

**EXECUTIVE SUMMARY OF
ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT**
(Submitted for Public Hearing as per the provision of EIA Notification 2006 & amendments thereof)
for
**EXPANSION & MODERNIZATION OF EXISTING PROJECT FOR
MANUFACTURING OF EXPLOSIVES & DEFENCE PRODUCTS**
(ToR Letter No. F.No.J-11011/28/2017-IA.II(I), dated 7th July, 2017)

Project Proponent



M/s Solar Industries India Limited

Village Chakdoh, Near Bazargaon,
Tehsil -Katol, Dist- Nagpur Pin Code - 440023, Maharashtra

Environmental Consultant



**QCI-NABET Accredited EIA Consultant for Synthetic Organic Industries (Sector 21),
MoEF&CC (GOI) and NABL Recognized Laboratory
ISO 9001:2008, ISO 14001:2004, OHSAS 18001:2007**

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Report No. ANqr /PD/20A/2016/57

[CATEGORY: A, 5 (F)]

AUGUST 2017

1.0 INTRODUCTION

Solar Industries India Ltd. (SIIL) has been incorporated on 24 Feb, 1995. The manufacturing unit of SIIL is located at Village-Chakdoh, Tahsil- Katol, Dist. Nagpur, Maharashtra. The location falls in Backward D+ Region as per PSI-07 policy of Government of Maharashtra. The company produces commercial explosives and its accessories. SIIL is implementing Mega project as per PSI-2007 policy by expanding plant capacities.

SIIL is the largest industrial explosives manufacturer in India and the fastest growing Company in the sector. Over the years, the Company leveraged its competitive advantage - high quality, wide product range, efficient manufacturing, large capacity and integration to emerge as the largest sectorial exporter from India.

1.1 IDENTIFICATION OF PROJECT

Based on the existing Industrial licensed capacities TNT for 500 MT/Annum and RDX 100 MT/Annum, company has further approached to DIPP, Govt. of India for enhancement of capacity of TNT and RDX for 3000 MTPA respectively and initiated finalization of technologies and critical equipment's from overseas sources.

The capacity enhancement has also been planned for Slurry /Emulsion Explosives 56250 MTPA, PETN 3000 MTPA and initiating explosives like Detonating fuse 150 Million meters/Annum and Cast Booster 3000 MTPA.

1.1.1 Nature of the Project

The existing products before expansion do not fall under the purview of the EIA Notification '2006 and subsequent amendments with respect to its capacity to produce various explosive products. However, SIIL has regularly obtained valid consents; CTE/CTO required from MPCB.

Now, expansion & modernization activity is falling under schedule (5f), category "A" of EIA notification 2006 and prior environment clearance is needs to be obtained from MoEF&CC, GOI.

1.1.2 Size of the Project

The details of existing and proposed expansion production/generation capacity are shown in **Table 1**.

**TABLE 1
EXISTING AND PROPOSED EXPANSION PRODUCTION DETAILS**

(Product Units are in Million Nos./Annum)					
Sr. No.	Name of products	Existing capacity Per Annum	Consent (Water/Air/HW) vide no. 1612001045 Dated 30/12/2016	Proposed Additions Per Annum	Total Capacity after Expansion Per Annum Proposed EC capacity
1.	DETONATORS (FINISHED)	125	125	Nil	125
2.	FILLING / PRESSING FOR FILLED SHELL (CAPTIVE)	63	63	Nil	63
3.	GI / CU WIRE COATING	90	90	Nil	90
(Product Units are in Million Meters/ Annum)					
Sr.	Name of products	Existing capacity Per Annum	Consent (Water/Air/HW) vide no. 1612001045 Dated 30/12/2016	Proposed Additions Per Annum	Total Capacity after Expansion Per Annum Proposed EC capacity
1.	DETONATING FUSE	75	75	75	150
(Product Units are in M.T/ Annum)					
Sr. No.	Name of products	Existing capacity Per Annum	Consent (Water/Air/HW) vide no. 1612001045 Dated 30/12/2016	Proposed Additions Per Annum	Total Capacity after Expansion Per Annum Proposed EC capacity
1.	SLURRY/ EMULSION EXPLOSIVES (FINISHED)	100000	1,00,000	56,250	1,56,250
2.	SORBITAN MONO OLEATE (SMO) (C & F)	9162	9162	Nil	9162
3.	POLY ISO BUTYLENE SUCCINIC ANHYDRIDE (PIBSA) C & F	6000	6000	Nil	6000

4.	PETN -(PENTA ERITHRITOL TETRA NITRATE) I & C & F	2062.5	2062.5	937.5	3000
5.	PENTOLITE / CAST BOOSTER (FINISHED)	1875	1875	1125	3000
(Product Units are in M.T./Annum)					
Sr. No.	Name of products	Existing capacity Per Annum	Consent (Water/Air/HW) vide no. 1612001045 Dated 30/12/2016	Proposed Additions Per Annum	Total Capacity after Expansion Per Annum Proposed EC capacity
6.	CALCIUM/ SODIUM NITRATE MELT (CAPTIVE)	3600	3600	Nil	3600
7.	DUST SUPPRESSANT (FINISHED)	1000	1000	Nil	1000
8.	LEAD AZIDE (CAPTIVE)	9	9	Nil	9
9.	LEAD STYPHANATE (CAPTIVE)	3	3	Nil	3
10.	ASA MIXING & DRYING (CAPTIVE)	12	12	Nil	12
(Product Units are in M.T./Annum)					
Sr. No.	Name of products	Existing capacity Per Annum	Consent to Establish (Water/Air/HW) vide no. 7819 Dated 15/06/2016	Proposed Additions Per Annum	Total Capacity after Expansion Per Annum Proposed EC capacity
1.	CYCLOTETRA METHYLENE TETRA NITRAMINE-HMX & HMX COMPOUNDED PRODUCT	62.5	62.5	237.5	300
2.	RDX AND RDX COMPOUNDED PRODUCT	Nil	125	2875	3000
3.	BULK EMULSION	Nil	Nil	125000	125000
4.	TNT (TRI NITRO TOLUENE)	Nil	625	2375	3000
Proposed Boiler					
1.	COAL FIRED BOILER	12 TPH			

1.1.3 Location of the Project

The proposed project area located within the existing plant at Village Chakdoh, Near Bazargaon, Khasra No. 37, 38, 39, 40, 70, 71, 72, 73/1, 73/2, 74, 75, 78, 79, 81, 82, 83, 85, 88, 28, 30, 31, 1, 3, 8/1, 8/2, 4/1, 4/2, 4/3, 29/1, 29/2, 124/1, 124/2, 124/3, 69, 84, 90, Tehsil -Katol, Dist- Nagpur, Pin Code - 440023, Maharashtra. The project site lies at the 21°02'47.28" N - 21°14'00.37" N latitude and 78°44'30.76" E - 78°45'00.14" E longitude on the Topo sheet No. 55k_12, 55k_16.

1.2 JUSTIFICATION AND NEED OF PROJECT

SIIL expanding capacity at strategic locations and diversifying to meet the growing resource demand. SIIL not only scaled up its production capacity since inception, but also developed a well-diversified portfolio of products. There is good availability of raw materials in India and future scope of supply products to Defense sector and export.

1.2.1 Regulatory Framework

According to the EIA Notification 2006 and its subsequent amendments, the proposed project comes under the project activity of 5 (f), Synthetic Organic Chemicals Industry under category A and is located at Village- Chakdoh, Near Bazargaon, Tehsil -Katol, District- Nagpur- 440 023, Maharashtra and requires environmental clearance from MoEF&CC (EAC Industry -2). Accordingly, M/s SIIL has therefore initiated the process of Environmental Clearance. Project status is as follows:

Description of Process	Date
ToR Application submitted at MoEF&CC	23 rd January 2017
Presentation before 20th EAC (Industry – 2) meeting	28 th February 2017
Earlier consent issued and Clarification submitted to MOEF&CC	6 th March 2017
Additional information submitted to MOEF&CC	4 th April 2017
TOR presentation 22nd EAC (Industry – 2) Meeting, (Sr. No. 22.4.14)	17 th April 2017
TOR issued by EAC, MOEF & CC ,New Delhi	7 th July 2017

The EIA report for the expansion and modernization of existing project is prepared based on the approved ToR by EAC, MoEF&CC, New Delhi, and will be submitted for grant of prior environmental clearance.

1.2.2 Cost of the Project

Total cost for the proposed project expansion is estimated to be Rs. 184.01 Crores.

2.0 PROJECT DESCRIPTION

2.1 PROCESS DESCRIPTION OF PROPOSED PRODUCT

The process for manufacturing as and know how about explosives manufacturing are available with the company as given in EIA report Chapter 2.

2.2 DETAILS ABOUT RESOURCES

2.2.1 Raw Materials

The consumption of raw materials for proposed new products is given below:

**TABLE 2
REQUIREMENTS OF RAW MATERIALS FOR
PROPOSED NEW PRODUCTS ANNUAL CAPACITIES**

Sr. No.	Name of Products	Raw Material Requirement (MTPA) for new product as applied CTE Vide MPCB 7819 Dt. 15/06/2016	Raw Material Requirement (MTPA) for Total Capacity of new product after expansion
1.0	RDX AND RDX COMPOUNDED PRODUCT	125 MTPA	3000 MTPA
1.1	Hexamine	54.000	1300.000
1.2	Nitric acid	102.500	2450.000
1.3	Ammonium Nitrate	87.500	2100.000
1.4	Acetic Acid	146.000	3500.000
1.5	Acetic Anhydride	360.000	8650.000
1.6	Solvent	62.500	1500.000
2.0	Bulk Emulsion	125000 MTPA	125000 MTPA
2.1	Ammonium Nitrate	80500.000	80500.000
	Calcium Nitrate	12500.000	12500.000
2.2	Furnace oil	5700.000	5700.000
2.3	SMO	1250.000	1250.000
2.4	Sodium nitrite	250.000	250.000
3.0	Trinitro toluene (TNT)	625 MTPA	3000 MTPA
3.1	Ortho nitrotoluene (ONT)	415.000	1995.000
3.2	Oleum (20%)	1250.000	6000.000
3.3	Nitric Acid (58%)	680.000	3265.000
3.4	Nitric Acid (98%)	370.000	1765.000
4.0	Boiler 12 TPH (Coal fired)		
4.1	Coal @ 50 MT/Hr x 20 Hr/day x 300 days	300000	300000

Source: All the raw materials are available from indigenous sources. Proposed raw materials will also be received by road transport from adjoining destinations of Maharashtra, Gujarat, Rajasthan and Chhattisgarh.

2.2.2 Land Requirement

The proposed activities will be within the existing plant. Presently 273.910 acres land area is under possession (**Annexure II**). The total land identified for the proposed project is 2590.44 sq/m. The location falls under industrially backward D+ backward region as per PSI-07 policy of Government of Maharashtra.

The proposed project area located within the existing plant at Village Chakdoh, Near Bazargaon, Khasra No. 37, 38, 39, 40, 70, 71, 72, 73/1, 73/2, 74, 75, 78, 79, 81, 82, 83, 85, 88, 28, 30, 31, 1, 3, 8/1, 8/2, 4/1, 4/2, 4/3, 29/1, 29/2, 124/1, 124/2, 124/3, 69, 84, 90, Tehsil-Katol, Dist- Nagpur Pin Code – 440023, Maharashtra.

2.2.3 Power Requirement and Supply

The industry has been obtained contract demand for 2000 KVA by MSEDCL. The present power requirement of the plant is met from connected power supply of 2350 KW. Additional power requirement of 1000 KW will be sourced from the MSEDCL grid. Load sanction Letter attached as **Annexure VI**.

D. G. Sets:

The existing D.G. sets 2x 380 KVA, 1x 400 KVA and 1x 600 KVA = 1760 KVA and proposed 2x300 KVA hence total capacity 2360 KVA are provided for emergency operation (standby only) of manufacturing process to avoid any accidental situation during MSEB power failure.

Fuel requirement:

- Coal @ 50 MT/Hr x 20 Hr/day x 300 days=300000 TPA
- HSD: 131800 liter/year

2.2.4 Water Availability and Wastewater Generation

Source of Water Supply and Requirement

Groundwater (before expansion) is the source. The existing water requirement is 556 KLD. Proposed additional water requirement will be 366 KLD. Total water requirement after expansion will be 922 KLD. Industrial water will be treated as per process requirement by softener/DM/RO through this 876 KLD generated for various processes and remaining 46 KLD reject will be treated in ETP.

Wastewater Generation

Wastewater generation through processes will be 259 KLD and hence total wastewater generation will be 259+46=305 KLD (82 KLD sewage and 223 KLD wastewater). Zero liquid discharge (ZLD) will be complied.

2.2.5 Manpower Requirement

SIIL is presently employing 1513 persons comprising of various categories such as managers, officers, supervisors and all types of workers and van drivers. The additional manpower requirement for project under revision is 197 persons. Total manpower after expansion will be 1710.

3.0 DESCRIPTION OF ENVIRONMENT

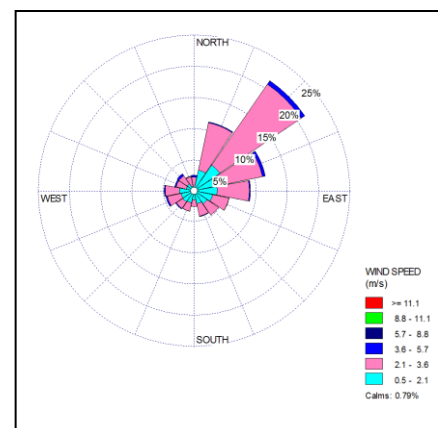
This chapter of the report provides an overview of the environmental baseline conditions within the study area. An environmental baseline monitoring was carried out as a part of EIA study for **M/s. SIIL**, during **Winter season (December 2016 to February 2017)**, and included as primary and secondary data.

3.1 AIR ENVIRONMENT

3.1.1 Meteorology

The weather monitoring station was installed at the project site to record temperature, wind speed, wind direction, relative humidity, and rain fall. The generated data was then compared with the meteorological data obtained from IMD. During December 2016 to February 2017 values monitored for temperature and humidity ranged from 15 to 37°C and 15 to 71% respectively and total rainfall observed 0.3 mm.

The site specific wind roses were drawn. It was observed from the wind roses that the first predominant wind direction 21.4% from NE and second predominant 11.6 % from ENE direction with the 0.79% calm conditions.



WIND-ROSES (WINTER 2016-2017)

3.1.2 Baseline Data

Ambient air monitoring was carried out at eight (08) locations. It has been observed that minimum and maximum concentration of PM₁₀ is ranged between **33.7-79.2** µg/m³. The concentrations of PM_{2.5} vary from **13.1-31.7** µg/m³. SO₂ concentration level ranged from **3.0 to 16.6** µg/m³ and NO₂ concentration ranged from **3.4-28.2** µg/m³ in the study area.

Pb, As and Ni in PM₁₀ were found below detectable limits.

Volatile Organic Compounds (VOCs) are organic chemical compounds that have high enough vapor pressures under normal conditions to significantly vaporize and enter the atmosphere. However total VOCs concentration ranged from BDL to 2.64 µg/m³. Concentration of Benzene ranged between BDL to 1.58 µg/m³. BaP was found below detectable limits. Volatile organic compounds (VOCs) are emitted from various sources, both anthropogenic and biogenic.

It has been observed that the Exceedence Factor for PM_{2.5}, SO₂ and NO₂ for all location is less than 0.5 which indicates the overall ambient air quality of study area is low polluted category. However, PM₁₀ for 3 locations falling in the third category are meeting the standards as of now but likely to exceed the standards in future if pollution continues to increase and is not controlled. However, the locations in Low pollution category have a rather clean air quality and such areas are to be maintained at low pollution level by way of adopting preventive and control measures of air pollution

3.2 NOISE ENVIRONMENT

Eight (08) locations were identified based on the activities in the village area, traffic and sensitive areas like hospitals and schools. The day time noise levels in residential and industrial area were observed to be well within the prescribed limit of CPCB standards. The night time noise levels were well within the prescribed limit of CPCB standard, in the study area.

One National Highway NH-6 is passing through these regions and having major traffic density. The Leq at above traffic junction was observed 69.2 dB (A).

3.3 WATER ENVIRONMENT

11 water (surface and groundwater) samples were collected from various sampling locations, eight (08) from groundwater sources and three (03) from surface water sources. These samples were collected as grab samples, preserved, brought to the laboratory and analyzed for various parameters. The samples were analyzed as per the procedures specified in standard methods for the examination of water and wastewater published by American Public Health Association (APHA/IS 10500).

Physico-chemical Characteristics

- **Surface water quality**

The physico-chemical characteristics of the surface water samples collected and analysed are presented in **Annexure IX** and are compared with the IS-10500 standards. The analysis results indicate that the pH ranged between 7.04-7.57 which are well within the specified standard of 6.5 to 8.5. The TDS was observed to be 622-690 mg/l which is within the permissible limit of 2000 mg/l. The total hardness recorded was in the range of 279.18-330.0 mg/l as CaCO₃ which is also within the permissible limit of 600 mg/l. The nitrate was found to be in the range of 5.44-16.05 mg/l. The levels of chloride and sulphate were found to be in the range of 25.80-47.85 mg/l and 3.24-13.60 mg/l respectively.

The overall surface water quality was found to be mineralized, however unsafe for physico-chemically wrt TDS (622-690 mg/l) and total hardness (279.18-330.0 mg/l) which cross the acceptable limits (TDS-500 mg/l & total hardness 200 mg/l) but within permissible limit (TDS-2000 mg/l & total hardness 600

mg/l), bacteriologically for drinking and need proper disinfection before use for alternate source of drinking purpose.

- **Groundwater quality**

The physico-chemical characteristics of groundwater are presented in **Annexure IX** and compared with the IS-10500 standards. The analysis results indicate that the pH ranged between 7.03-7.93.

The TDS was ranging from 348-962 mg/l. Total hardness was found to be in the range of 209.88-460.56 mg/l. The fluoride concentrations were varied between 0.51-1.85 mg/l which is within the acceptable limit of 1 mg/l. The nitrate and sulphate were found in the range of 4.36-44.87 mg/l and 5.18-48.59 mg/l respectively.

- **Bacteriological Characteristics**

Coliform group of organisms are indicators of faecal contamination in water. Water samples were analysed for total coliform deploying membrane filtration technique. Bacteriological quality of surface and groundwater in winter season is presented in **Annexure IX**.

3.4 LAND ENVIRONMENT

3.4.1 Soil Characteristics

Eight soil samples were collected from different locations of the study area. The monitoring was carried out once in the study period during winter season 2016-2017 and analyzed for significant parameters. The results indicated the following:

Soil characteristics in the study area

The bulk density of the soil in the study area ranged between **1.06-1.21** g/cc which indicates favorable physical condition for plant growth, the texture of soil in the maximum areas is found to be silty clay. pH is found to be neutral to moderately alkaline **7.18-8.16** in reaction. The nutrient status in terms of NPK value is found to be in the range of **190-441** kg/ha, **11.67-22.48** kg/ha and **170-682** kg/ha respectively. This indicates that soil is moderately fertile with low productivity. The soil is non toxic wrt heavy metals.

3.4.2 Land Use of the Study Area

The land-use & land cover map of the 10 km radial study area from the periphery of project site has been prepared using Resource SAT-2 (IRS-P6), sensor- LISS-3 having 23.5 m spatial resolution and date of pass 28th May 2014 satellite image with reference to Google Earth data and the IRS-P5-Cartosat-I data having 2.5 m spatial resolution and date of pass Jan 2016 (**Table 3.10**). In order to strengthen the baseline information on existing land use pattern, the following data covering approx. the proposed project site as well as the 10 km radius from the periphery of the project site i.e. 21°02'47.28" N - 21°14'00.37" N latitude and 78°44'30.76" E - 78°45'00.14" E longitude and elevation 410-470 meter are used.

Land use pattern of the study area as well as the catchment area was carried out by standard methods of analysis of remotely sensed data and followed by ground truth collection and interpretation of satellite data. The outcome of land use study is presented in EIA report.

3.5 BIOLOGICAL ENVIRONMENT

Floral Biodiversity of the Study Area

- a. **Trees:** Total 68 species were found in the study area
- b. **Shrubs (small trees):** Total 27 species were enumerated from the study area.
- c. **Herbs:** In the study area 17 species were observed.

- d. **Bamboo & Grasses:** 12 species were enlisted from the study area
- e. **Climbers and Twiners:** Total 13 species of climbers/ twiners were recorded in the study area.

Agriculture in the study area:

- The details pertaining to agriculture and horticulture crops within the study area are presented in **Annexure X**.

Fauna in the study area

- The 10 km radius study area was found to be a home to several species of mammals, reptiles, Aves and other lower invertebrates. As described earlier, the part of study area is covered with forest. Big wild animals like Wild boar, Sabhar, Nilgai, Barking deer, spotted deer as well as small sized fauna like Jackal, Monkey, etc. were found in the connected Reserve Forest area within study area.
- Birds were observed throughout the study area mostly near the forest area and water bodies. Reptiles and amphibians were also observed in the study area. Fresh water fishes were found in Vena dam which is beyond 10 km radius from project site. The details of Fauna observed/reported provided in **Annexure X**.

3.6 SOCIO-ECONOMIC ENVIRONMENT

Socioeconomic survey was carried out to know the infrastructural activities amenities available within 10 km radius of plant. The information regarding facilities available and the opinion of the people was sought by floating questionnaires and interaction with the people. This is done for observing the impact due to the project wrt social aspects so that proper actions / measures could be taken up for the benefit of the people (economically and wrt quality of life) and the project. Being export oriented project, the capital investments will add to national exchequer and revenue generation.

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 IMPACTS DURING CONSTRUCTION PHASE

- **Land Environment**

Unit is already set up for existing products, but for proposed products in the existing plant area construction work will be carried out for the installation of machineries. During construction activity, the impact on soil will be limited to the construction site only; no impact is envisaged on the topography.

- **Solid /Hazardous waste**

During construction phase, solid waste such as excavated soil, debris, some metal waste and small amount of oil and grease from construction machines will be generated. This waste may contaminate soil at plant site temporarily will be restricted to a small area.

- **Air Environments**

As the proposed expansion will be carried out in the existing plant area, there will be impact due to construction activities. The source of air emission during the construction will include dust from construction activity and excavation of the plant area. These emissions are expected to result in change in baseline air quality. Dust and other emissions are not likely to spread in wider area, which will affect homes and other properties.

SIIL used to operate chillers with Freon gas till 2015; it's replaced by water cooling towers. Entire processes were modified. This was done as part of implementation of environment friendly measures and to control Ozone depletion.

- **Noise Environment**

During construction various equipment, like dozer, scrapers, concrete mixers, generators, vibrators and power tools and vehicles will be the major noise sources. Noise during construction is difficult to predict because the level of activity will constantly change. Most of construction activities are expected to produce noise levels within the prescribed limit. The noise generated from various sources will be of short duration. Therefore, no significant impact is envisaged in the construction phase.

- **Water Environment**

The area is defined as safe zone as per CGWB. There will not be any adverse impact on the groundwater as no drawl of groundwater will be envisaged for proposed expansion activities. Only surface water will be used for additional requirements. Zero liquid discharge will be complied.

- **Biological Environment**

No clearance of vegetation involved in the project. Proposed expansion is confined within existing plant premises, well developed green belt were observed within existing plant premises, further, the effect are reduced by shortening the construction phase period during day time and development of additional green belt/greenery at the site. Besides, RF there is no sensitive locations within the study area. Hence, no significant adverse impacts are expected on biological environment.

- **Socioeconomic Environment**

Positive impact

- Direct and indirect employment opportunities for skilled semiskilled and unskilled workforce
- Changes in employment and income levels due to increased employment opportunities.
- Quality of life will improved due to increased income and employment opportunities

4.2 IMPACTS DURING OPERATION PHASE

- **Land Environment**

There may be some pollution, which may affect the soil adjacent to the plant area, if proper care is not taken. The anticipated pollution to soil environment due to plant activities is as follows:

- Changes in soil texture due to settling of air borne dust or due to wash off solid particulates by surface or groundwater. This will lead to change in porosity, permeability and other such physical characteristics of soil of the area.
- Changes in soil chemistry due to addition of foreign materials from polluted air and water due to plant activities in the area.

Proper mitigative measures like use of efficient pollution control systems, proper stack height and use of top soil in plantation results in no significant impact on soil of the project site. There will be no impact on soil of the study area located beyond the working area of the project.

- **Air Environment**

- **Details of air dispersion model**

Assessment of air pollution was carried out for stack attached to boiler, thermic fluid heater, D.G. sets etc. The ISCST-3 (Industrial Source Complex – short term-3) from Lakes Environment is an hour-by-hour steady state Gaussian Plume Model. This model is widely recognized as predictive tool in impact assessment for air environment. The ISCST-3 model was applied with the consideration of elevated + flat terrain, gradual plume rise and buoyancy induced dispersion options in the present study.

- **Stack details**

The stack details viz, height, diameter, temperature, velocity, volumetric flow and emission rates are presented in **Table 4.1**. Total 11 stacks were considered which is attached to the respective equipment through which the emissions are likely come out.

- **Resultant Concentrations**

The maximum incremental ground level concentrations (GLCs) for particulate matter, SO₂ and NO₂ due to existing and proposed expansion developmental activities were carried out. The predicted 24 hourly maximum concentrations for existing facilities (Thermic Fluid Heater, Boiler-2,3,6 TPH and DG sets) for particulate matter, SO₂ and NO₂ are found to be 2.5 µg/m³, 0.65 µg/m³ and 14.5 µg/m³ respectively. For proposed scenario (Boiler-12 TPH and DG set) for particulate matter, SO₂ and NO₂ are found to be 1.05 µg/m³, 0.32 µg/m³, 3.2 µg/m³ respectively. The existing + proposed scenario concentration levels (Thermic Fluid Heater, Boiler-12 TPH and DG sets) of particulate matter, SO₂ and NO₂ are observed 1.9 µg/m³, 0.44 µg/m³, 17.0 µg/m³ respectively. The short term modeling results are presented in **Table 4.2**. The isopleths of particulate matter, SO₂ and NO₂ representing the GLCs for existing, proposed and existing + proposed scenario are shown in **Figures 4.2 to 4.10** respectively.

The resultant concentration levels (Ambient + proposed incremental) revealed that the concentration levels for particulate matter, SO₂ and NO₂ likely to be encountered in the operation of the project are respectively occurring at a distance of about 1.4 km each in the SW and WSW directions with a concentration levels (resultant) of 80.25 µg/m³, 16.92 µg/m³ and 31.4 µg/m³ respectively and details are given in **Table 4.3**, which is well within the NAAQS levels prescribed by CPCB. Hence it is inferred that considering cumulative concentration levels, the pollution load exerted due to proposed project will be insignificant.

- **Noise Environment**

As per the model results, the noise levels due to the plant will be in the range of 28dB (A) to 56 dB (A) near the plant boundaries in all directions. The ambient noise levels will remain within the permissible limits.

- **Water Environment**

Source of Water Supply and Requirement

- The existing water requirement is 556 KLD. Proposed additional water requirement will be 366 KLD. Total water requirement after expansion will be 922 KLD. Industrial water will be treated as per process requirement by softener/DM/RO through this 876 KLD generated for various processes and remaining 46 KLD reject will be treated in ETP.

Wastewater Generation

- Wastewater generation through processes will be 259 KLD and hence total wastewater generation will be 259+46=305 KLD (82 KLD sewage and 223 KLD wastewater). Zero liquid discharge (ZLD) will be complied.

Wastewater Treatment Plant

- The capacity of existing ETP =125 KLD and additional ETP capacity = 110KLD
- Total capacity of ETP after expansion =235 KLD

- **Biological Environment**

No forest land involved in the project activities. The proposed expansion activities will be carried out within the existing plant premises. There are no endangered flora and fauna species in the region except common peafowl (*Pavo cristatus*) which is schedule I species as per WPA 1972 whereas least concern species as per IUCN. The anticipated impacts during the operation phase to adjacent kondali reserve forest will be compensated by existing fencing, green belt (36.58 Ha) and additional greenbelt planned within 25.92 Ha. This thick blanket of green belt will be helpful to minimize the impacts on surrounding environment. Vehicular movement during night will be restricted to avoid adverse consequence to birds and wide animals in the region. The project activities are restricted to the factory site except the transportation of raw material and products. There is no discharge of solid or liquid wastes to the environment. The plantation will comprise of fruiting trees, soil improving and air pollution abatement trees. No eco sensitive receivers or rare / endangered species of fauna were observed in the study area. Thus, the impacts on flora and fauna will be insignificant.

Greenbelt within plant premises

Total area of 273.91 Acre (110.85 Ha.) out of which 90.39 Acre (36.58 Ha) are the existing and Additional green belt will be developed in 64.04 Acre (25.92 Ha). Thus, total green belt after expansion will be 154.44 Acre (62.50 Ha).

At present green belt is developed around the factory site with suitable plant species. Presently 25050 nos. of trees grown in existing plant premises. Details of greenbelt development are present in **Chapter 10**.

- **Socio-Economic Environment**

The project indicates rapid economic growth and development moreover help in improving amenities including road, supply of water or electricity, medical care, street lighting, drainage, sewerage and such other convenience. This helps to improve human development index.

During survey, it was found that most of the working populations were belonging to labour work and income was less. Resources of income were less in the study area. Transportation facilities were not satisfactory. Overall study area needs development in employment as well as in infrastructure facilities.

5.0 ANALYSIS OF ALTERNATIVES (SITE AND TECHNOLOGY)

- **Study of Analysis of Alternatives Related to Site**

M/s. SILL proposed expansion project area is located within the existing plant at Village Chakdoh, Near Bazargaon, Khasra No. 37, 38, 39, 40, 70, 71, 72, 73/1, 73/2, 74, 75, 78, 79, 81, 82, 83, 85, 88, 28, 30, 31, 1, 3, 8/1, 8/2, 4/1, 4/2, 4/3, 29/1, 29/2, 124/1, 124/2, 124/3, 69, 84, 90, Tehsil-Katol, Dist- Nagpur Pin Code – 440023, Maharashtra.

Adequate land (273.93 acres) is available. No additional land will be acquired for proposed expansion & manufacturing Defence warhead/ explosives. The location falls under industrially backward D+ backward region as per PSI-07 policy of Government of Maharashtra. Hence site is already selected by project proponent and no alternative site is required. SILL has adequate land area for proposed expansion and hence expansion is proposed within existing land area. No additional land is required.

The land is acquired within existing and therefore no change in land use pattern is envisaged.

• **Analysis of Alternatives Related to Technology**

The products manufacturing is based on the need of the products and market availability. The raw materials will be transported through the existing network. The technologies for the establishment of the manufacturing activities will be in placed as per their know-how.

The management has decided to adopt the best operating practices to suit world class requirements. As the products are going to be exported, external audits to fulfill QA/QC requirements. The products will be manufactured based on green chemistry concept so that there is minimum emissions and minimum wastewater generation during manufacturing process.

Hence best technological environment friendly approach is selected.

6.0 ENVIRONMENTAL MONITORING PROGRAMME

Environmental monitoring will be carried out for monitoring of important and crucial environmental parameters to assess regularly the status of environment during operations. The monitoring program for implementation is given below:

Sr. No.	Environmental Parameters	Schedule & duration of monitoring
1.	AIR ENVIRONMENT	
1.1	Air quality Ambient air quality monitoring stations will be established inside the factory area as well outside for PM _{2.5} , PM ₁₀ , SO ₂ , NO ₂ , HCs and VOCs. Selection of monitoring stations will be done in consultation with State Pollution Control Board based on the metrological conditions of the area.	Quarterly in association with MPCB or as prescribed by MPCB/CPCB/MoEF&CC by MoEF approved / NABL accredited laboratory.
1.2	Stack monitoring Stack monitoring will be carried out for PM ₁₀ , SO ₂ , NO ₂	Once in every 3 months or as prescribed by MPCB/CPCB/ MoEF&CC
1.3	Fugitive emissions Hydrocarbons, VOCs, Particulate matter	Once in every 3 months or as prescribed by MPCB/CPCB/MoEF
2.	NOISE ENVIRONMENT	
	Noise levels will be monitored within premises near equipment installation, outside the premises and road side with frequency of vehicles during day and night time.	As prescribed by MPCB/CPCB/MoEF by third party
3.	WATER ENVIRONMENT	
3.1	Water quality (surface and ground water) All physico-chemical and bacteriological parameters as specified in IS 10500 for drinking purpose.	Grab sampling, Once in three month or as prescribed by MPCB/CPCB/MoEF&CC
3.2	Wastewater quality Raw effluent from inlet for pH, SS, BOD, COD, oil & grease Heavy metals and Phenolics.	One composite sample per batch
3.3	Effluent from ETP outlet (After Primary Treatment) for pH, TSS, BOD, COD, Oil and grease and Heavy metals.	Two 8 hourly composite samples per week (flow based)
4.	LAND ENVIRONMENT	
4.1	Soil quality pH, EC, Bulk density, ESP, exchangeable cations, NPK values, CEC, Organic Carbon and Heavy metals	Every year in dry season, in all plantation areas and parking area
5.	HAZARDOUS WASTE	
5.1	pH, Organic matter, Moisture content, TCLP Total inorganic matters including heavy metals	Monthly or as prescribed by MPCB/CPCB/ MoEF&CC by third party
6.	BIOLOGICAL ENVIRONMENT	
6.1	Plantation - No. of saplings planted - Survival rate of planted species within the plant premises and outside - Study of practical Implementation of conservation plan with budgetary provision.	Twice in a year
7.	SOCIO-ECONOMIC ENVIRONMENT	
	(Demographic structure, local employment profile, quality of life, Health status of workers through periodic medical checkup, implementation of CSR with periodic budgetary provision, infrastructure availability with respect to amenities)	Once in 4 years

6.1 BUDGET FOR IMPLEMENTATION OF ENVIRONMENTAL MONITORING PLAN

An effective environmental monitoring plan is proposed during the construction and operational phases of the project to conserve the environment at site.

TABLE 3
BUDGETARY PROVISIONS FOR ENVIRONMENTAL MONITORING PROGRAMME (in lacs)

Sr. No.	Environmental Component	Capital Cost	Recurring Cost
1	Air Environment including bag filter for 4 boilers	75	10
2	Noise Environment	---	0.50
3	Water Environment (water & wastewater)	80	10
4	Land Environment (Soil monitoring / reclamation)	---	01
5	EC compliance and due diligence ETP/WTP	---	30
Total =		155	51.5

7.0 ADDITIONAL STUDIES

7.1 RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN

Introduction

Risk assessment (RA) provides a numerical measure of the risk that a particular facility poses to the public. It begins with the identification of probable potential hazardous events at an industry and categorization as per the predetermined criteria. The consequences of major credible events are calculated for different combinations of weather conditions to simulate worst possible scenario. These consequence predictions are combined to provide numerical measures of the risk for the entire facility.

MCA analysis

The risk assessment report covers the following in terms of the extent of damage with resource to MCA (maximum credible accident) analysis and delineation of risk mitigations measures.

- Identification of potential hazardous sections and representative failure cases
- Visualization of release scenarios considering type and the quantity of the hazardous material
- Damage distance computations for the released cases at different wind velocities and atmospheric stability classes for heat radiations and pressure waves.
- Drawing of damage contours on plot plan to show the effect due to the accidental release of chemicals.

Hazard Identification

- Identification of hazards is an important step in risk assessment as it leads to the generation of accidental scenarios. The merits of including the hazard for further investigation are subsequently determined by its significance, normally using a cut-off or threshold quantity.

8.0 PROJECT BENEFITS

The project manufacturing unit has made improvement in infrastructure as well as overall socio-economic development in the area. The people residing in the nearby areas are being benefited directly and indirectly as well. The project is providing benefits for the locals during operational phase of the activity.

Economic Development

The products that will be manufactured by **M/s. SIIL** will have a high market potential. Due to increasing demand, the plant has own economic importance.

Solar is the largest exporter of Explosives and Initiating Systems from India. Soar's products and services have successfully met the needs and discerning expectations of its valuable customers not only in India but also overseas. In fact, SIIL, export products to more than 42 countries across the Middle-East, Africa, and the South East Asia is well accepted by the end users.

This will help to increase the economy of the region, state and thereby the country itself. There are other intangible benefits apart from the tangible benefits which will help to improve the economic status of the state and the country.

9.0 ENVIRONMENTAL COST BENEFIT ANALYSIS

M/s SIIL has proposed expansion and modernization of existing project, company has further approached to DIPP, Govt. of India for enhancement of capacity of TNT and RDX for 3000 MTPA respectively and initiated finalization of technologies and critical equipment from overseas sources.

The capacity enhancement has also been planned for Slurry /Emulsion Explosives 56250 MTPA, PETN 3000 MTPA and initiating explosives like Detonating fuse 150 Million meters/Annum & Cast Booster 3000 MTPA at Village Chakdoh, Near Bazargaon, Khasra No. 37, 38, 39, 40, 70, 71, 72, 73/1, 73/2, 74, 75, 78, 79, 81, 82, 83, 85, 88, 28, 30, 31,1, 3, 8/1, 8/2, 4/1, 4/2, 4/3, 29/1, 29/2,124/1, 124/2, 124/3, 69, 84, 90, Tehsil-Katol, Dist- Nagpur Pin Code – 440023, Maharashtra. All the basic requirements for the production are in place including infrastructure availability. The increase in production of chemicals will be available to the users. It will definitely boost the economic growth of the country; develop region and quality of life of the people in a sustainable manner without creating any environmental damage.

9.1 ENVIRONMENTAL VALUE ENHANCEMENT (BIODIVERSITY, CROP PRODUCTIVITY, ECO-TOURISM)

The project site is well connected to railways, roadways and airways. The proposed expansion project falls within existing project. Therefore, it will not involve loss of vegetation and biodiversity. The vegetation is similar in the whole area with no sensitive ecosystem or rare and endangered flora or fauna, hence no environmental loss will be there in terms of net productive value.

The total project cost for proposed expansion is estimated to be Rs. 184.01 Crores and expenditure on implementation of the Environmental Management Plan (EMP) is presented in Chapter 10 of this report. Besides tangible benefits, the project has got number of intangible benefits like minimum emission of the generated gases, no adverse impact on environment as far as air, noise and water environmental components are concerned.

10.0 ENVIRONMENTAL MANAGEMENT PLAN

The main objectives in formulating this environmental management plan are:

- To limit / reduce the degree, extent, magnitude or duration of adverse impacts.
- To treat all the pollutants i.e. liquid effluent, air emissions and hazardous waste with adoption of adequate and efficient technology.
- To comply with all the norms and standards stipulated by Maharashtra Pollution Control Board / Central Pollution Control Board.

- To reduce any risk hazards and design the disaster management plan.

Continuous development and search for innovative technologies for a cleaner and better environment

11.0 SUMMARY AND CONCLUSIONS

The project is environmentally, technically and economically feasible with respect to followings:

All activities are confined to private industrial land and minimum possible emission is allowed to enter in to the environment due to proposed expansion project. Thus environment will not be adversely affected in any way.

- Most of the wastewater generated will be recycled/reused in the process, rest will be treated, discharge and norms will be followed.
- Wastewater is treated in full-fledged effluent treatment plant. The treated wastewater will be used for green belt and gardening purposes. Domestic waste will be sent to STP and utilized in gardening.
- The development of green belt and plantation will help to attenuate the noise levels and restrict air pollution and will increase the aesthetics.
- Apart from this, the environmental management plan delineated may help to reduce pollution by implementation.
- The enterprise social commitment policy (formerly CSR) will work further to bring out the development of the surrounding villages and thus area and quality of life of people will be improved.
- The cost of environmental control and monitoring measures are computed and provision for capital & recurring is made by the management.
- Additional employment generation after expansion (existing 1513 + proposed addition 197 total after expansion 1710) and also due to export of products foreign exchange earnings will be more.
- This project being export oriented the additional capital investments will add to national exchequer and will be value addition in terms of revenue generation and enhanced foreign exchange earnings.
- Employees, company and region will be directly / indirectly benefitted.

Concluding Remarks:

Thus it can be concluded on a positive note that after the implementation of the mitigation measures, Environmental Management and Monitoring Plans as enumerated above, the normal operation of **M/s. SIIL** will have no significant impact on environment and the project will be benefitted to local people to some extent with an economic growth in state/ country level.