

EXECUTIVE SUMMARY

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Proposed formation of Adinarayana Hosahalli Industrial Area, Bengaluru Rural (D), Karnataka

Introduction

Karnataka Industrial Area Development Board (KIADB) proposes to set up Adinarayana Hosahalli Industrial Area (IA) at Doddaballapura Taluk, Bengaluru Rural District, Karnataka in an integrated manner with all required infrastructure facilities like roads, electricity, water and developed plot areas for setting up small & medium scale industries, commercial and office establishments. The proposed project will enhance opportunities by transforming the region into a potential growth hub. As the proposed project site is well connected, there is a demand for industrial plots.

Proposed project requires Environmental Clearance (EC) from Karnataka State Environment Impact Assessment Authority (SEIAA) as it falls under Project/Activity 7 (c) & Category -B as per EIA notification, 2006 & its amendments (IA consists of at least one category B industry and has an area < 500 Hectare (Ha)). KIADB has retained Ramky Enviro Services Private Limited (RESPL) as their environmental consultant to assist getting EC. As part of EC process, RESPL assisted KIADB to submit online Form-1 application to MOEF&CC for obtaining Terms of Reference (ToR).

Project proposal was placed before the State Level Expert Appraisal Committee (SEAC) in 246th meeting (agenda Item No.246.3) held on 29th & 30th June, 2020 via video conference for appraisal. Committee appraised the proposal as category - B1 and decided to recommend the proposal to SEIAA to issued standard ToR along with additional ToR to conduct Environmental Impact Assessment (EIA) studies as per EIA Notification, 2006 and relevant guidelines. SEIAA issued official ToR vide letter No. SEIAA 8 IND 2020 dated 02.09.2020.

Project requirements

Land requirement

Total land of proposed IA is 195.33 Acres (79.05 Ha). KIADB is in possession of this land to promote industrial development. There is no R&R plan involved in the project.

Water requirement

Total water requirement of proposed IA is around 613 KLD. Water during construction and operation phases will be sourced from existing Ground Level Storage reservoir (GLSR) at Obadenahalli industrial area. The treated water shall be reused in flushing, gardening etc. and the wastewater generated from the industries is 307 KLD, which shall be treated in their respective Effluent Treatment Plants (ETPs) on the bases of zero discharge concept. The treated water is reused by the industries for boilers, cleaning equipment's etc.

Power requirement

Electricity will be supplied to proposed IA through Bangalore Electricity Supply Company Limited (BESCOM). Power back-up facility is not provided by KIADB; hence individual industries shall make backup arrangement to meet their requirement.

Manpower requirement

Manpower requirement of proposed IA during construction & operations phase is about 500 & 2050 people respectively. It shall provide employment opportunity to youth from nearby habitations. Adequate workforce is available around the area for proposed project.

Fuel requirement

Fuel requirement of industries within IA is for Boilers and DG set to be used as back-up during power failure. Most of the industries shall use electric boilers up to a capacity of 1.5 Tons per Hour (TPH). Boilers above 1.5 TPH shall use High Speed Diesel and DG set shall use Diesel.

Proposed infrastructure facilities

Infrastructure requirements of IA were estimated based on National Building Council (NBC) guidelines and shall be developed and maintained by KIADB. IA shall include following

Infrastructure facilities:

- Industrial plots
- Internal roads and storm water drains
- Power supply system and street lights
- Water supply & drainage network
- Parking area
- commercial & office area
- Amenities and utilities
- Solid waste management
- Rain water harvesting system
- Public utilities/social infrastructure
- Green belt development
- Parks and buffer zones

Baseline environmental status

An area covering 10 km radius from proposed project site has been earmarked as study area for baseline environmental study and cumulative impact assessment. Field investigations were undertaken in study area for collecting existing baseline data during December 2019 to February 2020. During field investigations existing baseline data related to Land Use Land Cover (LULC), air, noise, traffic, surface & ground water, soil, hydrogeological & geological, ecological and socio-economic conditions was collected.

Land Use Land Cover (LULC)

Existing LULC features of study area is extracted by analysing Survey of India (SOI) toposheets, and interpreting Indian Remote Sensing satellite (IRS) imageries and further validated through ground truth validation. False colour Band combination of the satellite were applied for better interpretation of satellite image followed by executing several image enhancement logarithm. LULC of study area falls under following Class L-1 categories: Built-up: 7%; Agriculture land: 86%; Water bodies: 5%, Forest: 1% and Waste land: 1%.

Meteorology (Climate)

Meteorological data was collected from nearest IMD station at Bangalore, Karnataka & proposed IA with help of automatic weather monitoring station. Predominant wind direction recorded during monitoring period are E to W during October to December months with average wind speed of 2.60 m/s and calm condition recorded is 19.63%.

Ambient Air Quality

AAQ was monitored at 10 locations within study area. Monitoring locations were identified w.r.t upwind; cross wind and downwind direction of project site. Air pollutants monitored are Particulate Matter (PM_{2.5} & PM₁₀), Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x), Ozone (O₃), and Carbon Monoxide (CO) as per MoEF&CC guidelines and results were compared with NAAQ 2009 CPCB standards.

- PM₁₀ & PM_{2.5} levels (98th Percentile) recorded are range of 43.8 to 66.1 µg/m³ and 23.9 to 40.1 µg/m³ respective against a standard of 100 µg/m³ and 60 µg/m³ respectively. So PM₁₀ & PM_{2.5} levels observed in study area are within standards.
- SO₂ and NO_x levels (98th Percentile) observed are in the range of 8.7 to 18.2 µg/m³ and 19.9 to 28.1 µg/m³ respectively against a standard of 80 µg/m³. Observed SO₂ and NO_x levels in study area are within the standards.
- O₃ levels (98th Percentile) recorded is in the range of 21.9 to 32.6 µg/m³ against a standard of 100 µg/m³. Observed O₃ levels in study area are within standards.
- CO levels (98th Percentile) recorded is in the range of 432 to 910 µg/m³ against a standard of 2000 µg/m³. Observed CO levels in study area are within standards.

Noise monitoring

Noise levels were monitored at 11 locations within study area of project site. Locations were identified for assessment of existing noise level status (keeping in view land use pattern, Industrial: 2 nos; Residential: 7 nos; Silence: 2 nos).

Day equivalent noise levels at industrial zone is in range of 53.9 dB(A) to 58.9 dB(A) against a standard of 75 dB(A); Residential area is 53.7 to 54.1 dB(A) against a standard of 55 dB(A); Silence zone is 49.8 to 49.9 dB(A) against a standard of 50 dB(A). Night equivalent noise levels at proposed IA is in range of 44.1 dB(A) to 46.5 dB(A) against a standard of 70 dB(A); Residential area is 43.2 to 43.7 dB(A) against a standard of 45 dB(A); Silence zone is 39.9 dB(A) against a standard of 40 dB(A). Based on above analysis noise levels in study area are within the Noise Pollution Rules 2000.

Traffic survey

Traffic survey was conducted at Dodballapur to Devahalli road near project site. Based on traffic survey, maximum hourly PCU's/ hr of 1192 was calculated during 10 to 11 a.m. Based on width of the road, carrying capacity and maximum hourly PCU's/ hr calculated the LOS of Corridor falls under category "D" (Fair/Average).

Water quality monitoring

Samples of 4 Surface Water (SW) and 10 Ground Water (GW) were collected from different sources and analyzed for all important physico-chemical and biological parameters to establish quality of water prevailing in the study area. SW samples were collected from water bodies within study area and GW samples collected from hand pumps and bore wells.

Surface water samples:

Konaghatta lake: Values recorded are pH is 7.4, Electrical conductivity (EC) is 311 ($\mu\text{S}/\text{cm}$), Boron is <0.1 mg/l, Dissolved oxygen is 4.8 mg/l, BOD is 12 mg/l, and Total coliform MPN/100 ml is 150.

Dodballapur lake: Values recorded are pH is 7.8, Electrical conductivity (EC) is 1457 ($\mu\text{S}/\text{cm}$), Boron is <0.1 mg/l, Dissolved oxygen is 4.2 mg/l, BOD is 16 mg/l, and Total coliform MPN/100 ml is 280.

Aradeshanahalli kere lake: Values recorded are pH is 7.3, Electrical conductivity (EC) is 241 ($\mu\text{S}/\text{cm}$), Boron is <0.1 mg/l, Dissolved oxygen is 5.7 mg/l, BOD is 8 mg/l, and Total coliform MPN/100 ml is 130.

Kodaturu kere lake: Values recorded are pH is 7.2, Electrical conductivity (EC) is 201 ($\mu\text{S}/\text{cm}$), Boron is <0.1 mg/l, Dissolved oxygen is 4.6 mg/l, BOD is 14 mg/l, and Total coliform MPN/100 ml is 110

Ground water samples: The pH value of GW samples collected are in the range of 7.1 to 8.1 against an acceptable limit of 6.5 to 8.5 indicating pH values of all GW samples collected are within acceptable limits. Total Dissolved Solids (TDS) of GW samples collected is in the range of 330 mg/l to 1669 mg/l against an acceptable limit of 500 mg/l & permissible limit of 2000 mg/l. This indicates TDS value of two GW samples are within acceptable limits and remaining samples are above acceptable limit but within permissible limit. Chloride (as Cl) value of GW samples collected are in the range of 70 mg/l to 594 mg/l against an acceptable limit of 250 mg/l & permissible limit of 1000 mg/l. This indicates Chloride (as Cl) value of six samples are within acceptable limits and remaining samples Chloride values are above acceptable limit but within permissible limit. Total hardness (as CaCO_3) value of GW samples collected is in the range of 194 mg/l to 871 mg/l against an acceptable limit of 200 mg/l and permissible limit of 600 mg/l. This indicates total hardness values of one GW sample is within acceptable limit, seven samples are above acceptable limits but within permissible limit and remaining two samples which are above permissible limits. Fluoride (as F) value of GW samples collected are in the range of < 1.0 to 1.1 mg/l against an acceptable limit of 1.0 mg/l and permissible limit of 1.5 mg/l. This indicates one GW sample is above acceptable limit but within permissible limit and fluoride value of remaining GW samples collected are within acceptable limits.

Soil quality

Soil samples were collected from 10 locations within study area. Locations were selected to assess the existing soil conditions representing various land use conditions and geological

features. The important physical & chemical parameter concentrations were determined and compared with Standards of Indian Council of Agriculture Research, New Delhi.

- The pH value of soil samples collected is in the range of 6.7 to 7.6 indicating all soil samples fall under normal category (Neutral pH range).
- Electrical conductivity value of soil samples collected is in the range of 101 to 358 $\mu\text{S}/\text{cm}$ indicating all soil samples fall under normal category.
- Organic carbon value of soil samples collected is in the range of 0.54 % to 1.22 %. Four samples have medium organic carbon content and remaining sample have high organic carbon content.

Other important nutrients known as major elements used for characterization of soil for irrigation are primary nutrients: Nitrogen, Phosphorus and Potassium popularly known as NPK and secondary nutrient are Calcium, Magnesium and Sulphur.

- Available nitrogen value of soil samples range from 92 to 358 kg/Ha. Six samples have low nitrogen content and remaining samples have medium nitrogen content.
- Available phosphorus value of soil samples collected range from 17 to 97 kg/Ha indicating three samples have medium phosphorus content remaining samples have high phosphorus content respectively.
- Available potassium value of soil samples range from 74 to 506 kg/Ha. One sample have low potassium content four samples have medium potassium content and remaining five samples have high potassium content.

NPK values of soil samples collected are mostly low to high category indicating need for fertilizers with high nitrogen & phosphorus values for agriculture & horticulture activities.

Ecological environment

A detailed analysis was done in the study area which includes compilation of secondary data from published literature of Forest Division and Primary data generation through systematic studies. Primary data was collected through visual observation of species.

No notified ecologically sensitive areas such as the National Parks or Wildlife Sanctuaries etc.,) or any other protected areas exist within study area. None of species reported or recorded from the study area are placed in Schedule I of the Indian Wildlife (Protection) Act, 1972. There are no rare or endemic or endangered or threatened (REET) plants. All the species of taxa found in the study area are very common widely distributed.

Socio-Economic environment

Total population in study area as per 2011 census study is 1,41,956 people with sex ratio of 926. In study area 19.7% of people belong to scheduled category, of which 4.7% belongs to Scheduled Tribes (ST) and 15.1% to Scheduled Castes (SC). Main workers & marginal workers constitute 39.3% & 5.9% respectively. Most of villagers surveyed are benefited by government schemes and are aware of welfare schemes and programs of government. Youth in area are devoid of employment opportunities & are potential source of workforce.

Anticipated environmental impacts and mitigation measures

Impacts during construction phase

The possible construction activities that contribute to environmental impacts are:

- Dust generation during levelling of earth, movement of vehicles on unpaved roads, unloading of raw materials and removal of unwanted waste material from site
- Emission of pollutants from vehicular exhaust
- Accumulation of excavated earth material

Impacts due to these activities are temporary and confined within proposed IA boundary.

Impacts during operation phase

Impact on air quality

Major source of pollution are flue gas emissions from boiler & DG set stack (PM₁₀, PM_{2.5}, SO₂ & NO_x), fugitive dust emissions from material transfer points, movement of goods & vehicles.

Ground Level Concentration (GLC) values of air pollutants released from boiler & DG set stack was estimated using study state dispersion model based on Gaussian Plume (AERMOD Version 7.0.3) software

Result of dispersion modelling shows increase in maximum GLC is expected at a distance of 120 to 160 m from the stack. Maximum predicted / estimated GLC for PM is 5.9 µg/m³, SO₂ is 4.2 µg/m³ and NO_x is 9.1 µg/m³. Post project AAQ of PM, SO₂ & NO_x levels at monitoring station in study area are within NAAQ standards.

The proposed mitigation measures are:

- Dust suppression / water spray facilities will be provided to mitigate dust generated.
- Individual industries will provide protection devices to control PM & SO₂ emissions in flue gas with the standards.

Impact on noise quality

Main noise generating areas within proposed IA are boiler & cooling system, ID & FD Fans, CSTP, DG set etc. The noise levels generated in these areas varies from 65 to 100 dB(A). By implementing proposed protective and Mitigation measures the impact will be minimal and within Noise pollution rules, 2000.

Impact on water quality

At proposed IA, wastewater is generated by industrial operations and domestic consumption from industrial workers, commercial and office establishments. Wastewater generated by individual industries shall be treated in their respective Effluent Treatment Plants (ETPs) on bases of zero discharge concept. Domestic sewage generated within IA will be fully treated at CSTP of capacity 100 KLD (0.1 MLD) and reused for Greenbelt / floor wash / flushing / dust suppression. Zero Liquid Discharge (ZLD) system is proposed at IA hence impact on water environment will be minimal.

Solid and hazardous wastes

Solid waste generated will be segregated into domestic, biomedical and process wastes. Collection, storage and disposal of industrial waste generated is the responsibility of individual industries as per applicable regulations. Industries shall be advised to segregate waste at source for sending process & hazardous waste to nearby TSDF and used oil, batteries & other recyclable waste sold to SPCB/ CPCB authorized dealers. Sludge from CSTP shall be used as manure within the premises. Bio medical waste sent to nearest biomedical treatment facility.

Occupational safety and health

Occupational noise exposure to workers in the form of 8 hourly times weighted average will be maintained within Occupational Safety and Health Administration (OSHA) stipulated noise levels of up to 90 dB(A).

Adequate environment pollution control measures will be implemented at proposed IA as per regulatory standards. The environmental management and emergency preparedness plans are proposed to ensure that the probability of undesired events and consequences are greatly reduced and adequate mitigation are proposed in case of an emergency. The overall impact on human health would be insignificant during operation phase of proposed IA.

Environmental monitoring program

Environmental monitoring is systematic collection of samples of environmental parameters like air, water, soil, noise etc. to observe and study environmental changes if any due to project activity. Monitoring program will help project to maintain standards as per conditions specified in Environmental Clearance (EC), CPCB and SPCB. Monitoring will be carried out by either in-house laboratory or third party MoEF&CC approved laboratory. Monitoring program also gives an action plan for how to maintain standards for each parameter. Results of monitoring will be reviewed, analysed statistically and submitted to concerned authorities.

For implementation of EMP and periodic monitoring, a well-organized Environmental Management Group (EMG) consisting of competent workforce headed by senior level executive is established by proponent to deal with various environmental aspects. Activities of EMP include- follow up with SPCB, regional office of MoEF&CC & CPCB as well as to interact with inter-disciplinary groups responsible for maintenance of pollution control equipment.

Proposed IA level environmental protection measures like dust suppression, treatment and recycling of wastewater, plantation, housekeeping and implementation of EMP and EC conditions will be monitored by the EMG in accordance with compliance to EC / CFE / CFO.

Project benefits

Contribution of the proposed IA on local social infrastructure is expected to be significant. The proposed IA will stimulate growth of industrial and commercial activities in and around the district. Proposed IA will provide a significant amount of direct and indirect employment opportunities to the local people with different skills and trades.

The physical infrastructure and socio-economic status of the surrounding areas will be benefited as follows:

- Improvement in road & rail connectivity, educational, housing, banking, postal, medical, communication and recreation facilities
- Improvement in power supply, water supply and sanitation
- Improvement in the socio economic status
- Improvement in economic conditions and recreation facilities
- Training will be given to local people to improve employment potential
- Increase in revenue to State from taxes & duties from development of local businesses

Environmental management plan

Environmental Management Plan (EMP) is required to ensure a sustainable development of proposed IA and surrounding areas. EMP will be integrated in all major activities of the IA with clearly defined policies to ensure ecological balance of area is maintained and adverse effects are minimized. EMP requires multi-disciplinary approach with mitigation, management, monitoring and institutional measures taken during implementation and operation phases to eliminate adverse impacts or reduce them to acceptable levels.

The mitigation measures are planned for construction and operation phases and the overall management plan helps to improve the supportive capacity of the receiving bodies. The EMP aims to control pollution at the source level to the possible extent with the available and affordable technologies followed by the standard treatments before getting discharged. The recommended mitigation measures will synchronize the economic development of the study area with the environmental protection of the region.

Project Cost estimates

- Project Cost (Estimated): Rs. 252.3 Crores
- EMP (Capital Cost): Rs. 25.2 Crores
- EMP (Recurring expenditure): Rs. 2.52 Crores

Conclusions

EIA study made an overall assessment of potential environmental impacts due to proposed IA and proposed Mitigation measures to eliminate adverse environmental impacts or reduce them to acceptable levels as part of the EMP.

The demand for industrial area is steadily increasing. Setting up of proposed IA in this area will benefit society by providing better infrastructural, educational, medical facilities, power availability, improvement in employment and economic growth of the area.