SUMMARY

In accordance with the approved Terms of Reference (ToR) of Ministry of Environment, Forests & Climate Change (MoEFCC), Government of India for Environmental Impact Assessment (EIA) of the proposed 1.4 million tons per annum (MTPA) integrated iron and steel plant to be set up by Kalyani Steels Ltd (KSL) in Koppal district of Karnataka, this Summary presents a brief outline of the EIA findings and the proposed mitigation measures.

Glimpse of the Project

Total capacity	..	1.4 MTPA crude steel
Product mix	..	1.3 MTPA - Rolled long products 0.1 MTPA - Cast ingots
Process route	..	1) Production of hot metal through blast furnace followed by basic oxygen furnace (BOF) for conversion of hot metal to liquid steel in Phase-I (BF-BOF route) 2) Production of hot metal through blast furnace & hot direct reduced iron (HDRI) through direct reduction plant (DR plant) followed by basic oxygen furnace (BOF) & electric arc furnace (EAF) for conversion of both hot metal and HDRI to liquid steel in Phase-II (BF+DR-BOF+EAF+ EAF with IF for SS)
Site	..	Located in Koppal district of Karnataka, about 11 km west of Koppal district town and 17 km south east of Hospet city of Karnataka
Iron Ore Source	..	Through e-auction
Water Source	..	Tungabhadra reservoir
Electric Power	..	Karnataka Power Transmission Corporation Limited (KPTCL)
Estimated Investment..		Rs 5,531 crore (after Phase-II)
Completion Period	..	Phase-I : By 31st March 2018 Phase-II : By 28 January 2021

Summary (Cont'd)

INTRODUCTION

1. The state of Karnataka has always been at the forefront of Industrial growth in India. It owns a vast repository of minerals like iron ore, manganese ore, dolomite, chromite, bauxite, quartz, silica and even precious minerals like gold, diamond etc and foliage cover.

2. On the other hand, the state is characterized by favourable climate, enterprising citizens and strong communication channels provided by broad gauge railways, national & state highways, airports, and sea ports. These factors in combination make the state a model for both national and international investment opportunities.

3. Karnataka has a strong, vibrant and expanding industrial base. The industries are of diversified nature. Core industries like that of iron & steel, paper, power, cement, chemicals & fertilizers and textiles co- exist with industries dealing with products such as electronic goods, watches, aircrafts, etc.

4. In view of this scenario, KSL is planning to set up independently, a 1.4 MTPA integrated steel plant for production of carbon and alloy steel along with stainless steel in the existing complex at Koppal and the area under acquisition adjacent to the existing plant. KSL, in strategic alliance with Mukand Limited is operating Hospet Steels Limited, an integrated steel plant in Koppal district of Karnataka, with a capacity of 0.7 MTPA of hot metal and 0.3 MTPA of rolled products. This expansion plan is mostly encouraged by the upward demand of forged products in the Defence as well as domestic sector of the country.

Summary (Cont'd)

5. KSL has entered into a Memorandum of Understanding (MoU No. 1792/B-1/95)) with the Tungabhadra Board, State Government of Karnataka on July 24, 1996. As per MoU, the Board has accorded approval for permitting KSL the required water from the River Tungabhadra flowing at a distance of about 5.2 km south of the plant site. KSL has obtained Consent for water withdrawal of 4.8 MGD (21,816 KLD) from Tungabhadra Reservoir.

6. The proposed project would be set up in the existing plant premises of Hospet Steels Limited in the adjoining area to be acquired. The land to be acquired for the proposed expansion project does not have any human habitation. Hence, there would be no issues related to land acquisition.

7. KSL has applied to the MoEFCC for preliminary environmental appraisal (PEA) of the project and firming up of the Terms of Reference (ToR) of EIA. The EIA Expert Committee of MoEFCC has evaluated the PEA Application and has firmed up the ToR for EIA of the proposed project seeking EC.

PROJECT DESCRIPTION

8. The site is located in Koppal district of Karnataka. The site lies between latitudes 15°19'25" - 15°20'41" N and longitudes 76°14'48" - 76°15'43" E and 498 m above mean sea level (MSL). It is located about 11 km west of Koppal Town and 17 km south east of Hospet city of Karnataka State. The total land area requirement is 548.90 acres.

Summary (Cont'd)

9. The annual production plan for the proposed project is envisaged as follows:

		MTPA
A. Intermediate products		
Hot metal	..	1.64
DRI	..	0.40
Pig Iron	..	0.38
Crude steel	..	1.4 ± 5%
B. Saleable steel*	..	1.36 + 5%
i. Finished products		
Bar & Wire Rods	..	0.83
Rounds & RCS	..	0.31
Total	**..**	**1.14**
ii. Semi-finished products		
Cast billets/blooms/Rounds	..	0.12
Cast Ingots	..	0.10
Total	**..**	**0.22**

* *The above stated product-mix is tentative and may vary marginally depending on the market demand*

10. The process route options considered would be i) Production of hot metal through blast furnace followed by basic oxygen furnace (BOF) for conversion of hot metal to liquid steel in Phase-I (BF-BOF route), ii) Production of hot metal through blast furnace & hot direct reduced iron (HDRI) through direct reduction plant (DR plant) followed by basic oxygen furnace (BOF) & electric arc furnace (EAF) for conversion of both hot metal and HDRI to liquid steel in Phase-II (BF+DR-BOF+ EAF + EAF with IF for SS).

11. The raw materials required for operation of the plant would be iron ore, coking coal, PCI coal and anthracite coal as principal raw materials. In addition, the additives like limestone, dolomite and quartzite would also be required. It is estimated that annually around 4.87 MT of solid raw

Summary (Cont'd)

materials would be consumed; the relative share of iron ore is near about 62%, coal about 21% and balances 17% accounts for additives like limestone, quartzite, etc. Thus, the raw materials consumption rate would be about 3.48 t/t of crude steel.

12. Total water requirement would be about 4.76 MGD, which would be drawn from Tungabhadra Reservoir, at a distance of 5.2 km in south western direction of the plant site. Raw water storage reservoir of capacity about 1.0 million cu m has been considered. KSL already has a water withdrawal permission of 4.8 MGD (909 cu m/hr), of which about 235 cu m/hr water is required for the existing plant. Balance 674 cu m/hr of make-up water would be made available for the proposed expansion from the existing system. However, an additional amount of about 230 cu m/hr water is needed to meet the water requirement for the proposed expansion. Withdrawal of this additional quantity of water need to be arranged by KSL and necessary permission from the concerned authority is to be obtained from TB authority.

13. Total power requirement for the project after Phase-II, would be about 128 MW. This would be met through in-plant generation of about 8.68 MW (5.4 MW from CDQ and 3.28 MW from TRT) and drawal of power from KPTCL grid of about 120 MW. KPTCL substation is available within 8 km from the site with 220 kV HT line brought within the area to KSL's MRSS.

14. NH 63 and NH 23 are adjacent to the Plant in North direction while NH 13 is at distance of 6 km in eastern direction of the Plant. The railway line is 0.5 km from the Plant in the northern direction and the nearest railway station is Ginigera. Captive railway siding is available for trucks,

Summary (Cont'd)

trailers coming to the plant in loaded/unloaded condition. The site is about 10 km by rail from Koppal. The nearest airport is at Hubli which is about 140 km from the plant site. Few ports namely Mormugao Port, Krishnapatnam Port and Mangalore Port are located near the plant site at distance varying from 400 to 700 km.

15. The main production facilities as planned would be as follows

Sl. No.	Production Unit	Production capacity
1	Coke Ovens and By-products Recovery Plant (COBP)	0.6 MTPA Gross Coke
2	Sinter Plant Pellet Plant	1.79 MTPA Product Sinter 1.2 MTPA
3	Blast Furnace DR Plant	1.64 MTPA Hot Metal 0.4 MTPA
4	Lime/Dolo Calcining Plant	0.12 MTPA Lime
5	Steel Melt Shop	1.46 MTPA Liquid Steel 1.4 MTPA Crude Steel
6	Rolling Mill	Ingot Casting 0.49 MTPA Bars, flats & Wire Rods 0.32 MTPA Rounds & RCS 0.3 MTPA Bars, flats & Wire Rods

16. The total thermal energy requirement (excluding electrical) for various process operations as stated earlier has been estimated at 21.46 GJ/tcs. This thermal energy would be derived from coking coal, PCI coal and anthracite. The by-product fuel gases would also add up for in-plant thermal energy requirement. In addition, there would be requirement of some amount of Liquid Propane.

Summary (Cont'd)

17. The plant would run for three shifts in a day, each shift of 8 hrs duration, throughout the year, except temporary shutdown for capital repair or annual maintenance as and when required. The proposed steel plant would be designed with four level automation systems to enable the plant and machineries achieve higher productivity with improved quality in a planned and coordinated manner.

18. It is estimated that around 1,060 personnel would be required to administer, run and maintain the plant facilities. In addition 500 personnel may be required for carrying out various contract jobs to operate and maintain the plant facilities.

19. The plant is likely to be completed within a period of 60 months. Resourceful contractors would be deployed for main packages. The construction labour force during peak period would be around 3,000 in a day; local labourers, after necessary training, if required would be deployed for construction work.

POLLUTION MITIGATION MEASURES

20. Considering handling and processing of bulk quantities of solid raw materials and by-products generated, necessary pollution control measures in respect of air and water environment have been taken into account in planning the project.

21. For handling of solid raw materials, including sizing of the same, the fugitive dust emissions would be arrested by water sprinkling, water fogging and dust extraction (DE) systems based on fabric filters. The material would be transported in covered conveyors. Stock house of sinter plant, blast

Summary (Cont'd)

furnace stock house & cast house and secondary fumes of BOF shop fumes containing dusts only would be arrested by electro-static precipitators (ESPs) of adequate capacities.

22. The emissions of volatile organic chemicals (VOCs) from the coke oven batteries would be arrested by the adoption of state-of-the art technologies such a high pressure liquor aspiration (HPLA), on-main charging of coal, water sealing of AP Caps, pusher side emission extractor, hydraulic doors, door frame cleaner etc to abate the VOC emissions within permissible values. Land based fume extraction system would be provided to control the particulate emissions from the battery doors during coke pushing.

23. Dust emissions would take place from the combustion flues of various furnaces and kilns. The dust laden waste flue gases of sintering machine would be cleaned by ESP. Lime dusts and dolo dusts of the respective kiln combustion flues would be arrested in fabric filters. SO_2 emissions due to combustion of COG would be minimised by desulphurisation of COG.

24. Application of coke dry quenching (CDQ) would reduce make up water consumption, arrest emission of particulates during quenching and also generate power from the energy recovered.

25. NOx emissions from the combustion processes would be controlled by adopting micro-processor based combustion control, use of low NOx combustion technology with induction of minimum amount of secondary air to reduce the NOx emission load and recycling of waste flue gas in the combustion zone. In order to ensure complete combustion of CO in presence of excess air, all combustion processes involving by-product fuel gases would be provided with micro-processor based combustion control devices.

Summary (Cont'd)

26. The continuous noise generated within the working area can be minimized by selecting low noise prone rotary equipment, providing sound proof control rooms, housing noisy equipment separately and considering vibration dampening while designing the plant.

27. In the case of water pollution abatement and conservation of water, each production shop would be provided with wastewater treatment plant. The treated water would get recycled to the system or to be stored in the Guard Pond for in-plant use.

28. The treatment involves principally physical separation devices, such as oil separators, clarifiers and settling chambers. The phenolic effluent from the by-product recovery plant of coke oven batteries would be treated in a Biological Oxidation & Dephenolisation (BOD) plant which comprises activated sludge process followed by cyanide treatment.

29. As an additional safeguard, the treated coke oven effluent mixed with treated plant sewage and other left out treated effluents would be finally treated in common effluent treatment plant (CETP) for secondary treatment. The treated water of CETP would be reused within the plant. However, provision for discharge of treated wastewater has been kept for emergency purpose.

PRESENT ENVIRONMENTAL SETTING

30. The proposed project would be set up within the existing premises of Hospet Steels Limited and the area (to be acquired) adjacent to the existing plant, in Koppal district of Karnataka. The present environmental setting has been

Summary (Cont'd)

ascertained for an aerial coverage of around 10 km from the project site by several field studies as required by the ToR of EIA.

Physical Environment

31. The study area falling under Survey of India (SOI) Toposheet Nos. 57A/3 and 53A/7 depicts rolling plain type of topography with small hill ranges made up of granites and few chains of Dharwar schists & gneisses. The Digital Elevation Model (DEM) generated from SRTM data (90 m spatial resolution) of 10 km radius area from the proposed plant site indicates the area is moderately undulating with shallow troughs and mounds of granites hills at scattered places. The study area comes under Tungabhadra sub-basin which is part of Krishna basin. The main streams draining the area are Maskinala, Ilkal-nadi and Hirenala, which are ephemeral in nature.

32. Geologically, the study area is a part of the Dharwar Craton of the Indian Peninsular Shield which is divided into two blocks - the major part of the area falling in the Western block and a small part in the Eastern block - separated by a major shear zone known as Chitradurga shear zone. Regionally the stratigraphy of Western block have Precambrian rocks ranging in age from Archaean (3.4 Ga) while the oldest Precambrian rocks of the Eastern block are having an age of 2.6-2.8 Ga.

33. The earthquake zoning map of India divides India into 4 seismic zones (Zone II, III, IV and V)) of which Zone V infers to the highest level of seismicity, whereas Zone II connotes to the lowest level of seismicity. Koppal district falls in Zone II of the Seismic Zoning map of India.

Summary (Cont'd)

34. The entire study area is mainly underlain by gneisses, granites and in part by schists which, being hard rocks, do not possess any primary porosity. However weathering, fracturing, joints and structural features like folds and faults associated with them have imparted a secondary porosity and permeability, which has improved water yielding capacity of the wells. The wells taping schistose formation are poor in yield compared to granite and gneissic formations. The main source of recharge is precipitation. In general ground water is available in the weathered zone under phreatic condition and under confined to semi-confined conditions in the jointed and fractured rock formations at depth.

35. The soil in the study area is slightly blackish in colour and clayey in texture. The soil is also slightly basic in nature & rich in calcium. The fertility of soil is moderately low due to low moisture content and average concentrations of nitrogen, potassium & organic carbon. Iron content varies from 980 mg/kg to 1280 mg/kg. The concentrations of other heavy metals are well below the acceptable range.

36. As per recent satellite imageries, for the core zone, nearly 66% is covered by barren land, 18% by the steel plant, 11% by greenery and balance 5% is occupied by waste dump and water reservoir. For buffer zone, a total of 10 classes were mapped. The most dominant land category is single crop agricultural land which covers around 67.0% of the whole study area followed by rocky area consisting of 10.0%, reservoir and other water bodies 10.0%, Vegetation covers about 3.0% , human settlement comprises 2.0% and Vacant land 3.0% of the total buffer zone of the study area.

Summary (Cont'd)

Water Environment

37. The Tungabhadra River is formed by the confluence of the Tunga River and Bhadra River, which flow down the eastern slope of the Western Ghats in the State of Karnataka. River Tunga contributes to the maximum part of flow in Tungabhadra. This river is rain-fed. Its catchment receives 60% of annual rainfall between June to September and 24% in October & November.

38. The total hardness (TH) of Tungabhadra canal water as reported to be in the ranges from 38 - 114.7 mg/l at several locations of the stream The average DO level for all surface streams where monitoring was done ranges between 5.3 - 5.9 mg/l whereas average BOD level ranges between 4.7 - 8.7 mg/l. Total coliform count ranges from 560-920 MPN/100 ml across various surface water sampling locations.

39. Total hardness (TH) and total dissolved solids (TDS) content in ground water were found to be in the range 210 - 1506 mg/l and 689 - 2936 mg/l respectively at the selected locations as against the allowable standards of 300 mg/l for TH and 500 mg/l for TDS. Chromium, lead, arsenic and other heavy metals are found to be below detection limit (bdl).

Air Environment

40. The climate of Koppal district is marked by hot summer with moderate humidity. The average daytime temperature during summer (March-May) is around 30°C with relative humidity of about 50%. The relative humidity rises to a level of 80% during rainy season (June-August). During winter (December-February), the average temperature is around 23°C with humidity level of about 65%. The annual average rainfall is around 530 mm.

Summary (Cont'd)

41. Based on IMD's wind data recorded at the Koppal Station the annual and seasonal windrose diagram are prepared, which shows that the wind blows predominantly from SW and NE during Monsoon & Post monsoon/Winter respectively; otherwise, it is more or less distributed.

42. Meteorological parameters of the study area was recorded by temporary continuous weather monitoring station was installed at the guest house at KSL plant site. The maximum & average dry bulb temperature was recorded between 30.7 -33°C and 23-24°C. The relative humidity ranges from 65-73 per cent, whereas average wind speed lies between 3.1-3.5 m/s. The predominant wind direction is NE and total rainfall 96 mm.

43. Mixing height, as recorded during November'14-January '15, shows an average of 174 m as night time mixing height and 1,353 m as day time mixing height. The higher mixing height during daytime is attributed to mechanical mixing of the pollutants due to wind action, leading to greater dispersion of pollutants.

44. The prevailing ambient air quality of the study area as recorded at 8 different locations, depending on the windrose, is generally clean. The respirable suspended particulate matters (PM_{10} & $PM_{2.5}$), SO_2 and NOx are lower than the permissible values as stipulated by National Ambient Air Quality Standards (NAAQS) for rural areas.

45. To assess the chemical characteristics of PM_{10}, the dust samples were analysed for silica, heavy metals, benzene soluble fraction and presence of polyaromatic hydrocarbons. It is observed from the analysis results that the dust mainly contains of iron and not any harmful constituent.

Summary (Cont'd)

Biological Enviornment

46. The study area mainly consists of single cropped agricultural lands, few scattered scrub forest lands, fallow waste lands, bare hills and an unclassed forest (Tawargera) as classified by Koppal forest Division, Govt. of Karnataka. There are no eco-sensitive zones like National Parks, Wild Life Sanctuaries, Elephant/Tiger Reserve, Migratory routes, Reserve Forest, Protected Forest with in the study area.

47. Trees in the study area are tropical dry deciduous in nature, scattered along the road sides and boundary of agricultural lands. Dominant tree species of the study area are Neem (*Azadirachta indica), Amaltas (Albizzia lebbek),* Krishna siris *(Albizzia amara),* Sissoo *(Dalbergia sissoo),* Ballarijali*(Prosopis juliflora), etc*. The scrub forests are scattered through out the study area comprising of thorny Acacia and fleshy Euphorbia. The major species of medicinally important shrubs and herbs are Akanda (*Colotrophis gigantean),* Jangli arand *(Jatropha glandulifera),* Wild karanda (*Carissa diffusa),* Nisinda (*Vitex negundo),* Barmutha grass *(Cyanodon doctylon),* Datura *(Datura stramonium),* Bhringaraj *(Ecipta alba), Tulsi (Ocimum sanctum), etc.*

48. The major agricultural crops of the study area are Rice (*Oryza sativa*), Jowar (*Sorghum vulgare*) and Maize (*Zea mays*), Wheat (*Triticum aestivum*), Sunflower (*Helianthus Annuus*) and Groundnut (*Arachis Hypogea*). The important fruit plants are *Musa paradisica* (Banana), *Mangifera indica* (Mango), *Carica papapya* (Papita), *Psidium guava (Guava), Annona squamosa* (Sitaphal) and *Syziguim cumini* (Jamun).

Summary (Cont'd)

49. No such major wild animals found in the study area except occasionally visiting animals like *Monkey (Macaca mulata)* and Langur (*Presbytis entellus*). The entire study area is devoid of Schedule- I & II category faunal species as per Wildlife Protection Act (1972) and its subsequent amendment. None of the flora-fauna can be assigned rare, endangered, threatened or vulnerable category as per IUCN, Red data book.

50. A total of twenty (20) identified species of aquatic macrophytes of which Bush morning (*Ipomoea carnea),* Purple nutsedge *(Cyprus sp.),* Narrow leaf cattail *(Typha angustifolia) and* Pond weed (*Potamogeton crispus)* are dominant and most widely distributed in the shallow lakes and reservoirs of the study area. A total of twenty (20) Phytoplankton & Zooplankton species were identified in the aquatic habitats, with Phytoplanktons are dominated by *Navicula sp., Nostoc.sp., Ulothrix sp.* followed by *Volvox sp., Oscillatoria sp.*, and *Closteridum sp.* and Zooplanktons are dominated by Copepoda and Rotifers followed by Cladocera. The aquatic habitats have moderate level of planktonic mass and organic nutrients. The natural macro fauna, fish species are moderately produce in the main water body Tungabhadra reservoir.

Human environment

51. The Project Influence Area (PIA) is mainly rural in nature and it encompasses 19 major villages and one urban agglomeration within 10 km radius from the existing Plant site. The total population of the PIA is around 87,716 as recorded in 2011 Census. The decadal population growth rate is 21.14% while literacy rate shows an impressive rise of 24 % since 2001.

Summary (Cont'd)

52. The per capita annual income of the State as per Planning Commission data of 2011 is Rs 69,051. Major sources of livelihood in the project influence area are agriculture, work in factories, petty business and services, with noteworthy increase in the population of cultivators and agricultural labourers. However, the proportion of non workers continues to be about fifty percent in both 2001 and 2011 indicating almost half of the population as dependent population comprising senior citizens, children and 'specially-abled' members.

53. There has been significant immigration from various states of the country owing to high generation of employment and growth of petty business & services in parallel to rapid growth of industries. Emigration pattern is more limited to local boundaries like that of Koppal and Huligi, the youth population is also confined within the district boundaries.

54. Government primary health centres or dispensaries are located in mostly all villages in the study area. For advanced and critical health care, people visit Hospet, Ginigera, Munirabad and Koppal wherein both government and private services are available. In each village the concerned panchayat is accountable to provide clean supply of drinking water and majority have access to it. Few factories and banks have installed water filters in villages like Kanakapur and Agalkera.

55. There are various banks in the PIA, State Bank of India, Pragati Gramin Bank, Syndicate Bank are to name a few. People borrow money from local money lenders as well as from Thrift and Credit (T&C) Societies run by women. Anganwadis and primary schools (both government and private) are present in most of the villages. For secondary and higher secondary schooling and varied degree courses, students travel to Koppal, Ginegera, Hospet, Mundrabad.

Summary (Cont'd)

56. The study area is dry and rain fed and the area is rural and agrarian in nature, the weather being hot & semi-arid. The proposed expansion area is a bare land with small hillocks, scrubs and boulders. Hampi is the nearest archaeological place and heritage site and is located 31 Km (E) from the project area.

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

57. Initial scoping of environmental impacts of the project has been evaluated by the MoEFCC. Accordingly, the Terms of Reference (ToR) of EIA has been firmed up. In addition, other relevant impacts such as selection of process technology, site acquisition, social issues etc have also been covered in the EIA.

58. EIA findings and the mitigation measures to minimize the negative impacts on environment are summarized below:

Sl. No.	Activity	Environ-mental impacts	Mitigation measures	Benefits
i)	Establishment of Project	Industrial Development	- Water conservation - Pollution control measures - Solid wastes management - Greenbelt development - Social upliftment etc	- Infrastructure improvement; - Employment generation; - Revenue earning by the Government in the form of taxes & duties; - a capital asset of the State; - wide scope for economic development of the nearby areas
ii)	Construction	Temporary adverse impact due to emission of dusts, discharge of construction wastewater and safety of construction workers	- Mechanised construction to reduce the construction period - Dust abatement by water sprinkling - Stoppage of noise prone work during night time - Safety practices and use of Safety appliances - Proper management of liquid & solid discharge	- Prevention of surface stream pollution - Reasonably clean workzone environment

Summary (Cont'd)

Sl. No.	Activity	Environ-mental impacts	Mitigation measures	Benefits
iii)	Water withdrawal from Tungabhadra river	Adverse, if adequate conservation measures are not adopted	- Water conservation by closed loop recycling of wastewater after treatment - Use of treated wastewater in various non-production uses - Rain water harvesting in ponds	River water withdrawal would be minimum without affecting other downstream users.
iv)	Discharge of Plant Wastewater	Adverse, if untreated wastewater is discharged to the nearby stream	- Wastewater Treatment for respective production shops - Recycling of treated wastewater within the respective plant to conserve water - Providing CETP for final treatment of treated coke oven effluent, treated plant sanitary wastewater and other bleeds of treated effluents - The finally treated effluent from CETP would either get reused in the cooling circuit or stored in Guard Pond for other uses such as greenbelt/landscape maintenance - A part of the treated water from CETP would be further treated in ultrafiltration (UF) plant to further use for secondary purposes in plant units.	- Reuse of treated wastewater collected in the Pond - As there would be minimum plant discharge into the surface stream, the quality of surface stream would not be greatly affected.
v)	Air pollution from production processes	Adverse due to emission of heat, dusts, SO2, NOx, CO and VOC	- VOC emission of coke oven batteries would be arrested by modern technological features - Covered conveying systems for dry raw materials - Adoption of Coke dry quenching (CDQ) - Coke oven gas desulphurization - Water sprinkling and dry fogging for suppression of fugitive dusts - ESP based workzone fugitive dust extraction devices - Tall stacks for better dispersion of airborne pollutants	- To keep ambient air less polluted and maintain rural standards of ambient air quality - Prevent endemic diseases of the community

Summary (Cont'd)

Sl. No.	Activity	Environ-mental impacts	Mitigation measures	Benefits
vi)	Workzone noise	Adverse due to noise from rotary/vibrator machines/ equipment, steam ejection etc	- Selection of low noise prone rotary equipment, vibration dampening and dynamically balanced of rotating parts - Housing of noise prone equipment in a separate enclosure - Operation from the noise shield cabins/pulpits - Administrative control	Operation and maintenance personnel would not get noise exposure more than 85 dB (A) for a continuous period of 8 hrs.
vii)	Solid wastes generation	Adverse, if the solid wastes generated are stockpiled in open area for years together	- Maximum practicable processing of solid wastes either by reuse within the plant or by selling or by other gainful use - To avoid contamination of ground water due to leaching, the storage yard would require concrete liner	- To block minimum land area for solid wastes dumping - Maximum reuse of solid wastes for commercial/ useful purpose to prevent ground water contamination
viii)	Health	Adverse on the occupa-tional health of the working personnel & community people	- On-line monitoring of emissions and wastewater release and corrective actions if pollution level exceeds the design target - Occupational health care of the plant personnel as per international practice	- Check on the occupational ailments/hazards - Prevention on the loss of production mandays
ix)	Safety	Adverse due to safety lapses	- Extensive safety measures for the plant operation and maintenance, electrical installations, fire safety measures including fire/smoke detection alarms, portable CO detectors and personnel safety appliances	- Avoidance of accidents causing minor to fatal injury of the plant personnel - Avoidance of dangerous events like gas leak, fire, injuries etc
x)	Peripherial Socio-economy	Beneficial	- As a part of Corporate Social Responsibility (CSR), social upliftment programmes in consultation with local people for development of education, infrastructure, health & drinking water supply and physical environment	- Acceptance of the project by the local population through accountable & transparent measures - Sustainability of the project by believing in the principle that social responsibility becomes an integral part of the business - Social upliftment and employment opportunity for the local people

Summary (Cont'd)

59. For implementation of the proposed environmental mitigation measures, the estimated capital expenditure (CAPEX) would be around Rs 300 crores. Of the total estimated CAPEX. Rs 232 crores would be spent towards various forms of pollution mitigation measures and balance Rs 68 crores have been provided for greenbelt development, eco-restoration, on-line monitoring & environmental laboratory and energy conservation.

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

60. In order to have effective management of the overall environmental performance of the plant including social commitments, it is essential to have a comprehensive environmental management plan (EMP). This plan includes a proper organization structure, responsibilities, planning, budgeting, training etc.

61. The operation of the plant would have to comply with the environmental regulations, public liability, Government Notifications etc as applicable from time to time for industrial operation.

62. Without proper organizational set up, EMP cannot be enforced. It is, thus, proposed to build a suitable organizational structure having three functional wings, namely, (i) Environment, (ii) Health and (iii) Safety, for implementation of the mitigation measures and continuous improvement on overall performance of the plant. The organisation would be manned by experienced professionals in the areas of environment, health and safety (EHS).

63. The functions of EHS cover monitoring, regulatory compliance, remedial measures planning, budgeting, implementation and occupational health care and safety. The organization is required to adopt comprehensive

Summary (Cont'd)

environmental management, social responsibility management system and occupational health care systems of the plant as required by ISO-14001-2004, SA-8000-2008 and OSHAS-18001-2007 respectively, in addition to quality management system of ISO-9002.

64. Imparting Training, implementation of programme on eco-restoration, Green House Gas (GHG) emission reduction and Research and Development (R&D) for resource conservation and wastes reduction would be an integral part of the environmental management.

65. KSL would undertake various initiatives under Corporate Social Responsibility for this project site for uplifting the socio-economic status of the local people by providing health and education facilities, skill development, business entrepreneurship development etc. The total budget allocated towards peripheral social development and CSR activities is estimated at Rs 100 crores for the proposed expansion project.

ENVIRONMENTAL RISK ASSESSMENT

66. It is presumed that the proposed project would be designed, engineered and installed with the standard code of practices of engineering, best practicable safety measures and environmental safeguards.

67. In spite of adaptation of best engineering of the plant and facilities, accidental events cannot be ruled out due to some design deficiency or improper operation and maintenance or malfunctioning of the various control systems installed. This may affect life, property and environment.

Summary (Cont'd)

68. Hazard potentials at this pre-engineering stage of the project have been identified. Some of the potential hazards may arise due to failure of effluent treatment plants, fuel gases storage and handling systems, pollution control systems, electric short circuits, unsafe storage and handling of oily wastes etc.

69. After design freeze or prior to commissioning, it is proposed to have HAZOP study with consequences, particularly for handling of fuel gases and combustible products, to take further safeguards in the plant engineering and operation manuals.

70. Safety during construction and operation would be of utmost importance. The plant would have its own on-site & off-site management plan to deal with various emergencies. Also, various aspects of Disaster Management Plan (DMP) have been discussed and it is suggested to get a DMP report prepared that would help the plant personnel tackle disastrous events.

ENVIRONMENTAL IMPACT STATEMENT

71. In consideration of the predicted environmental impacts, mitigation measures, environmental risks and the implementation of the proposed EMP of the project under consideration to be sited at Koppal, a matrix of net environmental impacts is presented at the end. It may be seen from the EIA matrix of the project that if the proposed mitigation schemes with effective environmental management on a continual basis are implemented, the prevailing environment would not become alarmingly adverse; rather it would usher in economic development of Koppal region.

Summary (Cont'd)

Table - Environmental Impact Statement at Operational Stage

Environmental Attributes	Impact on baseline: Project without mitigation measures	Impact on baseline: Project with mitigation measures and EMP	Remarks
I. Physico-chemical			
Soil cover	-1	0	
Land use (Solid waste storage)	-2	0	
TB water resource	-2	-1	
TB water quality (outlet)	-1	0	
Ground water resource	0	+1	
Ground water quality	0	0	
Ambient air quality	-3	0	
Workzone air quality	-3	0	
Workzone noise	-2	0	
Ambient noise	0	0	
II. Biological			
Terrestrial ecology	-1	+1	Due to greenbelt development to the extent of 33% of area to be acquired
Aquatic ecology	-2	0	
III. Human			
Infrastructure	+1	+3	
Temporary Employment generation	+1	+3	
Economic upliftment of locals	+2	+3	
Social upliftment and education	+1	+2	
Health	-2	0	
Safety	-2	0	
IV. Aesthetics			
Climate	0	0	
Landscape	-1	0	
Green coverage	0	+1	Due to greenbelt development to the extent of 33% of area to be acquired

Legend: **'1'** = Marginal**; '2'** = Moderate**; '3'** = Significant**; '4'** = Irreversible
(+ve) = Beneficial; **(-ve)** = Adverse