfection.

- Quality of Pond and Nallah water observed might polluted. The DO is less and BOD is slightly high at SW3, SW5, SW6 & SW7 may be due to some mixing of sewage water from nearby villages or some other activities in pond like washing and bathing by villagers and animals also. Hence the quality of SW3, SW5, SW6 & SW7 are compared with class E as per classification of Inland Surface Water and it is use for irrigation and industrial cooling.

Ground Water

- As per chemical analysis of ground water, the quality of ground water for pH is ranging from 6.85 (GW-5) to 7.33 (GW-3). The range of TDS is from 160 mg/lit (GW-7) to 491 mg/lit (GW-9).
- Alkalinity is ranging from 13.10 mg/lit (GW-10) to 110 mg/lit (GW-3) while it was found 100 mg/lit in GW samples collected from Project site, Nangal and Bhabour Sahib.
- Nitrate is ranging from 12.12 mg/lit (Project Site – GWL at 6.60mbgl) to 54.80 mg/lit (Maujowal – GWL at 5mbgl), 53.60 mg/lit (Bhabour Sahib – GWL at 76 mbgl) and 46.30 mg/lit (Raipur – GWL at 85 mbgl). This chemical analysis results indicate the hydraulic connection of shallow and deeper aquifers.
- Presence of Iron (Fe) is about 0.12 mg/lit at project site to 0.241 at Behdala and Bhabour Sahib which is indicates the presence of leaky aquifers within the study area with respect to depth.
- Mercury has been found below detection level.
- The increase in usage of ground water from various abstraction structure has reflected in Salinity results which is found to be 246 mg/lit in ground water samples of Fatehpur, Bhallari, Maujowal and Nangal.
- Although, aquifers in in this area are having good porosity, permeability and Transmissivity. Overall all Parameters are within the permissible limits for drinking purpose set by the BIS (Bureau of Indian Standards).

1.2.7 Biological Environment

In core zone, total 144 species were reported based on field observations and consultation with local people including 21 species of mammals, 116 species of birds and 2 species of amphibians, 5 species of reptiles during the site visit. Some Schedule-I species are present in 10 km study area. Conservation plan for Indian peafowl, Leopard, Python, and Pangolin has been prepared and got approved from Forest Department, SAS Nagar, Punjab.

There is no Biosphere Reserve, Tiger / Elephant Reserve, Migratory Corridors, falls in the project study area of 10 km radius except one Reserve forests. In core zone / project site no any threatened species were reported during survey. However, from buffer zone, one species of bird i.e. Pavo crestatus (Peacock) falls in the Schedule–I category of Wild life Protection Act (1972). Among recorded faunal species, none of the species can be designated as an endemic. Among floral species, no threatened species was reported during site visit.

Overall 16 likely impacts were identified out of which two were minor, two less severe, 12 moderately affecting which requires proper management. Further, Impact assessment shows that there will be no impact on the flora-fauna of the study area except some likely impact on close areas in the vicinity of project land.

1.2.8 Socio Economic Environment

Sr. No.	Socio-Economic indice Description	Key Findings
1	Population & Sex Ratio	There are total 39,255 households are covering 1, 90,110 persons in the Study area with male population of 97,713 and female population of 92,397 indicating a sex ratio of 946 and household size of average 5 members. The national sex ratio in India is 940 as per latest reports of Census 2011, this indicates good gender equality, than nationwide averages.
2	SC / ST Population	According to census data 2011it is revealed that 0.39% of the study area population belongs to Schedule Tribe communities, 21.35% population belongs to Schedule caste and rest other communities.
3	Literacy Rate	The literacy rate in the study area, as per the Census of India 2011 is about 76.36% which is good as compared to the State literacy rate i.e. 75.84%. Wherein male literacy rate is 80.98% and 71.48% women are literate in the study area.

Sr. No.	Socio-Economic indice Description	Key Findings
4	Occupational Pattern	Total working population is tabulated in ***Table 3 - 48.***

1.3 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

1.3.1 Air Environment

Comparing the incremental ground level concentrations of pollutants with the CPCB limits and allowable limits as per factories act, it can be concluded that proposed activities are not expected to cause any effect on vegetation and human settlements in the vicinity of the project site.

Mitigation measures for air quality impacts are:

- APC like Water Scrubbers, Caustic Scrubbers, Activated Carbon & ESP will be provided;
- ESP Stack height of 55 – 60 m will be provided to control PM;
- DG Sets with adequate height is already provided;
- Effective water spraying will be done on the access roads to control re-entrained dust during dry season (if required);
- Proper operating procedures will be followed during startup and shutdown;
- Proper PPE like dust masks will be provided to workers and its use ensured;
- Regular Work place monitoring will be done.

Traffic

Average peak hourly (i.e. morning 0800 hours to 1200 hours and evening 1600 hours to 2000 hours) traffic to Chandigarh & Una road is 794 and 896 PCU respectively as tabulated in ***Table 4-8 & Table 4-9***. Detailed Traffic Survey sheets are attached as ***Annexure 23.***

1.3.2 Noise Environment

Although there was no significant increase predicted at any of the noise monitoring locations outside the project site, the noise environment also includes the people who are working within the project site, and who may face permanent hearing damage in case they face the Noise Dosage beyond the permissible limits. Therefore, it is important to implement adequate noise control measures in order to avoid any permanent hearing damage to the people working inside the project site.

Punjab Alkalies and Chemicals Limited (PACL). is already adopting necessary noise control measures as given below and the same will be further strengthened in the proposed expansion project. Additional noise control measures will be adopted, wherever required.

- Provision of Acoustic Enclosures on major noisy stationary equipment in the plant;
- Provision of suitable personal protective equipment (PPE) such as earmuffs and earplugs to Workers exposed to high noise generating operations/area;
- Job Rotation of workers working in the high noise area;
- Replacement of old, noisy machines with new silent type machines, wherever feasible;
- Identification of High noise generating areas and marking with display board for warning;
- Development of thick Green belt within the plant premises and along project boundary to screen noise;
- Erection of noise barriers at plant boundary facing nearby habitations;
- Provision of Acoustic mufflers / enclosures in large engines/machinery;
- All equipment operated within specified design parameters;
- Equipment to be maintained in good working order;

- Implement good working practices (equipment selection) to minimize noise and reduce its impacts on human health (earmuffs, safe distances, and enclosures);
- Periodic monitoring of ambient noise levels in the plant premises and Noise Exposure levels for workers deputed in different sections in the plant. Based on the monitoring results, effectiveness of noise control measures will be identified and additional noise control measures will be adopted, if required.

1.3.3 Water Environment

Impact on Ground water

No adverse impact on groundwater is envisaged as no withdrawal of groundwater is proposed in the project.

Impact on Surface water

Surface water quality and quantity will not be affected by the proposed project, since the project shall achieve Zero Liquid Discharge, by taking various recycling and reuse steps as discussed in ***Chapter 2.***

Mitigation measures for impacts on Surface water

The Following mitigation measures are implemented to reduce surface water related impacts:

- During construction phase, sewage will be disposed into sewage line. Regular cleaning will be carried out.
- Zero Liquid Discharge shall be achieved by recycled and reuse of the treated waste water.
- Properly designed effluent drains with side barriers will be provided & inflow will be diverted to ETP, RO & MEE for necessary treatment.
- Proper operation and maintenance of effluent treatment plant will be done to ensure meeting specified disposal standards.
- Maximum use of steam condensate from boiler as makeup water for steam generation.
- ETP sludge and MEE salts will be disposed properly as per norms.
- Drip irrigation system will be proposed for greenbelt development to reduce fresh water demand.
- Process, chemical fuel storage and handling area will have proper bunds and dyke walls so that contaminated run-off cannot meet the storm water line. In case of leakage, leaked fuel shall be immediately transferred to the spare tank.
- Use of PPE's during the collection, storage, handling and treatment of liquid waste.

The overall impact on surface water quality will be negligible as no wastewater from proposed plant will be discharged outside of project premises

1.3.4 Land Environment

The project involves Expansion in the existing project premises. It is located in Naya Nangal, Dist. Rupnagar, Punjab site. It will not lead to any change in land use. The project may lead to potential change in land use due to potential spillage of effluents, hazardous waste and fly ash. Development of vegetative cover and waste handling practices will improve the overall land cover characteristics both aesthetically as well as ecologically. It is our belief that land use related impacts are nil and land cover related impacts are manageable and should not impede the objective of sustainable development.

1.3.5 Biological Environment

Possible Impacts

- During construction phase, increase in deposition of dust and dust settling on the existing vegetation may alter or limit the plant's abilities to photosynthesize and / or reproduce.
- Habitation fragmentation due to clearance of existing scrub cover during site preparation.

- The concentration of HCl more than its permissible limit damages the plant roots and stops the plant growth above the surface.
- Chlorine exposure to crops leads to shoot and root damage and death, leaf marginal distortion, death, and premature abscission.

Mitigation Measures to Conserve Ecology & Biodiversity

The developed greenbelt and green cover in the project area would increase the flora and fauna density in the area at the project site.

Greenbelt Development

Project is having an existing green belt area of 52,608 m^2 in premises while green belt area of 61,248 m^2 have been proposed. So there will be a total green belt area of 1,13,856 m^2 with total plantation of 19,185 tree (@1,500 trees per hectare) within the project premises as per Standard ToR condition.

However, industry has developed a green belt all along the boundary and having 1,978 trees planted on the project site and will be planting remaining 17,207 trees.

1.3.6 Socio Economic Environment

While assessing the socio-economic and sociological impact including health impacts to surrounding population, the upcoming project will bring job opportunities for the local people.

1.4 ENVIRONMENTAL MONITORING PROGRAMME

Environmental monitoring and management cost including capital and recurring cost is tabulated in ***Table 1-7.***

Table 1-7: Environmental Monitoring and Management Cost

S. No	Head	Approximate Capital cost (In Crore)	Approximate recurring cost per annum (In Crore)	Basis for Cost Estimates
1	Air Pollution Control	250	5	Capital Cost (per annum)
				Capital Cost: Cost of Stack, APC like ESP, online monitoring system.
				Recurring Cost (per annum)
				Cost of Maintaining the APCM & Cost of Stack Monitoring & Cost of ash handling from Power Plant to End users (Cement Plant/Brick Manufacturers)
2	Water Pollution Control	13.605	4.6	Capital Cost (per annum)
				Capital Cost: ETP, RO & MEE.
				Recurring Cost (per annum)
				Maintenance cost to run RO & MEE
3	Noise Pollution Monitoring	0.95	0.35	Capital Cost (per annum)
				Installation of acoustic enclosures.
				Recurring Cost (per annum)
				Monitoring cost of regular Noise measurements.
4	Solid and Hazardous Waste Management	11.5	1.05	Capital Cost (per annum)
				Cost of SLF & Hazardous waste Storage Facility
				Recurring Cost (per annum)

S. No	Head	Approximate Capital cost (In Crore)	Approximate recurring cost per annum (In Crore)	Basis for Cost Estimates
				Membership fees for TSDF & Incinerator Facility. Disposal & transportation cost.
5	Environment Monitoring And Management	10	0	Capital Cost (per annum)
				Hiring of consultants and payment of various statutory fees to regulatory agencies.
6	Greenbelt	0.05	0.02	Capital Cost (per annum)
				Cost for saplings in and around project
				Recurring Cost: (per annum)
				Maintenance of Greenbelt
Total		**286.11**	**11.02**	

Various environmental parameters to be monitored post environmental clearance are tabulated in ***Table 1-8.***

Table 1-8: Post EC Environmental Monitoring Plan

S No.	Environmental Component / Parameter	Frequency of Monitoring	Location
1	CEMS Sensors (HCl & Cl_2).	Online	On stack attached with hypo scrubber
2	HCl & Cl_2 in stacks	Monthly	HCl unit stack vent, Hypo Stack Vent
3	PM, SO_2, NO_x	Online	Boiler Stack
		Monthly	Boiler Stack & DG Set Stacks
5	PM_{10}, $PM_{2.5}$, SO_2, NO_x, HCl & Cl_2 in ambient air	Twice in a month	At Site
6	WPM for HCl & Cl_2	As per Factories Rules	At Site
7	Noise levels	Monthly	Main Plants and Utilities Area
8	Water consumed in various activities and waste water generated from various areas of plants	Daily	Main intake, plantwise water supply line & effluent diversion line to ETPs
9	Monitoring of wastewater inlet and outlet at ETP plants for the principal parameters (such as pH, SS, TDS, COD)	Daily	Streamwise inlet & outlet of ETPs
10	Quantity of Fly Ash Generated	Daily	Ash Silo
11	Quantity of Brine Sludge Generated	Daily	Secured Landfill Site

1.5 ADIITIONAL STUDIES

1.5.1 Socio Economic Development Activities

Corporate Environmental Responsibility (CER) Budgetary Provision

The Company will spend INR 3.10 Crore for 5 years (i.e. 0.25% of project cost INR 1,240 crores as per the OM dated May 1, 2018) for undertaking the Corporate Environment Responsibility (CER) activities in study area as shown in ***Table 1-9.***

Table 1-9: Budget for CER Activities for 5 years

S. No.	Activities	Budget in %	Budget Amount (INR in crores)
1	**Education**	**30%**	**0.93**
1.1	Infrastructure development (renovation of building, furniture, septic tank, library, classrooms, CCTV, paver blocks, shed, library, water storage tank etc.)		
1.2	Uniforms		
1.3	Smart class		
1.4	Computers		
1.5	Spots kit		
1.6	Water filter with cooler		
1.7	Solar system		
2	**Health and Hygiene**	**15%**	**0.465**
2.1	Community toilets		
2.2	Medical camps		
2.3	Veterinary camps		
2.4	Hospitals/clinic		
3	**Safe drinking water**	**15 %**	**0.465**
3.1	Water tank		
3.2	Borewell		
3.3	RO plant		
4	**Infrastructure development/ facilities**	**25 %**	**0.775**
4.1	Construction/ repair and maintenance of public buildings/utilities like community hall, drainage system, panchayat building, renovation of primary health centre etc.		
4.2	Solar Street light		
5	**Skill development**	**10 %**	**0.31**
5.1	Awareness of farming techniques in local farmers		
6.	**Plantation in community areas**	**5 %**	**0.155**
	Total	**100%**	**3.10**

1.5.2 Risk & Hazards

- Chlorine impacts will always be outside the facility and thus considered as risk.
- The safety measures provided in report will be strictly followed and thus the risk will be minimized.

1.6 PROJECT BENEFITS

The project will deliver socio-economic benefits as follows:

- Increased state and central taxes and revenues accruing to the state and central exchequers;
- 200 persons will be required for operating Power Plant. Local skilled and semi-skilled workers will be preferentially hired for the purpose.

Further, indirect employment of a sizeable number of persons in the following manner:

- Increase in business opportunities for local people as there will be scope of hiring vehicle like tractors and trolleys, bulldozers, JCB, excavators during construction and operation phase of the project;

Increase in small-scale businesses like tea stalls, catering services / hotels, groceries, confectionery, sweet marts and cycle shops within the industrial estate.

The Corporate Environmental Responsibility (CER) interventions proposed include:

- Preventive health, Sanitation and safe, clean drinking water;
- Education and Skill development;
- Rural Development;
- Environmental Sustainability including village pond rejuvenation;

There shall be employment generation for the local people during the construction and operational phase of the proposed facility.

The existing manpower deployed at PACL's Naya Nangal site is 400 persons direct and about 500 indirect. The existing manpower will be sufficient to operate the plants after expansion in Caustic Soda Plant. However, 200 person will be required for operating Power Plant. Local skilled and semi-skilled workers will be preferentially hired for the purpose.

1.7 ENVIRONMENT MANAGEMENT PLAN

Environmental Monitoring Plan for suggested mitigation measures and monitoring plan will include:

- Review of Compliance of EMP, EC & statutory conditions in the management meeting;
- Preparation and timely submission of required statutory reports & Cess;
- Proper hazardous waste inventory accounting by HSE department;
- Monitoring for reduction in air emissions, effluent generation, generation of hazardous waste quantity by concerned department heads as per QMS developed by PACL;
- Reviewing time bound action plan for imparting training to drivers and availability of TREM cards;
- Reviewing annual performance of EHS in board meeting;

An Environmental Management Cell with adequate professional expertise and resources shall be established to discharge responsibilities related to environmental management including statutory compliance, pollution prevention, environmental monitoring, etc.

1.8 CONCLUSION

Based on the EIA study conducted for 12 weeks of 2018 -2019 and as per terms of reference given by EAC the following highlight emerges:

- Site is well connected with ports, highway and railway;
- Vehicular transportation via road would be ~200 trucks/day;
- Strict adherence to all the applicable regulatory requirements will be complied with;
- Safety and environmental norms will be followed;
- Recycle & Reuse scheme will be implemented to reduce water consumption;
- Provision of air pollution control equipment, management of hazardous waste, will lead to minimum adverse environmental impacts;
- The project shall generate employment potential for skilled, semiskilled, unskilled people during construction & operation phase.

If this project comes up, it will have social & financial benefits and will be environmentally sustainable. In view of this, the project may be considered for grant of Environmental Clearance.