

Executive Summary

1. Brief Description Of the Nature of the Project

The proposed “Development of Chamarajanagara Industrial Area” is an Industrial theme park with a vision of providing “Hassle free production environment” for Specialized industrial parks for spices, a textile park, food park and granite park, several industries involved in agro-processing, Ayurvedic farm park, coconut processing, General engineering and Automobile industries, power and renewable energy parks will be set up within the industrial hub etc.

The area earmarked for the proposed industrial area is about 591.04 Ha (1460.47 Acre) of land. The capital cost of the proposed project is Rs.191 crores. Presently the land is Proposed project site is plain land with sparse vegetation, barren with degraded shrub in most of the area, while some land is also covered by agricultural activity.

2 Identification of Project and Project Proponent

KIADB identified the land and wanted to develop an industrial area with a purpose to promote an orderly development of industries in the state.

Any activity aimed at development will have repercussions on the environment, both positive and negative. Environmental Impact Assessment (EIA) study is a management tool, which enables the proponent to identify the negative impacts and to mitigate the negative impacts through appropriate Environmental Management Plans. Hence KIADB as a part of the compliance to the regulatory requirement i.e. to obtain Environment Clearance (EC) from Environmental Appraisal Committee (EAC), MoEF&CC, Delhi have appointed M/s.Ramky Enviro Engineers Ltd, Hyderabad as an Environmental consultant to carry out the studies for the proposed Development of Chamarajanagara Industrial Area.

3 Need of the Project

In order to improve the socio – economic status of the country “Development of Industries is a Must”. Due to the proposed development of industrial area at in Badanakuppe & Kallambelli Villages, Chamarajanagara Taluk & District.

1. There will positive impacts on the socio – economic status of the surrounding areas
2. More employment opportunities will be generated
3. Physical infrastructure development such as improvement to roads, UGD lines, street lights etc. will take place

4 Salient Features of Location & Landscape Area Details

The salient features and the latitude and longitude of the proposed Chamarajanagara industrial area are depicted in **Table 1**.

Table. 1

Salient features of the proposed Development of Chamarajanagara Industrial Area

Latitudes	N 11° 58' 55.7" and 11° 58' 28.8"
Longitudes	E 76° 52' 59.35" and 76° 52' 34.49"
Nearest Town	Chamrajanagara -9.5 km (SE)
Nearest City	Bengaluru - 134 km (NE)
District head quarters	Chamrajanagara -9.5 km(SE)
Nearest Railway Station	Badanakuppe Railway Station- 3.5km (NW)
Nearest Airport	Bengaluru Airport -162km (NE)
Nearest Highway	SH-80 Mysore - Chamarajanagara Road- adjacent SW NH 209 Chamarajanagara – Bangalore-7.5km
Elevation	760-780m MSL
Water Requirement	10068 KLD
Power Requirement	6 MW from KPTCL
Manpower requirement	16,734 Persons
Waste Water Generation	4158 KLD
Nearest Habitation	Badanakuppe & Kallambelli- 0.5km (W)
Nearest Forests	None within 10km radius of the project site
Nearest Water Bodies	Kabini River- 26.0 km (N)

5 Power Requirement

The total power requirement for the active industrial area would be 6 MW and would be met by KPTCL which would be utilized for industrial, commercial, utilities and for proposed CETPs and CSTPs. For emergency backup, DG Sets are proposed.

Around 2000 liters of HSD would be stored at site on weekly basis as for utilization in DG sets to meet emergency power requirements for CETP/CSTP and utilities (Assuming 40 liters/hr of HSD for 250 KVA DG set and 80 liters/hr of HSD for 500 KVA DG set for CSTP and CETP respectively).

6 Water and Waste Water Generations

The total water required and wastewater generated for the Development of Chamarajanagara Industrial Area is given in **Table 2**.

Table 2
Water Requirement and Wastewater Generation - (KLD)

S.No	Utility	Water Requirement			Wastewater generation
		Total	Fresh	Treated	
1	Industrial Units	4351	4351(for day one)	3306.76	3480.8
2	Potable/ Domestic	753	753	643.815	677.7
3	Green belt development	4964	1013		-
	Total	10068	6117	3950.58	4158.5
Note: 3951 KLD of treated water will be used for Green belt development					
1.12.5 KLD/Ha of Industrial land (348.87 Ha)					
2. 45lpd/person for industrial workers (16734 persons)					
3.10KLD/Ac for Greenbelt (496.44 ac)					

Total Water demand for the proposed project is 10068 KLD(6117 KLD fresh water +3951 KLD treated water) Water source will be the nearby surface Water body (Kabini River) and from the ground water source also.

7 Man Power

16,734 persons would be employed for the project out of which 4186 would be Executive staff and 12550 persons are needed as skilled/unskilled workers. Work force will be employed from the nearby villages on priority basis for operational maintenance of the proposed Industrial Area.

8 Baseline Environmental Status

The baseline environmental data was collected from 10km radius around the site (study area) to assess the impacts arising from proposed industrial activities.

8.1 Meteorology (Climate)

Meteorological data was collected for the study area during the months of Post monsoon (September, October and November (2015)). Wind Speed, Wind Direction, Temperature, and Relative Humidity were recorded on hourly basis during the study period. Secondary meteorological data has been collected from the nearest IMD station of Mysore.

The climate of the study area is classified as warm, humid and tropical. For the entire Post monsoon season the winds were predominantly recorded from SW followed by W, WSW and NE. Calm conditions prevailed for 12.41 % of the total time and the average wind speed for the season i.e. September to November 2015 is 2.20 m/sec. The average maximum temperature is 36.6⁰C and minimum is 21.1⁰C. The relative humidity is high during SW monsoon season which rises during morning time throughout the year; while

in the afternoon, it is comparatively low except during SW monsoon season. The humidity is very less with 35% and still lowers in the afternoons (Jan to April).

8.2 Air Quality

Around 10 Ambient Air Quality Monitoring locations were monitored for SO₂, NO_x, Ozone (O₃) and Particulate Matter (PM) <2.5µm and <10µm in the study area.

- Range of 98th percentile of PM <2.5µm is 19.5 to 35.8 µg/m³ and the range of <10µm is between 49.4 to 57.9 µg/m³.
- Range of 98th percentile of SO₂ is 11.6 to 16.4 µg/m³ and the range of NO_x is between 19.7 to 26.2 µg/m³
- O₃ values were in the range of 14.4 to 20.7 µg/m³.

The observed air pollutants were within the limits as per NAAQ standards.

8.3 Water Quality Status

About 10 ground and 2 surface water samples were collected from the study area to assess the water quality during the study period. The ground water samples were drawn from the hand pumps and open wells being used by the villagers for their domestic needs. Surface water sampling was carried out from major tanks / ponds within 10km of the proposed project site.

Ground Water

- The pH was varying for ground waters from 7.29 to 7.92, indicating that they are in acceptable limits.
- The total dissolved solids are varying from 382 mg/l to 1130 mg/l. The two samples were below acceptable limit. Rests of all the samples were above the acceptable limits but within the permissible limits of 2000 mg/l.
- The Chloride levels in the ground water samples collected in the study area were ranging from 24 mg/l to a maximum of 209 mg/l. All Samples are within the acceptable limit.
- The hardness is varying from 248 mg/l to 691 mg/l. All samples are above the acceptable limits but within the permissible limits.
- The fluoride values were in the range of 0.59 to 1.12 mg/l. The fluoride levels in all samples were within the acceptable limit.

Surface Water

- The pH level in the surface water from 8.83 to 8.87 which is meeting the Class 'A' norms as per IS: 2296 -1992 Standards.

- The total dissolved solids are varying from 143 to 205 mg/l, which is meeting the Class 'A' norms as per IS: 2296 -1992 Standards.
- The chlorides are varying from 17 to 26 mg/l, which is meeting the Class 'A' norms as per IS: 2296 -1992 Standards.
- The hardness is varying from 83 to 96 mg/l, which is meeting the Class 'A' norms as per IS: 2296 -1992 Standards.
- The fluoride levels are varying from 0.38 to 0.66 mg/l, which is meeting the Class 'A' norms as per IS: 2296 -1992 standards.

From the above results it is shown that maximum no.of ground water samples that are collected and analyzed are found to be with in the acceptable limits. Few samples are above the acceptable limit but within the permissible limit. Hardness, Chloride and TDS levels in one or two samples are above the permissible limits. Surfacewater samples are meeting the class 'B' norms as per IS: 2296-1982 inland surface water Standards.

8.4 Noise Quality

Baseline noise levels have been monitored at 11 locations within the study zone, using a continuous noise measurement device. The day levels of noise have been monitored during 6 AM to 10 PM and the night levels during 10 PM to 6 AM. The day equivalents during the study period are ranging between 52.6 to 62.6dB (A) whereas the night equivalents were in the range of 41.4 to 45 dB (A). From the results it can be seen that the Day equivalents and the Night equivalents were within the Ambient Noise standards of residential areas standards.

8.5 Soil Quality

The area in particular is generally red sandy with patches of silty loam and red loamy soils. For studying the soil types and soil characteristics, 9 sampling locations were selected to assess the existing soil conditions representing various land use and geological features.

The results are:

- pH values in the study area are varying from 7.18 to 7.81 indicating that the soils are falling in normal to saline class.
- Electrical conductivity in the study area is varying from 41 to 136 μ s indicating that soils falling under Normal category and do not indicate any hazard to soil, agriculture and ecological balance.
- The organic carbon in the study area is varying from 0.12 to 0.53 % which indicating that seven samples are in low range and two samples are in medium range

- The available Nitrogen as N in the study area is varying from **132 to 212 kg/ha** which indicates that all samples are in Low range.
- The available Phosphorus is varying from **11 to 33 kg/ha**, which indicates that five samples are in medium range and four samples are in high range.
- The available potassium in the study area is varying between **30 to 187 kg/ha** which indicates that seven samples are falling in low range and two samples are medium range.

8.6 Flora & Fauna

Ecological survey was done to understand baseline ecological status, important floristic elements, fauna structure. Secondary data was collected from Forest Working Plan and Gazetteers.

Project land is a non forest wasteland. A part of it was under rain fed dry cultivation and the rest was sparsely colonized by xerophytic shrubs. It was open to grazing by local domestic livestock of sheep, goats and cows. Depending the landuse before the present, different areas supported different types of vegetation and flora. The areas under cultivation were colonized mainly by weeds while the wastelands were colonized mainly by non palatable xerophytes and succulents. The prominent and abundant species include *Dodonaea viscosa*, *Tarenna asiatica*, *Erythroxylon monogynum*, *Agave americana*, *Lantana camara*, *Chromolaena odorata*, *Acacia leucophloea*, *Prosopis juliflora* and others. There are only a few trees of Neem, Tamarind and White babul.

The common crops in the study area are *saccharum officinarum*, *oryza sativa*, *Triticum diococcum*, *Pennisitum glacaum*, *ziamays* which are mainly depend on rainwater and tube well, borewell in non-monsoon season.

In addition to these crop lands, various weeds are entered like *Cynodon dictylon*, *Euphorbia hirta*, *Cyperus rotundus*, *Digitarea species* and *Alycicarpus* are also contributing to primary production. Apart from that commercial crops like *groundnut*, *sunflower* and several vegetables like, red chillies, brinjal, bhendi, leafy vegetable crops are also grow in this region.

There is no national park, wildlife sanctuary, biosphere reserve within 10 km of the study area. As per Wildlife Protection Act 1972, there is no critically endangered, endangered, threatened or rare species of wildlife in the core & buffer zone.

8.7 Socio Economics

Sample survey was done to collect qualitative information about the socio economic environment of the area. The Study area (10km radius of the proposed Development of Chamarajanagara Industrial Area) is mostly inhabited by economically weaker section people. Lack of amenities such as roads, drinking water, dwellings, lavatories, education, employment, medical and electricity facilities was evident during the site visit.

Though agriculture is the main occupation, in the studied villages it has provided employment opportunities to only 50-60% of the families.

The remaining population is depending on the other type of employment opportunities mainly as labourers. These opportunities are provided by surrounding Argo based works in the nearby area. In each village 10-15 people are getting employment opportunities as daily wage earners. The proposed Chamarajanagara Industrial Area Project by KIADB will facilitate the direct employment opportunities.

8.7.1 Social Services needed

These villages want improvements in basic facilities and especially towards medical facility either through regular or through mobile health services. The five villages namely kasturu, Kellamballi, Badanaguppe, Paduvalamarahalli, Cikkahomma needed the following services.

- Proper Drinking water facility in the village.
- Drinking water through OHT (over head tank) with taps.
- Arrange for public toilet & Taps.
- Need PHC (primary health centre)
- Need community hall, library, playground and cremation ground for village
- Educational drawing should be done on the compound wall. Village roads need to be improved further for better transport services.
- Arrange bus facility and BT roads
- Compound wall, computer lab, library, racks, safe drinking water, and separate toilets for staff & students in the school
- RO water Treatment plants
- Continuous availability of Electricity
- Special training for employment youth
- Cement Roads/Road Improvements
- Health facility either through regular or through mobile health services.

9 Anticipated Environmental Impacts and Mitigation Measures

9.1 Impact on Air Quality

The Predicted maximum Ground level concentration of 24 Hour average of SO₂, and NO_x concentrations considering 24 hour mean meteorological data of study season are superimposed on the maximum baseline concentrations obtained during the study period to estimate the post project scenario, which would prevail at the post operational phase.

The major type of fuel used for DG set & Boiler is HSD and the expected GLC concentrations for SO₂ is 0.38 µg/m³ and whereas the NO_x GLC concentrations are 19.5 µg/m³.

The overall post project scenario along with existing baseline concentrations of SO₂ & NO_x is found to be 16.08µg/m³ and 39.6 µg/m³ respectively, against the NAAQ standards of 80µg/m³.

9.1.1 Mitigation Measures

Following mitigation measures will be adopted to limit the environmental impact during constructional phase:

- Regular water sprinkling will be done to avoid the dust materials entering into the atmosphere. Furthermore, during windy days, the frequency of the water sprinkling will be increased.
- The vehicular movement will be minimized, with a planned scheduling, to reduce the emission of pollutants.
- Temporary thin sheets of sufficient height (3m) will be erected around the proposed site for development of Chamarajanagara Industrial Area as a barrier for dust control.
- The excavated material shall be reused within the boundary from the Chamarajanagara Industrial Area and the movement of cut and fill material will be limited.
- Plantation of trees around the proposed boundary of Chamarajanagara Industrial Area and it will be initiated at the early stages by plantation of 2 to 3 years old saplings using drip irrigation so that the area will be moist for most part of the day.
- All the vehicles carrying raw materials will be covered with tarpaulin/plastic sheet; unloading and loading activity will be stopped during windy period.
- To control SO₂ and NO_x emissions from DG set & Boiler stacks with sufficient height will be proposed to meet the MOEF&CC guidelines.

9.2 Impact on water quality

The total water requirement for the industrial area will be 10068 KLD. This will be met by reusing treated water to the tune of 3950.58 KLD and with a fresh water intake of 6117 KLD. The main source of fresh water is Kabini River & Bore wells.

9.2.1 Mitigation measures

Waste water generated from all the proposed units are treated in a common effluent treatment plant. The expected waste water characteristics are pH of 6.5-8.0; Oil & grease less than 10mg/l; TSS less than 50mg/l; TDS 4000-4500 mg/l; COD 3000 to 3500mg/l.

The industrial and domestic effluent are collected through separate drains and treated in CETP & CSTP respectively. Treated water is used for greenbelt development to the maximum extent along with industrial floor washing and cooling purpose

9.2.2 Storm Water Management

Storm water drains would be provided to collect rain water all along the road network with adequate size to prevent flooding of the site. Rainwater harvesting structures are proposed for recharge of water from roof top and paved surface at buildings. The storm water drains will be acting as recharge trench as the bottom will not be lined and intermittent check dams will be provided in the storm water drains, so that maximum amount of rainwater infiltrate into the ground. Treatment for silt, oil & grease removal will be provided to rainwater harvesting recharging pit. Excess water will be diverted into the common storm water drain. The width and depth of the drain proposed is 1 m and 0.8 m respectively.

9.3 Solid and Hazardous Waste Management

Municipal Solid Waste would be collected and stored in an earmarked storage yard and further hand over to the authorized facility for treatment and disposal by the member industries & by the developer.

The hazardous waste generated from all proposed industries, will utilize the services of the Common Hazardous Waste Management Facility (CHWMF) which already exists near Dobaspet village(Near Bangalore) von NH 207. Safe storage and transportation of the produced solid and hazardous waste is the total responsibility of the member industry.

9.3.1 Mitigation Measures

During construction phase, all attempts should be made to stick to the following measures.

- construction waste shall be stored within the proposed site for development of Chamarajanagara Industrial Area itself. A proper screen will be provided so that the waste does not get scattered.
- Attempts will be made to keep the waste segregated into different heaps as far as possible so that their further gradation and reuse is facilitated.
- Materials, which can be reused for purpose of construction, leveling, making roads/ pavement will also be kept in separate heaps from those which are to be sold or land filled.
- The local body or a private company may be arranged to provide appropriate number of skip containers/ trolleys on hire.

The major solid wastes generated during operation are waste oil, and used batteries and domestic waste. The details of the hazardous and non hazardous waste generated are given in **Table- 3&4**

Table- 3:
Details of the Hazardous Waste

Category of Wastes	Name of the waste	Quantity	Method of collection and disposal
Batteries (M&H) Rules 2010	Lead acid batteries	712 nos / year	Will be returned back to supplier
Used oil Category of 5.1 of schedule -1	Used oil	3800ltrs /year	CHWMF (Common Hazardous Waste Management Facility) for appropriate treatment and disposal or any authorised dealer
Bio medical Waste Rule 2011	Bio-medical Waste	11.2 Kg /day	Bio Medical Waste Treatment Facility operator.
CETP	Sludge	2.8TPD	CHWMF (Common Hazardous Waste Management Facility) for appropriate treatment and disposal
E-waste s(Handling & Management Rules 2011	e-wastes	11,713 Kg/year	Will be returned back to supplier/ E-Waste Facility
Note: 1. Waste battery generation @ 2 batteries/ industry per year (356 industries) 2. Used oil @ 20litres /year for 120 KVA DG set; 40 liters/ year for 250 KVA; 150 liters/year for 1000 KVA (120KVA X 133, 250KVA X 3, 1000KVA X 6) 3. Biomedical waste @ 150 gms/person/day for about 75 persons per day 4. E-waste @ 0.7kg/person/year in India			

Table-4
Details of the Non- Hazardous Waste

Particulars	Units	Quantity/day	Remarks
CSTP Sludge	Kg	110	Used as a manure for green belt
Domestic & Canteen waste	Kg	6694(@0.4)	Disposed to local municipalities / Compost plant.
Note: • As per CPHEEO manual the per capita MSW generation in developed countries is 0.2-0.6kg/d			

Recyclable wastes like paper, cartons, plastics, scrap materials etc will be sold for further reuse and recycle.

9.4 Greenbelt Development

Natural vegetation would be damaged during construction owing to civil and infrastructure development. But none of the plants or animals of the proposed site (Core area) belong to Rare or Endangered or Endemic or Threatened (REET) categories. Hence, there is very less chance of losing any valuable biodiversity. However a detailed green belt development programme within the project site will be provided as per standard procedures. Around 266.87 Acres of land is allotted for green belt development within the industrial area.

9.4.1 Mitigation measures

- When the project is fully operational over a period, greenery would be developed in the form of avenue trees, ornamentals, fruit trees and lawns.
- There is no plan to introduce new exotic species except those that have become naturalized. Preference will be given to native and local trees.
- Planting stocks are readily available from the Forest Department as well as from the local private nurseries.
- All plants are locally adapted and the present site can support their growth with suitable horticultural practices. Sufficient space, resources and man power for development and maintenance are provided in the plan.

10 Environmental Monitoring Programme

10.1 Constructional Phase

The proposed Development of Chamarajanagara Industrial Area envisages the setting up of major components is mechanical and electrical equipment's for common utilities.

The constructional activities involve:

- Clearing of vegetation
- Mobilisation of constructional material
- Mobilisation of equipment.

The constructional activities are expected to last for a short period and dust suppression will be done by regular sprinkling of water and providing mobile STP for treating waste water at the site.

10.2 Operational Phase

During operational stage of Development of Chamarajanagara Industrial Area, continuous air emissions (Particulate Matter, SO₂, and NO_x emissions) and wastewater generation are expected. The following attributes which merit regular monitoring based on the environmental setting and nature of project activities are listed below:

- Source emissions and ambient air quality;
- Groundwater Levels and ground water quality;
- Water and wastewater quality (water quality, effluent & sewage quality etc);
- Solid waste characterisation (HW/MSW/CETP / CSTP sludge);
- Soil quality;
- Noise levels in and around the proposed Development of Chamarajanagara Industrial Area (equipment and machinery noise levels, occupational exposures and ambient noise levels); and

- Ecological preservation and afforestation.

10.3 Environmental Laboratory Equipment

The proposed Industrial Area would maintain an in-house environmental laboratory for the routine monitoring / sampling of Air, Water, Soil, Meteorology, and Noise which can also be utilized by the member industries / developer. The In house laboratory equipment's required for monitoring / sampling /analysis are listed in **Table 5**.

Table 5
List of Equipment Proposed for Environmental Laboratory

Name of the Equipment	No of Instruments
Manual or Automatic Weather Station, which can record wind speed, wind direction Temperature, Relative Humidity	1
Gaseous stack monitoring kit for SO ₂ , NO _x , Flue gas volume, Temperature and conventional monitoring kit for particulates	1
Air samplers with PM<10 μm & PM <2.5 μm provision	6
Portable Noise level meter (Dosimeter)	1
Portable Wastewater Analysis Kit	1
Electronic Micro Balance with minimum 0.01mg	1

11 Project Benefits

The proposed Development of Chamarajanagara Industrial Area shall have positive impact on consumption behavior by way of raising average consumption and income through effective Environmental Management System by Common Sewage / Effluent Recycling Systems.

11.1 Socio-economic benefits

1. The development of IA shall bring about changes in the pattern of demand from food to non-food items.
2. Due to the corporate social responsibility (CSR) activities of the proposed Development of Chamarajanagara Industrial Area, the socio economic condition of the people will be improved.
3. Project would facilitate in further development of social infrastructures such as Education facilities, Post offices, Medical facilities, Plantation and parks.

11.2 Physical Infrastructure development

Developments of roads; Lying of UGD lines; Improvement in transportation facilities (government/ private buses); Business Establishments; Improvement in street lightings; Improvement in water supply system.

11.3 Employment Potential –Skilled; Semi-Skilled And Unskilled

Indirect employment opportunities to local people in contractual works like transportations, sanitation, for supply of goods and services to the project and also other community services will be developed.

11.4 Other Tangible Benefits

- Additional housing demand for rental accommodation will increase
- Market and business establishment facilities will also increase.
- Cultural, recreation and aesthetic facilities will also improve.
- Improvement in communication, transport, education, community development and medical facilities.
- Overall change in employment and income opportunity.
- The State Government will also benefit directly from the propose Development of Chamarajanagara Industrial Area through increased revenue from royalties, excise duty and stowing duty.

12 Budgetary Provisions for EMP& CSR

Cost towards investment for Environmental Management / Environmental Mitigation Measures will be around Rs.26.56 crores and 10% of this will be the recurring cost.(2.65 crores).

Financial help will be provided to local youth (tuition fees, hostel charges, books, examination fees, etc) and trainings in Industrial training institutes/ centers, Polytechnics in various trades like Electricians, Plumbers, Fitters, Driving, etc. An approximate amount of Rs. 196 lakhs equivalent to 1% of the total project cost i.e., Rs. 191 Crores is earmarked towards CSR Activities for a span of four years initially.

13 Conclusions

It can be concluded from overall assessment of the impacts in terms of positive and negative effects on various environmental components that the project activities will not have any adverse effect on the surrounding environment.

To mitigate any impacts due to the industrial activities, a well-planned EMP and a detailed post project monitoring system is provided for continuous monitoring and immediate rectification at site. Due to the new industrial development socio economic conditions in and around the site are expected to improve substantially.