॥ॐ श्री परमात्मने देवाय नमः॥

THAKUR INDUSTRIES

Date: 02-06-2018

To,
The Director, (I)
Ministry of Environment, Forests & Climate Change
Indira Paryavaran Bhavan, Jor Bagh Road,
New Delhi - 110003.

Dear Sir/Madam,

Sub: Submission of additional clarification in respect of proposed expansion of Ore Beneficiation Plant at Hirebaganal Village, Koppal Taluk & District., Karnataka – reg.
Ref.: Your letter No. F. No. J-11011/208/2016-IA-II (I) dated 25th January 2018.

With reference to above subject, we are herewith submitting additional clarification sought after technical presentation before 27th EAC meeting held in the month of jan 2018, for our proposed expansion of Ore Beneficiation Plant with throughput capacity from 0.60 million tons per annum a to 1.50 million tons per annum at Hirebaganal Village, Koppal Taluk & District, Karnataka State.

For Thakur Industries
Partner

Sr. No.	Clarifications Sought	Compliance
1	Revised time bound action plan along with fund provision on the issues raised during the PH social need assessment.	Revised time bound action plan along with fund provision on the issues raised during the PH social need assessment is discussed in **Chapter 7** of EIA Report.
2	Details of Enterprise Social Commitment (ESC) based on public hearing issues / need based assessment as capital expenditure in project mode and shall be completed in concurrence with the implementation of the expansion.	Details of Enterprise Social Commitment (ESC) based on public hearing issues / need-based assessment is given in section **8.5.2 & 8.5.3 of Chapter 8** of EIA Report.
3	Groundwater development in the study area and category of the area based on [illegible] guidelines.	Detailed report of Groundwater development in the study area is enclosed as **Annexure No. XX.**

For Thakur Industries
Partner

Office & Correspondence Address : # F-2, 1st Floor, R.R. Kuteera, Door No-48,29th Ward,
BDCC Bank Colony, M.J.Nagar, HOSPET - 583201.
Works : Sy.No.234B-235B, Hirebagnal Village, Koppal Dist., KARNATAKA - 583228.
Ph : 08394 - 230208 I Fax : 08394-230102 I E-mail : thakurind07@gmail.com

Sr. No.	Clarifications Sought	Compliance
4	Ground water permission letter translated in English.	Ground water permission letter translated in English is enclosed as **Annexure No. XIX** of EIA report.
5	Revised air quality modeling studies by considering fugitive emissions from the proposed plant.	Revised Modeling studies is given **in section 4.3 of Chapter 4** of EIA Report.
6	Revised noise monitoring as per the requirement of monitoring protocol.	Revised Noise Measurement Report is enclosed as **Annexure No. IX.**
7	Detailed action plan for 100% utilization of solid waste management.	Solid waste management is detailed under section **4.10 of Chapter 4** of EIA Report.
8	Corporate Environmental Policy approved by its Board of Directors incorporating standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / condition and system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the company.	Detailed Corporate Environmental Policy is detailed in **section 10.1 of Chapter 10** of EIA Report.
9	Interpretation of all the baseline data including Ecology & Biodiversity and socioeconomic environment.	Interpretation and inference is carried-out for various environmental attributes in **Chapter 3** - Description of the Environment of EIA Report.
10	BOD, COD and DO for surface water.	Revised Analysis Reports are enclosed as **Annexure No. IX.**
11	Revised Risk Assessment specific to proposed project.	Details are incorporated in **section 7.2 of Chapter 7** EIA Report.
12	Impact prediction on the land, soil, biodiversity.	Impact prediction for various environmental attributes in **Chapter 4 - Anticipated Environmental Impacts and Mitigative Measures** of EIA Report.

For Thakur Industries
Partner

For Thakur Industires
Partner

Sr. No.	Clarifications Sought	Compliance
13	Revised green belt development plan with local broad-leaved tree species.	A detail Revised green belt development plan has been discussed in **section 4.11 of Chapter 4** of EIA Report.
14	Justification for selection of AAQ monitoring locations.	Details are given in **Chapter 3 of 3.6.3** of EIA Report.

Trust the above information is in order and requesting you to kindly do the further needful action to accord Environmental Clearance.

Thanking you,

Yours faithfully,
for **THAKUR INDUSTRIES**

THAKUR INDUSTRIES HOSPET

SHAILESH AGARWAL
MANAGING PARTNER

Encl: a/a.

FINAL

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

For

PROPOSED EXPANSION OF ORE BENEFICIATION PLANT

Through-put Capacity from 0.60 m.t.p.a to 1.50 m.t.p.a

TOTAL EXTENT: 17.50 Acres (7.08 Ha)

Of

M/s. THAKUR INDUSTRIES, HOSAPETE, BALLARI.

AT

HIREBAGANAL VILLAGE,
KOPPAL TALUK, KOPPAL DISTRICT,
KARNATAKA STATE

ENVIRONMENT CONSULTANT

METAMORPHOSIS[SM] Project Consultants Pvt. Ltd.

(QCI/NABET Accredited EIA Consultant - NABET/EIA/1518/RA 014)

BENGALURU, KARNATAKA

JUNE 2018

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CHAPTER – 1

INTRODUCTION

FINAL EIA Report

CHAPTER-1

INTRODUCTION

1.1 Purpose of the Report

As per Environment Impact Assessment (EIA) Notification dated 14th September, 2006, and its subsequent amendments; it is mandatory to obtain prior Environmental Clearance for any new industry or the expansion / modernization of the existing industry from Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India, New Delhi / State Environment Impact Assessment Authority (SEIAA). The project proponent has to prepare Environmental Impact Assessment (EIA) Report as per guidelines given by MoEF&CC, New Delhi.

The purpose of this EIA report is to provide a coherent statement after analysis of all potential impacts due to proposed enhancement project and the measures that should be taken to eliminate and mitigate them. It contains essential information for:

- The proponent to implement the proposal in an environmentally and socially responsible way;
- The responsible authority to make an informed decision on the proposal, including the terms and conditions that must be attached to an approval or authorization; and
- The public to understand the proposal and its likely impacts on people and the environment.

1.2 Identification of the Project and Project Proponent

1.2.1 Identification of the Project

1.2.1.1 Details of the Existing Project

M/s. Thakur Industries operating an ore beneficiation plant with throughput capacity of 0.6 million tons per annum (m.t.p.a.) over an area of 17.50 Acres of Hirebaganal Village, Koppal Taluk & District, Karnataka. Accordingly Environmental Clearance was obtained from Ministry of Environment, Forests & Climate Change (MOEF & CC), New Delhi, vide letter ref. no. J-1015/257/2010-IA.II (M), dated 19th April, 2012 (Copy enclosed **Annexure No - IA**). Consent For Establishment (CFE) for setting up of Iron Ore Beneficiation Plant of 0.6 m.t.p.a was obtained from Karnataka State Pollution Control Board (KSPCB), vide letter ref. no. 20/PCB/MIN/CFE/2012-13/238 dated 28th May 2012 (Copy enclosed as **Annexure No - IB**).

As per the Hon'ble Supreme Court vide its order dated 29/07/2011 and 26/08/2011, mining operations have been banned in the district of Ballari, Chitradurga & Tumakuru of Karnataka State and hence raw material for operating the plant was not available. In view of commencement of mining operations and availability of raw material through e-auction, Consent for Operation (CFO) was obtained for the same from KSPCB vide letter ref. no. 03/KSPCB/RO/KPL/SR/2014-15/201 dated 21st June 2014 (Copy is enclosed as **Annexure No - IC).** The details of approval for existing project is given in **Table No. 1.1**

Table No. 1.1: The Details of Approval for Existing Project

Sr. No.	Particulars	Existing Capacity	Existing Approvals
1	Iron Ore Beneficiation Plant	0.6 m.t.p.a through-put	Environmental Clearance from MoEF, New Delhi vide No.: J-1015/257/2010-IA.II (M), dated 19th April 2012.
2			Consent for Establishment from KSPCB vide No.: 20/PCB/MIN/CFE/2012-13/238 dated 28th May 2012.
3			Consent for Operation from KSPCB vide No.: 03/KSPCB/RO/KPL/SR/2014-15/201 dated 21st June 2014.
¢ Compliance of the conditions stipulated in EC is being submitted to the concerned authorities on regular basis. ¢ Certified Compliance report for the existing project is obtained. Copy of the same has been enclosed as **Annexure No – II** along with this EIA/EMP Report.			

1.2.1.2 Details of the Present Project

At present, the project proponent proposes to enhance the Ore beneficiation throughput capacity from 0.60 m.t.p.a to 1.50 m.t.p.a by adding additional beneficiating equipments in the existing facility covering an area of 17.50 Acres of Sy. Nos. 234/B, 235/B, 235/C, 234/2 & 234/3 Hirebaganal Village, Koppal Taluk & District, Karnataka. Compliance to EC Conditions is incorporated in this EIA Report in Chapter 7.0 - Additional Studies, 7.4 - EC Compliance. The same is being submitted regularly to the concerned authorities.

Accordingly, Terms of Reference (ToR) from MOEF & CC, for the propose expansion obtained vide letter ref no. J-11011/208/2016-IA.II (I), dated 19th September 2016.

Further, Rapid Environmental Impact Assessment and Environmental Management Plan prepared considering **Post - Monsoon 2016** baseline data. Public Consultation was

conducted on 18th August 2017 at Thakur Industries, Hirebaganal Village, Koppal Taluk & District. The project was taken up before 27th EAC meeting held on 03rd – 05th January 2018 for grant of Environmental Clearance. Based on the presentation made, the Expert Committee asked to submit revised EIA/EMP by complying all the terms stipulated to the project, inter alia, incorporating the information asked in the MoEF & CC letter dated 25th January 2018.

Time of Completion of the Project: Approximately Six (6) months for installation of additional equipments to the existing beneficiation plant to enhance the capacity.

1.2.2 Information about the Project Proponent

M/s. Thakur Industries (TI) was incorporated as a Partnership Firm on 25th October 2007, Register Office address # 116, 1st Stage, Raghavendra Colony, Patel Nagar, Ballari, Karnataka. The purpose proposed project to carryout ore beneficiation to beneficiate low grade ore to high grad before dispatching to nearly needy steel/sponge iron units. Accordingly, EIA Report was prepared and obtained Environmental Clearance from Ministry of Environment, Forests & Climate Change, New Delhi, vide letter ref no. J-11015/257/2010-IA.II (M), dated 19th April, 2012.

Meanwhile, Deed of Partnership was reconstituted on 01st April 2015 with inclusion of two persons namely Mr. Shailesh Agarwal and Mr. M. Prakash Lalwani as Partners. Now the partners of the firm are as follows:

- Mr. Naresh Kumar Cherania
- Smt. Anju Devi Chirania
- Sri. Shailesh Agarwal
- Mr. M. Prakash Lalwani

The copy of Reconstituted Deed of Partnership is enclosed for reference as **Annexure III.**

Subsequently, again on 1st July 2015, Deed of Partnership has been reconstituted in view of retirement of partners namely **Mr. Naresh Kumar Cherania** & **Smt. Anju Devi Chirania** and continuation of other two partners namely **Sri. Shailesh Agarwal** & **Mr. M. Prakash Lalwani**. Mr. Shailesh Agarwal is authorized as Managing Partner of the firm M/s. Thakur Industries with effect from 01/07/2015. The copy of the Reconstituted Deed of Partnership is enclosed as **Annexure IV.** The register office

address has changed to F-2, 1st Floor, R.R. Kuteera, Door No. 48, 29th Ward, BDCC Bank Colony, M.J. Nagar, Hosapete, Ballari District.

Accordingly, change of management of M/s. Thakur Industries has been communicated to MoEF & CC, New Delhi, vide letter ref. no. Nil dated 28th September 2015.

Management of the company:

Shri. Shailesh Agarwal, Managing Partner - who holds Bachelor's Degree in Commerce and Charted Accountant (Intermediate) having over 14 years of total experience of which 5 years is in Beneficiation plant and he is the Authorized Signatory.

Shri. Prakash Lalwani, Partner **-** having over 18 years of total experience of which 2 years is in Beneficiation plant and his having vast knowledge in Ore business and trading and He has been handling the entire production and project implementation activities of the Group.

1.3 Brief description of the Nature, Size, Location of the Project and it's importance to the Country, Region.

1.3.1 Nature of the Project

Ore beneficiation plant with existing throughput capacity 0.6 m.t.p.a and proposes to increase annual throughput capacity to 1.5 m.t.p.a within the existing plant premises.

1.3.2 Size of the Project

- Existing ore beneficiation throughput capacity 0.6 m.t.p.a
- Proposed to increase annual throughput capacity to 1.5 million tons

1.3.3 Location of the Project

The project is located over an extent of 17.50 Acres at Sy. No: 234/B, 235/B, 235/C, 234/2 & 234/3 of Hirebaganal Village, Koppal Taluk and District, Karnataka State. Total land acquired 17.50 acres (7.08 Ha and the land document of the project are enclosed in **Annexure - V.** The Project area is covered in survey of India Topo sheet no. 57 A/3 (Scale 1:50000).

1.3.4 Process in brief, importance and benefits of the proposed expansion:

There are many favorable factors, economical and environmental, for the site located at Hirebaganal Village, Koppal Taluk and District, Karnataka State, which is considered to be most backwards districts of the state.

Iron ore mine is carried out extensively in Bellary, Hospet, Sandur sector of this North Karnataka area. There are mining companies operated both by public and private sectors. Currently, realizing the importance of preserving the natural resources, government has imposed an export cess on iron ore exports. With this, government has made it clear to use the raw material indigenously so that optimum use of the raw material realized. This led business houses to set up units like Beneficiation plants, Pelletization plants and other related industries.

There is a significant quantity of this low grade ore at all the operating mines in Karnataka and other states of the country. If the low grade (<56% grade Fe) converted to high grade ore (>60% Fe) and exported there are several advantages, environmental and economically. Further, there is also a growing need for high quality ore from the manufacture of Sponge Iron, Pig Iron which is the basic raw material for steel making. Hence upgraded ore has good demand in domestic market too.

There is huge quantity of low grade ore at all the operating mines situated in the areas of Hospet-Bellary-Sandur sector in Karnataka State which are left behind of good quality of ore exports. The low grade ore are not in demand and hence ignored and a huge quantity generated in the past is accumulated and further accumulating day by day. Hence, vast quantity of low grade ore is available in Karnataka and adjoining state of Telangana and Andra Pradesh including Goa at the Existing Iron ore mines, which are lying unprocessed which is the basic raw material for the plant.

Ore beneficiation plant which is an intermediate process and raw material for sponge/steel making plays an important w.r.t. the process and protection of ecology & environment. The process involves up gradation of low/rejection generated incidental to mining. The proposed expansion of ore beneficiation of throughput capacity 1.50 mtpa from the existing throughput capacity of 0.60 mtpa will help is processing of low/rejection at mine head. The concept of "**Waste to Wealth**" and helps in environment protection, or otherwise the waste generated would have become environmental nuisance viz-a-viz disposal of the same and other interlinked environmental attributes.

1.4 Scope of the Study

The disciplines covered under the study are prerequisite information of the project site, manufacturing / operation details, production details, waste generation and its proper disposal, impacts and management plans. This report contains performance-

testing data of ambient air quality, water quality as well as the ecological studies, noise environment, socio-economic study carried out during Post-Monsoon 2016 Season (September to November 2016).

Copy of the amended ToR Letter along with former ToR Letter has been incorporated in this EIA/EMP Report.

1.4.1 Details of Regulatory Aspects for Scoping

Environment plays a vital role in an overall development of the country. Recognizing the importance of environmental protection and sustainable development, the Ministry of Environment and Forest, Government of India had formulated policies and procedures governing the industrial and other developmental activities to prevent indiscriminate exploitation of natural resources and to promote integration of environmental concern in developmental projects.

The Ministry of Environment & Forest has made mandatory prior environmental clearance (EC) for those developmental projects listed in the schedule of EIA Notification of Ministry of Environment, Forest & Climate Change, Govt. of India through its notification issued on 14th September 2006 and subsequent amendments. As per the schedule of EIA Notification 2006, project activity primary processing is numbered 2 and further the mineral beneficiation is listed as activity 2(b) in the said Notification. Therefore, the proposed expansion of ore beneficiation plant requires prior Environmental Clearance.

The schedule of EIA Notification, 2006, has stipulated threshold limits for describing the category of a project to denote the Regulatory Authority empowered to issue Environmental Clearance. Referring to activity 2(b), Mineral Beneficiation Projects with ≥ 0.5 Million TPA comes under category A, for which Environmental Clearance is mandatory for the expansion.

As per the EIA Notification of 14th September 2006 and its amendment dated 1^{s} December 2009, Mineral Beneficiation projects are divided into two categories as given in the **Table 1.2** and various steps is involved to obtain Environmental Clearance is explained.

Table 1.2: Categories of Mineral Beneficiation Projects

Project Activity	A Category	General Condition
Beneficiation Plant	≥ 0.5 Million TPA	Any project or activity specified in category 'B' will be appraised at the Central) level as Category' A', if located in whole or in part within 5 km. from the boundary of: (i) Protected areas notified under the Wildlife (Protection) Act, 1972 (53 of 1972); (ii) Critically polluted areas as identified by the Central Pollution Control Board constituted under the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) from time to time; (iii) Eco-sensitive areas as notified under sub-section (2) of section 3 of the Environment (Protection) Act, 1986, and (iv) inter-State boundaries and international boundaries; provided that for River Valley Projects specified in item l(c), Thermal Power Plants specified in item I (d), Industrial estates / parks / complexes / areas, export processing zones (EPZs), Special Economic Zones (SEZs), biotech parks, leather complexes specified in item 7(c) and common hazardous waste treatment, storage and disposal facilities (TSDFs) specified in item 7(d), the appraisal shall be made at Central level even if located within 10km. Provided further that the requirement regarding distance of 5 km or 10 km, as the case may be, of the inter-State boundaries can be reduced or completely done away with by an agreement between the respective States or the Union Territories sharing the common boundary in case the activity does not fan within 5km or 10 km, as the case may be of the areas mentioned at item (i), (ii) and (iii) above." (As per Notification S.O.1599 (E) 25th June 2014.

Since the project already exists, flow-chart, depicting these stages in obtaining the environmental clearance for mineral beneficiation projects, is presented in **Figure 1.1.**

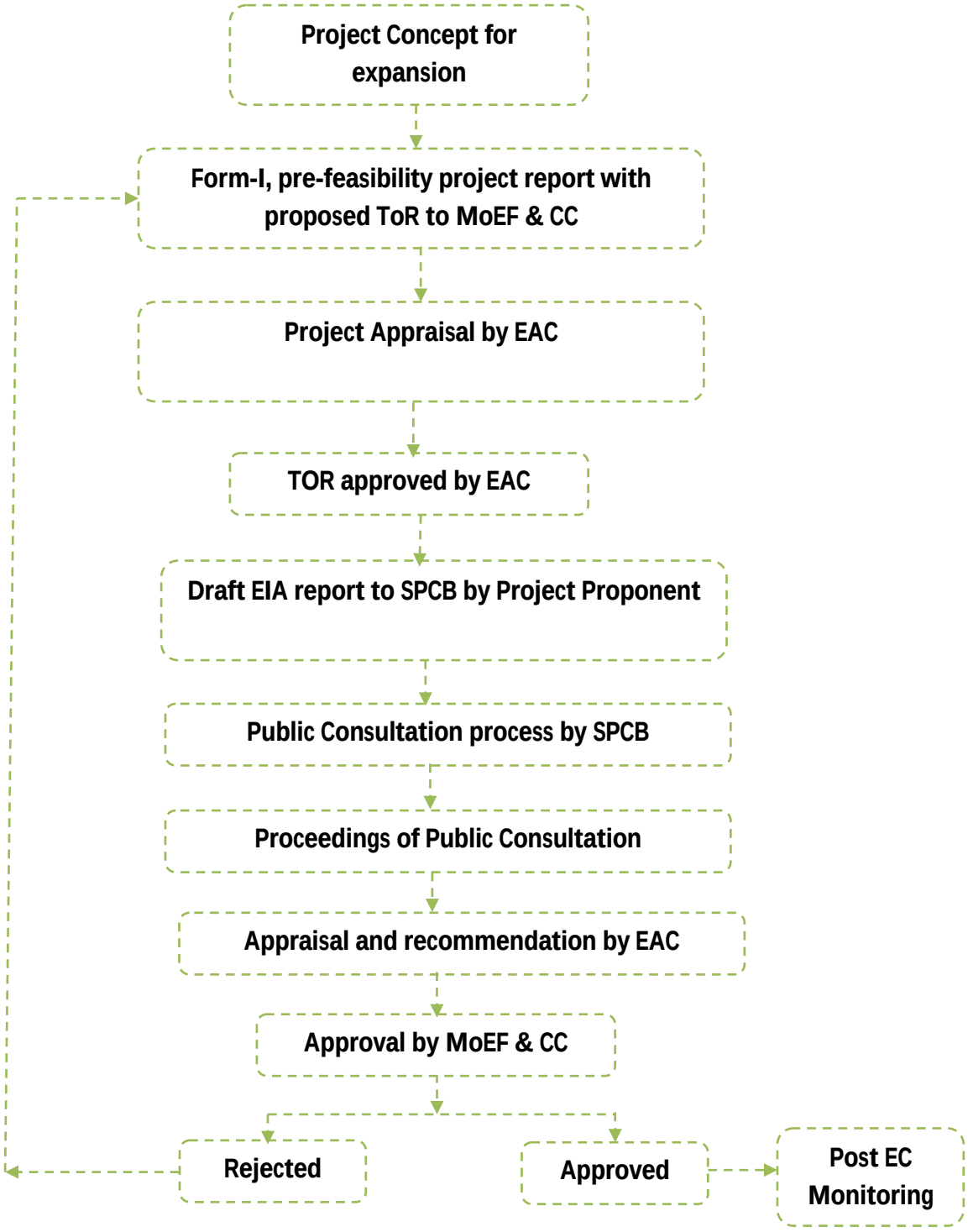


Figure 1.1: Flow-chart, depicting the stages in obtaining the environmental clearance for our Ore Beneficiation Plant located at Koppal District.

The scope of the present study involves identification of all environmental attributes that have a potential impact on the environment and delineating suitable environmental measures to minimize the negative impacts and to ensure the compliance of operations as per the statutory Consent/ as per the local requirement. Scope of the study also includes a detailed characterization of various environmental components like air, noise, water, soil and socio-economics conditions within an area of 10 km radius around the project site.

1.4.2 Methodology of EIA

The Environmental Impact assessment studies are conducted within an area of 10 km radius around the project site. Various steps involved in the study area are divided into three following phases.

- Identification of significant environmental parameters and assessing the status within the study area.
- Predictions of impacts envisaged due to proposed scheme on various environmental attributes.
- Evaluation of impacts after superimposing the predicated scenario over the baseline scenario to prepare Environmental Management Plan.

1.4.3 Applicable Legislation to Ore Beneficiation Project

Ministry of Environment, Forest & Climate Change and CPCB made regulation to Beneficiation sector. Some of the important legislations are given below;

Significant Applicable legislations are given below:

- Environmental Impact Assessment Notification 2006 and subsequent amendments
- The Water (Prevention and Control of Pollution) Act, 1974
- The Air (Prevention and Control of Pollution) Act, 1981
- The Environment (Protection) Act, 1986
- The Wildlife (Protection) Act, 1972.
- Hazardous Waste Management (HMW) Act, 2008/2010
- The Forest (Conservation) Act, 1980.

CHAPTER – 2

PROJECT DESCRIPTION

FINAL EIA Report

Chapter 2

Project Description

Condensed description of those aspects of the Project (based on project feasibility study) likely to cause environmental effects.

2.1 Type of Project

It is a primary processing with 1.50 m.t.p.a. throughput capacity, mineral beneficiation activity 2(b), category A as per the schedule (Projects or Activities requiring prior Environmental Clearance) of EIA Notification 2006.

2.2 Need for the Project

Benchmark set for exporting Iron ore is considered as >60% Fe. Hence low quality Iron ore are not utilized for export which otherwise could earn lot of foreign exchange. There is a significant quantity of this low grade ore at all the operating mines in Karnataka. If the low grade (<56% grade Fe) converted to high grade ore (>60% Fe) and exported there are several advantages, environmental and economically. Further, there is also a growing need for high quality ore from the manufacture of Sponge Iron, Pig Iron which is the basic raw material for steel making. Hence upgraded ore has good demand in domestic market too.

Iron ore mine is carried out extensively in Bellary, Hospet, Sandur sector of this North Karnataka area. There are mining companies operated both by public and private sectors. After the boom in mining sector due to requirement of iron ore from foreign markets and after lifting of the ban on iron ore exports the demand for the above is increased drastically. Currently, realizing the importance of preserving the natural resources, government has imposed an export cess on iron ore exports. With this, government has made it clear to use the raw material indigenously so that optimum use of the raw material realized. This led business houses to set up units like Beneficiation plants, Pelletization plants and other related industries.

There is huge quantity of low grade ore at all the operating mines situated in the areas of Hospet-Bellary-Sandur sector in Karnataka State which are left behind. The low grade ore are not in demand and hence ignored and a huge quantity generated in the past is accumulated and further accumulating day by day. Hence, vast quantity of low grade ore is available in Karnataka and adjoining state of Telangana and Andra Pradesh including

Goa at the Existing Iron ore mines, which are lying unprocessed which is the basic raw material for the plant.

2.3 Location (Maps showing general location, specific location, project boundary and project site Layout).

There are many favorable factors, economical and environmental, for the site located at Hirebaganal Village, Koppal Taluk and District, Karnataka State with a Latitude 15°19'0.64'' North and Longitude 76°14'9.68'' East**.** The total land available for the proposed plant site is 17.50 acres (7.08 Ha) out of which 5.7 Acres (2.33 Ha) land is being developed for Green belt development. Location map is given in **Figure 2.1** and plant layout map is given in **Figure 2.2.**

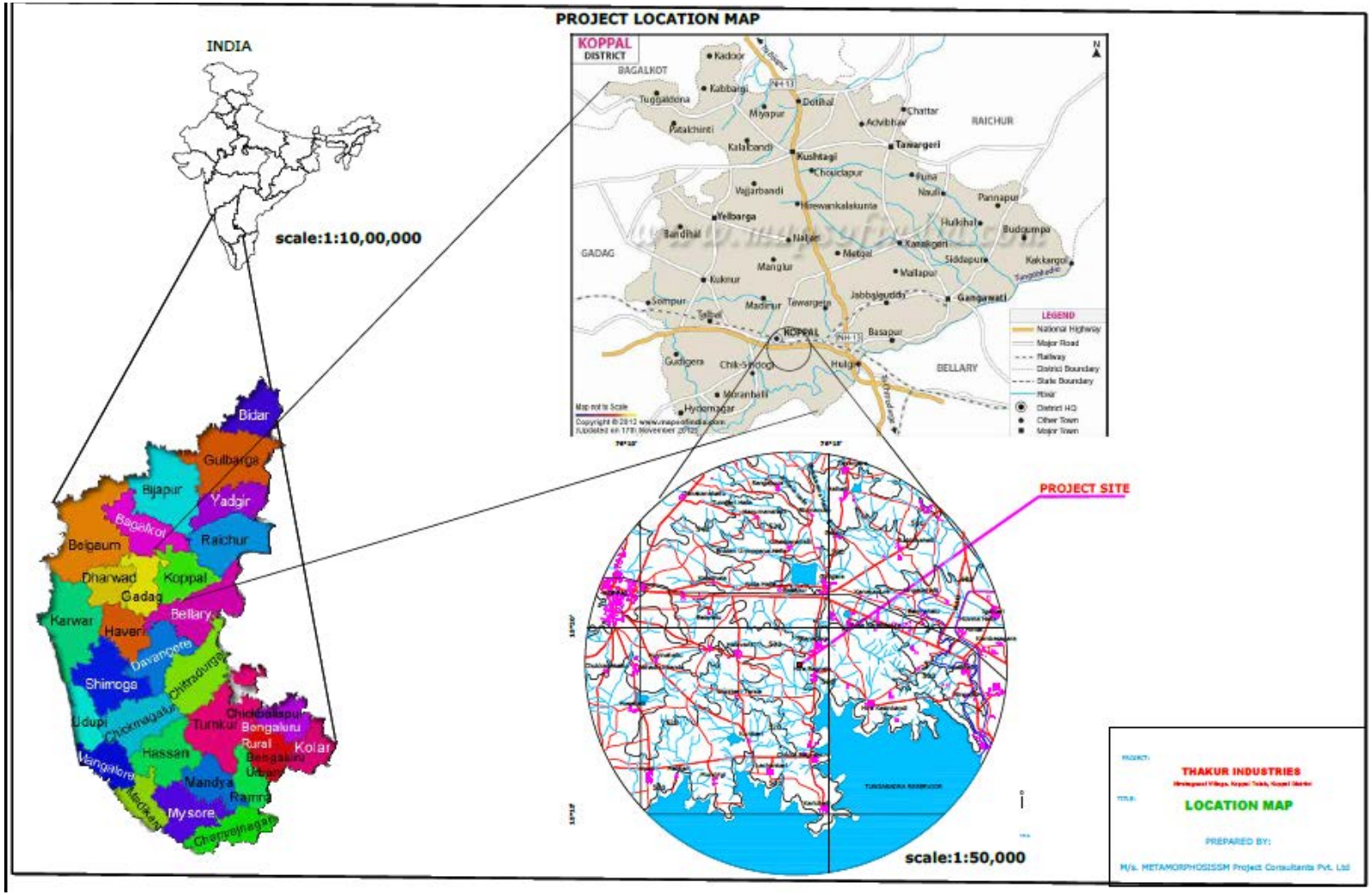


Figure 2.1: Location Map

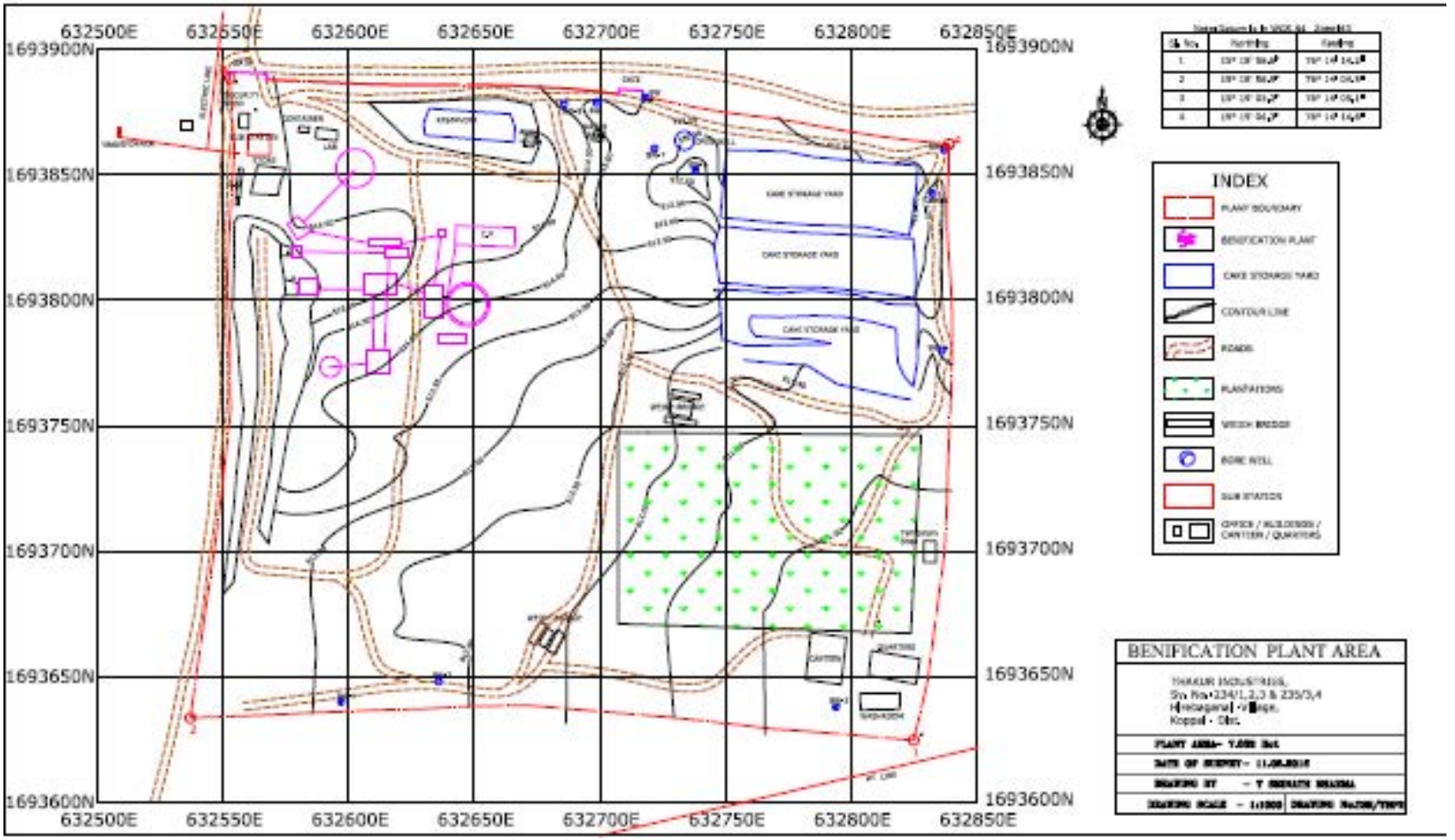


Figure 2.2: Plant Layout Map

Photo 1.1: Photograph showing existing plant & machinery

Photo 1.2: Sponge plant towards north side of the plant

Photo 1.3: Towards eastern side of the plant

Photo 1.4: Agricultural land towards western side of the plant

Photo 1.5: Experts site visit and discussions with PP

2.4 Size / Magnitude of Operation

M/s. Thakur Industries has proposed expansion of Beneficiation plant capacity from existing throughput capacity 0.60 m.t.p.a. to 1.50 m.t.p.a. in the existing plant premises of an area of 17.5 Acres at Sy. Nos. 234/B, 235/B, 235/C, 234/2 & 234/3 of Hirebaganal Village, Koppal Taluk and District, Karnataka State. The details of existing and proposed expansion production capacities are given in **Table 2.1.**

Table 2.1: The details of existing and proposed expansion production

Sr. No.	Particulars	Existing Capacity (throughput)	Proposed Capacity after expansion (throughput)
1	Beneficiation Plant	6,00,000 Tons per Annum	15,00,000 Tons per Annum

2.5 Technology and Process Description

2.5.1 Source of Raw Materials

Raw material will be procured from Karnataka and adjoining state of Telangana and Andra Pradesh including Goa and also from any state of India. Also would be met by imports from other countries as and when required.

- Through E-auction (as is prevalent now) in the state of Karnataka:
- Low-grade ore from existing nearby mines of Bellary District (Bellary-Hosapete-Sandur region) and Chitradurga-Tumakuru region approximate distance is about 100-200 km and mode of transportation by road/train.

Beneficiation process will be arrived on Up-gradation of low-grade ore, based on multiple raw material sources, the plant and machinery specifications will be selected accordingly.

2.5.2 Raw Material Characteristics

The following band width of raw material characteristics have been considered while designing the Plant.

Chemical Composition	Fe	52% - 58%
	FeO	< 0.5%
	Al_2O_3	< 04%
	L.O.I.	Preferably < 06%
Mineralogy	Hematite	Not less than 45%
	Geothite	Not exceeding 30%
	Clay	Preferably < 8%
Characteristics	Fe Liberation	Preferably -65 mesh
	Bond work Index	8.5 KW/Ton max.

2.5.3 Concentrate Properties

Desired properties of concentrate produced in the process has been considered as;

Chemical Composition		
	Fe	63% - 64%
	FeO	< 0.5%
	Gangue (SiO_2+Al_2O_3)	< 06%
	L.O.I.	Preferably < 06%
Particle Size	200 mesh, 90% passing	
Moisture Content	Preferably < 09%, Maximum 10%	

2.5.4 Raw Material Storage & Handling

Raw materials received will be weighed and stacked at the designated stockyard both open place if the raw material is wet and in enclosed storage sheds if it is dry in nature.

2.6 Manufacturing Process

2.6.1 Ore Beneficiation Plant

Input: Ore Fines - "Beneficiation," means the following: as applied to iron ore, milling (crushing and grinding); washing; filtration; sorting; sizing; gravity concentration; magnetic separation; flotation; and agglomeration (pelletizing, sintering, briquetting, or nodulizing). Flotation is primarily used to upgrade concentrates from magnetic separation by reducing the silica content of the concentrate.

Operations in Beneficiation process will result in production of three materials: a) concentrate; b) middling or very low-grade concentrate, which is either reprocessed (in modern plants) or stockpiled; and c) tailing (waste), which is discarded.

In plant, entire material from the Dry circuit is received by Wet Drum Scrubber along with water, in which the material (-40mm) is allowed to be get conditioned and scrubbed properly in water medium with cascading action in a continuously rotating Drum. Output from the Wet Drum Scrubber is allowed to pass over a Triple Deck Vibro Screen, over which the water is sprayed with high pressure (Upper Deck as 22mm, Middle Deck as 8mm and Lower Deck as 4mm) by which the material is classified in accordance with size fraction as +22mm; the over size, is again crushed in a Cone Crusher (closed Circuit) to get complete –22mm sized material is fed to Wet Drum Scrubber through the Feed Conveyor. The under sized material from middle decks (-22+8mm)is stocked out separately as the product, can be marketed as Sponge Iron Feed, Pig Iron Feed and sized Lumps, Calibrated ore (C-Ore). One more under sized material from the middle deck screen (-8+4 mm) stocked out separately as Chips fine ore or Grained fine Ore. Below size material (-4 mm) in slurry condition is fed to Screw Classifier in which the settled coarser iron particles will been dragged out from slurry and the over flow slurry water containing clay, silica, alumina, slimes with fine iron particles is fed Tangentially to First stage (contains one Primary and one Secondary) Hydro Cyclone. The Primary Hydro Cyclone, in which the lighter particles such as slimes, clay, alumina, silica with water are recovered at top opening as Over flow and the Heavier particles collected from the bottom opening is treated as Under flow which is once again conditioned with water (PD maintained) and is fed to Secondary Hydro Cyclone.

Under flow from this is the Super Grade material and the Over Flow from Secondary Hydro Cyclone along with Over Flow from primary Hydro Cyclone in First stage is fed to Second Stage Hydro cyclone (one No.), the under flow is fed to a High intensity magnetic separator (wet), the magnetic values are collected as Super grade concentrates.

The over flow from the magnetic separator and the overflow from II stage Hydro Cyclone is fed to the High Rate Thickener. In Thickener, more than 80% of used water is recovered as clear water (Thickener Over flow) and can be collected in Fresh water pond and recycled, the Under flow- thickened slurry is passed through a filter to separate the water. The water is circulated to the thickener and the dry tailings are collected.

The Process Flow Diagram is given in **Figure 2.3.**

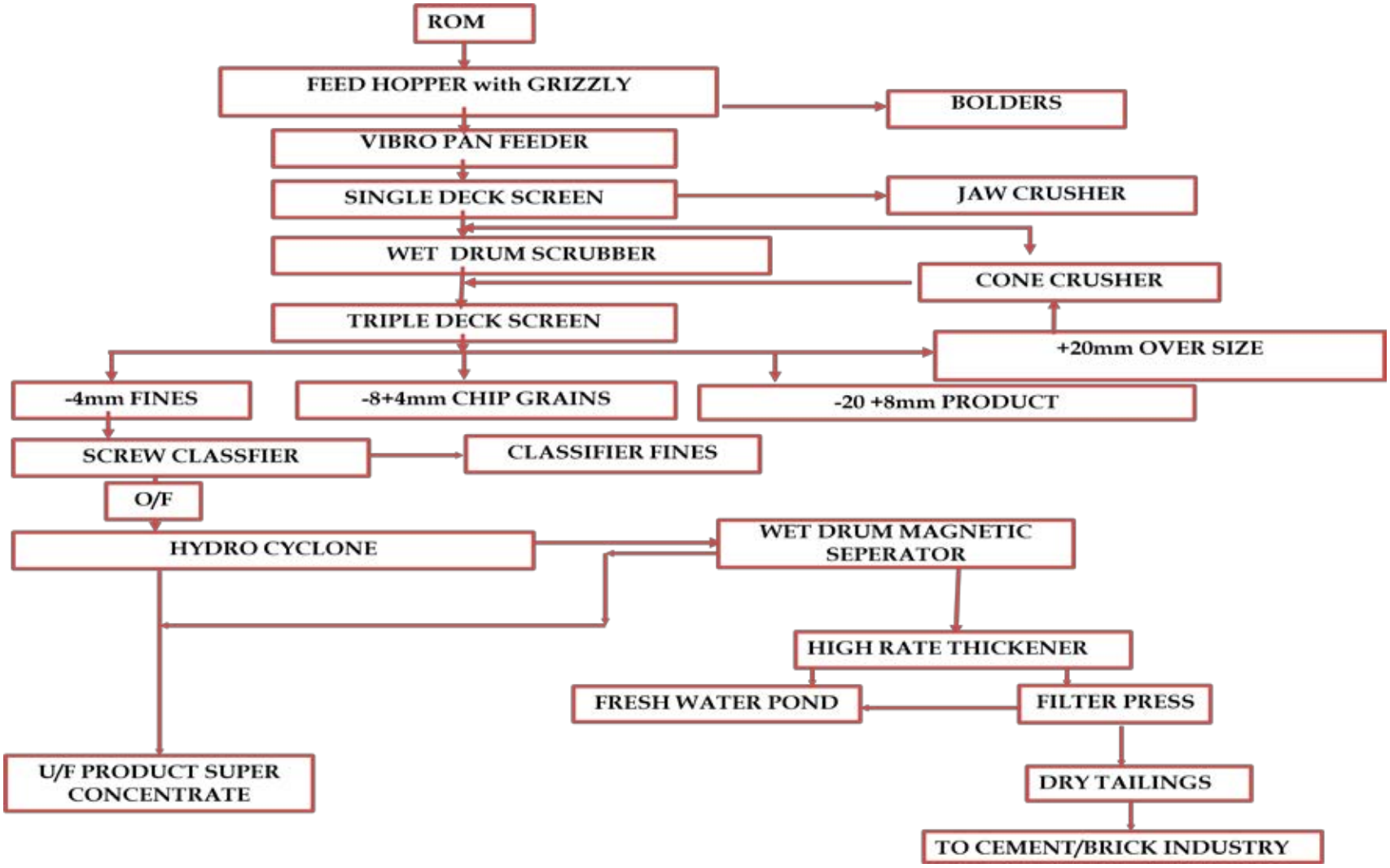


Figure 2.3: Process Flow Diagram

2.6.2 Major Equipments

List of machinery required for the planned production is given in **Table no. 2.2**.

Table 2.2: List of machinery

Sr. No.	Equipment	Quantity
1	Main Hopper	1
2	Grizzly Feeder	1
3	Scrubber	1
4	Screen	2
5	Classifier	1
6	Cyclones	2
7	Jig	1
8	Ball Mill	1
9	Magnetic Separator	1
10	Filter	1
11	Jaw Crusher	2
12	Thickener	1
13	Conveyors	14
14	Pan Feeder	2
15	Bin	2

2.6.3 Water Requirement

Beneficiation is a wet process and requires water for processing of low-grade ore. In order to conserve fresh water, water economy has been an underlying criterion for selection of plant and equipment.

Water recirculation systems have been planned to cater extensive recycling and reuse of return water from plant processes. Requirement of water will be fulfilled by existing bore wells located within the project site.

The total water consumption with the proposed increase in throughput to the plant will be 3000 KLD (Consumptive consumption will be only 900 KLD) to process the ore excluding the water required for other purpose. However, the comprehensive water balance details are given in **Table 2.3.**

As per Sec 11 of Karnataka Ground Water Act, 2011, Koppal is not notified area to obtain permission / No Objection Certificate to withdraw well / bore well water. As per reference no. (4) Government of Karnataka has issued notification on 22.09.2017 by notifying 43 Taluks in 15 District. The said Notification does not cover Koppal District. Hence no approval or NOC is required to withdraw ground water. The copy of the letter is enclosed as **Annexure No – VI.**

Table 2.3: Water Balance Details

Purpose	**Water Consumption (KLD)**	
	Existing	**Proposed**
Dust Suppression	4	75
Domestic	3.5	40
Afforestation	1.5	35
Process	591	3000
Total	**600**	**3150**
Consumptive consumption for the plant		Plant requires: 3000 KLD Considering 70% recycling the consumptive consumption will be only 900 KLD.

Water Balance chart is given in **Figure 2.4**

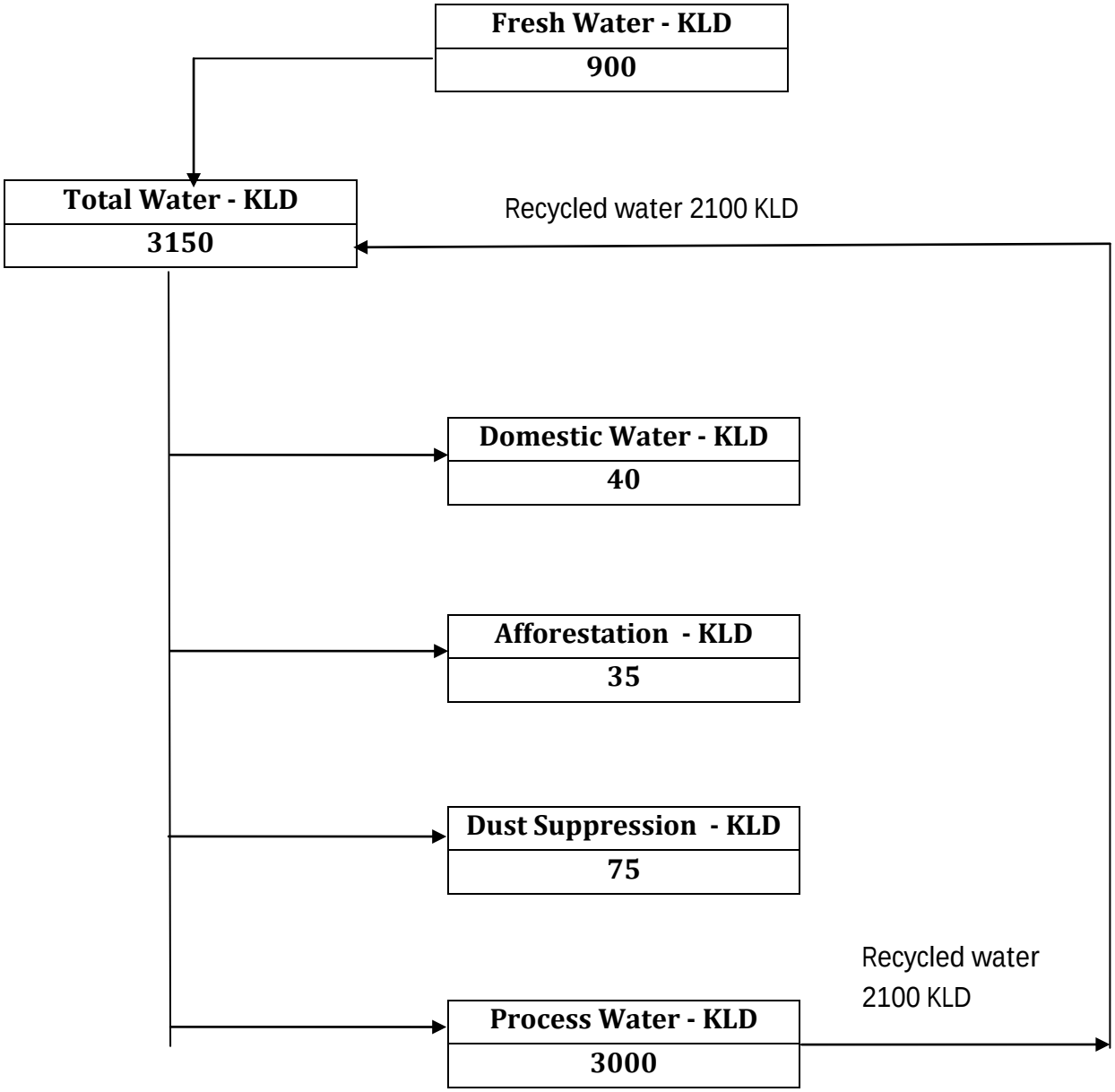


Figure 2.4: Water Balance Chart

2.6.3.1 Waste Water Generation

The total wastewater generated from existing and proposed plant is given in **Table 2.4.**

Table 2.4: Details of wastewater generation

Waste Water Stream	Water Consumption (KLD)		Management Plan
	Existing	Proposed	
Beneficiation Plant	532	2100	Process water will be collected in the pit and the will be recycled in the process, dust suppression and green belt development.
Domestic	2.8	32	Will be disposed off to CPCB Approved Soak Pit and Septic Tank.
Total	**534.8**	**2132**	

2.6.4 Power Requirement

Power supply will be met from GESCOM. The total power requirement for the plant will be 900 KVA. Power requirements details are given in **Table 2.5.** The approval Letter from GESCOM is enclosed as **Annexure No – VII.**

Table 2.5: The Details of Power Requirement

Source	Power Requirement (KVA)		
	Existing	Proposed	Total
GESCOM	200	700	900

2.7 Assessment of new & Untested Technology for the Risk of Technological Failure

Ore beneficiation technologies are well proven technology all over the world. Hence there will not be any risk of technological failure from this proposed expansion project.

2.8 Material Balance for Beneficiation Plant

Capacity: 15,00,000 Tonnes /Annum (5000 MT per day)

Table 2.8: Material Balance for Beneficiation Plant

IN PUT		OUT PUT	
Qty Tons /tons of Beneficiated ore	**Qty Tons / day for 5000 tons Beneficiated Ore**	**Qty / tons of Beneficiated ore**	**Qty Tons per day for 5000 M T Beneficiated Ore**
Fines: 1.4	5000	Beneficiated ore 100%	3571
		Wastes / Tailing	1429
Water	3000	Recycle	2700
		Ground loss & Evaporation	300
Total In put	**8000 tons**	**Total Out Put**	**8000 tons**

CHAPTER- 3

BASELINE DATA - ENVIRONMENTAL DESCRIPTION

FINAL EIA REPORT

CHAPTER – 3

Description of the Environment

3.1 Introduction

Collection of three months data for different Environmental Attributes like Air, Water, Noise, Soil, Flora, Fauna, Socio-economic etc., is an important stage in the preparation of Environmental Impact Assessment (EIA), which helps to predict the changes which may occur after the expansion of the project.

Hence, the teams of the functional area experts have visited the site to have reconnaissance survey of the location and the details with regard to the location features are collected and monitoring locations were also fixed to carry-out baseline monitoring of Air, Water, Noise, Soil, etc.,

The salient features of the location are given below;

The criteria for selecting monitoring location for different Environmental Attributes are as below;

3.2 Description of Study Area

The study area covers 10 km radius of the project site of M/s. Thakur Industries at Hirebaganal Village, Koppal Taluk, Koppal District, Karnataka State. Baseline environment quality represents the background environmental scenario of various environmental attributes.

3.3 Study Period

The baseline environment quality represents the background scenario of various environmental components in the study area. M/s. Thakur industries has initiated studies to carry out Environmental Impact Assessment over a radial distance of 10 km around the plant and obtained Terms of Reference (ToR) from MoEF, New Delhi and obtained TOR on 19th September 2016.

Further, Rapid Environmental Impact Assessment and Environmental Management Plan prepared considering **September – November 2016** baseline data. In additional to all the relevant information as per General Structure of EIA given Appendix III and IIIA in the EIA Notification, 2006.

Accordingly, M/s. Thakur Industries engaged the services of **METAMORPHOSIS^{SM} Project Consultants Pvt. Ltd.**, for preparation of Environmental Impact Assessment by carried-out baseline data to obtain Environmental Clearance from Ministry of Environment, Forest & Climate Change, New Delhi.

3.4 Land Use / Land Cover Study

3.4.1 Objective

To comply the ToR points issued vide letter no. J-11011/208/2016-IA.II (I), dated 19th September 2016 for Enhancement in Production Capacity. **ToR Point no. 3 (Additional ToR for Beneficiation Plant – Annexure 2):** Present land use shall be prepared based on satellite imagery. High-resolution satellite image data having 1m-5m spatial resolution like quick bird, Ikonos, IRS P-6 pan sharpened etc. for the 10 Km radius area from proposed project site. The same is used for land used/land-cover mapping of the area.

- To develop land use and land cover map using land coordinates of the project area
- To identify and mark important basic features according to primary and secondary data.
- To evaluate the project's impact on existing land use of the project area
- To suggest measures for conservation and sustainable use of land

3.4.2 Data Used

Current vintage data of Indian Remote Sensing Satellite RESOURCESAT-2 (L4FMX) digital FCC (False Color Composite) has been used for preparation of Land use/ Land cover thematic map of study area.

Satellite image has been procured from National Remote Sensing Centre, Hyderabad. Survey of India toposheet as a reference map on 1:50,000 scale has been used for preparation of base layer data like road, rail network, village and project site and for geo-referencing of satellite image.

Technical details of Data

Satellite Image - RESOURCESAT-2 (L4FMX)
Satellite data Source - NRSC, Hyderabad
SOI Toposheets No. - 57 A/3
Software Used - Earth Resources Data Analysis System (ERDAS) Imagine 9.2

3.4.3 Methodology

- **Preliminary / primary data collection of the study area:** Satellite data procurement from NRSC Hyderabad.

- Secondary data collection from authorized bodies

  - Survey of India Toposheet (SOI)
  - Plant Layout
  - Cadastral / Khasra map
  - GPS Coordinates of Plant Boundary

- Processing of satellite data using ERDAS Imagine 9.2 and to prepare the Land use and Land cover maps (e.g. Forest, agriculture, settlements, wasteland, water bodies etc.) by digital image processing (DIP) technique.

  - Geo-Referencing of the Survey of India Toposheet
  - Geo-Referencing of satellite Imagery with the help of Geo-Referenced Toposheets
  - Enhancement of the Satellite Imagery
  - Base Map layer creation (Roads, Railway, Village Names and others Secondary data etc.)
  - Data analysis and Classification using Digital interpretation techniques
  - Ground truth studies or field Verification
  - Error fixing / Reclassification
  - Final Map Generation

3.4.4 List of Major Industries

Sr. No.	Name of the Industries	Distance from Project Site
1	P. Balaubha Shetty & Sons Sponge Unit	0.2 kms
2	Hospet Steel Limited	2.0 kms
3	Bhadrashree Steel & Power Limited	3.0 kms
4	Xindia Steel Ltd.	2.5 kms
5	Baba Akhila Sai Jyothi Industries Pvt. Ltd.,	3.0 kms
6	Kirloskar Ferrous Industries Limited	6.0 kms
7	Nanjundeshwara Industries	7.8 kms

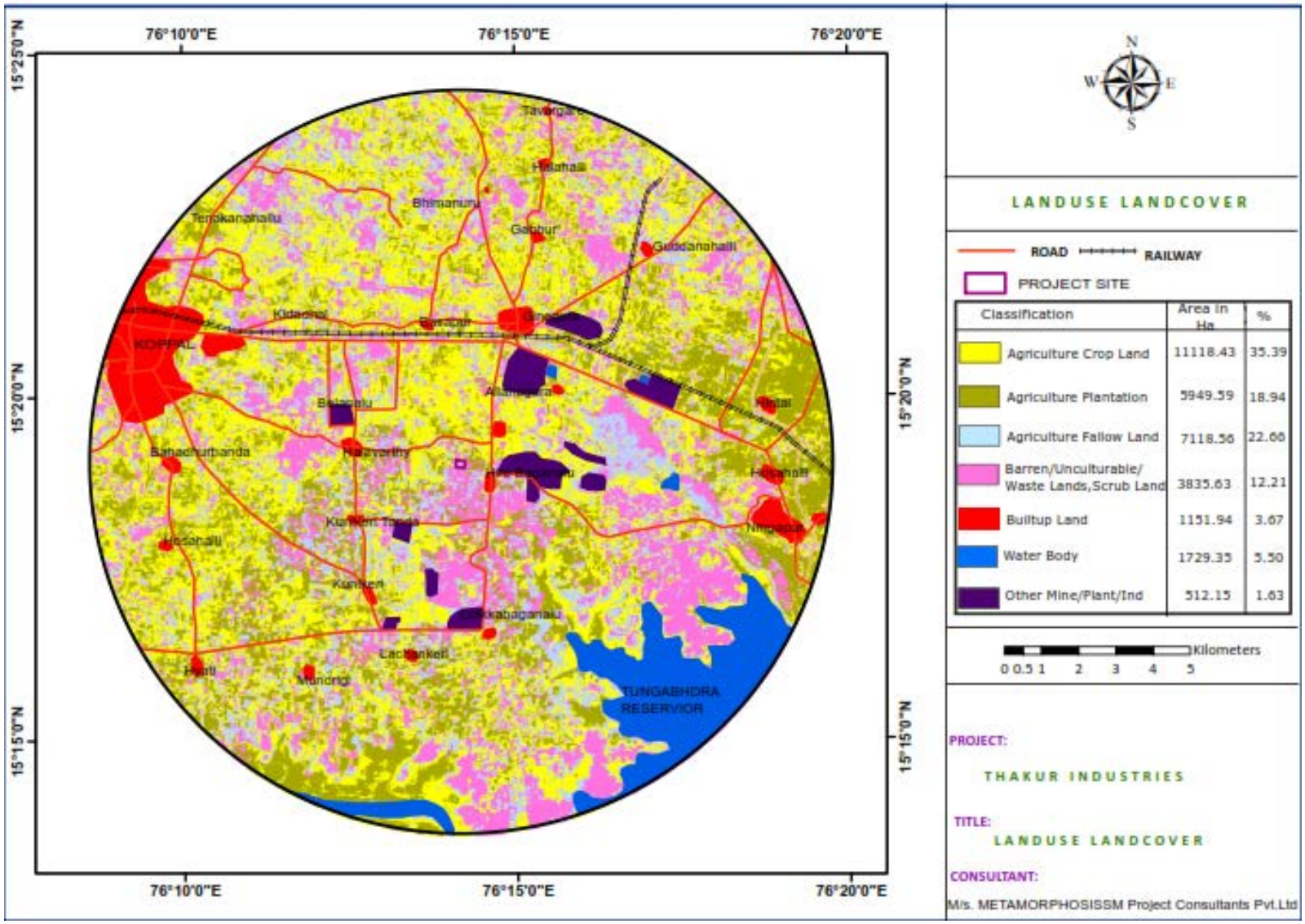


Fig 3.1: Land use/Land Map within 10 km Radius of the Study Area

3.4.5 Observation of the LULC Data

- In the core zone, 54.49% falls under open land, 45.51 % of the area falls under stony wasteland.
- 10 km study area mainly comprises of Cropland, which constitutes 35.39 % of the total area Thus, other classes occupy only 64.61 % of the total area. The second largest area falls under Fallow land which constitutes 22.66 % of total study area.
- There are two (2) River/ water bodies existing within 10 Km radius of study area.
- Buffer area seems flat and slope is towards the NE direction from the project site.
- Hirebaganal is the nearest village from the project site.
- There are no Ecological Sensitive Areas (National Park, Wild Life Sanctuary, Biosphere Reserve etc.) within 10 km radius of the study area.

3.4.6 Interpretation and Conclusion

- Proposed enhancement will be done at the existing project site; thus, no additional land is required for the same. Hence, rendering no impact on Core Zone.
- Beneficiation plant will be established on the open land; hence, there will not be any adverse impact on the land use of the area.
- There will be increase in the vehicular movement due to the proposed enhancement activity. Dust emissions from the plant may degrade the fertility of land.
- Air pollution control measures such as installation of Air pollution control equipments, water sprinkling on roads and regular air monitoring etc. will be adopted to maintain the pollution level within limits.
- Thick Greenbelt will be developed all along the plant boundary and in the plant area to minimize the dust emission impacts.

3.4.7 Digital Elevation Model

Digital Elevation Model is data files that contain the elevation of the terrain over a specified area, usually at a fixed grid interval over the "Bare Earth". The intervals between each of the grid points will always be referenced to some geographical coordinate system. This is usually either latitude-longitude or UTM (Universal Transverse Mercator) coordinate systems DEM has been prepared for Beneficiation plant of M/s. Thakur Industries for 10 km radius study area.

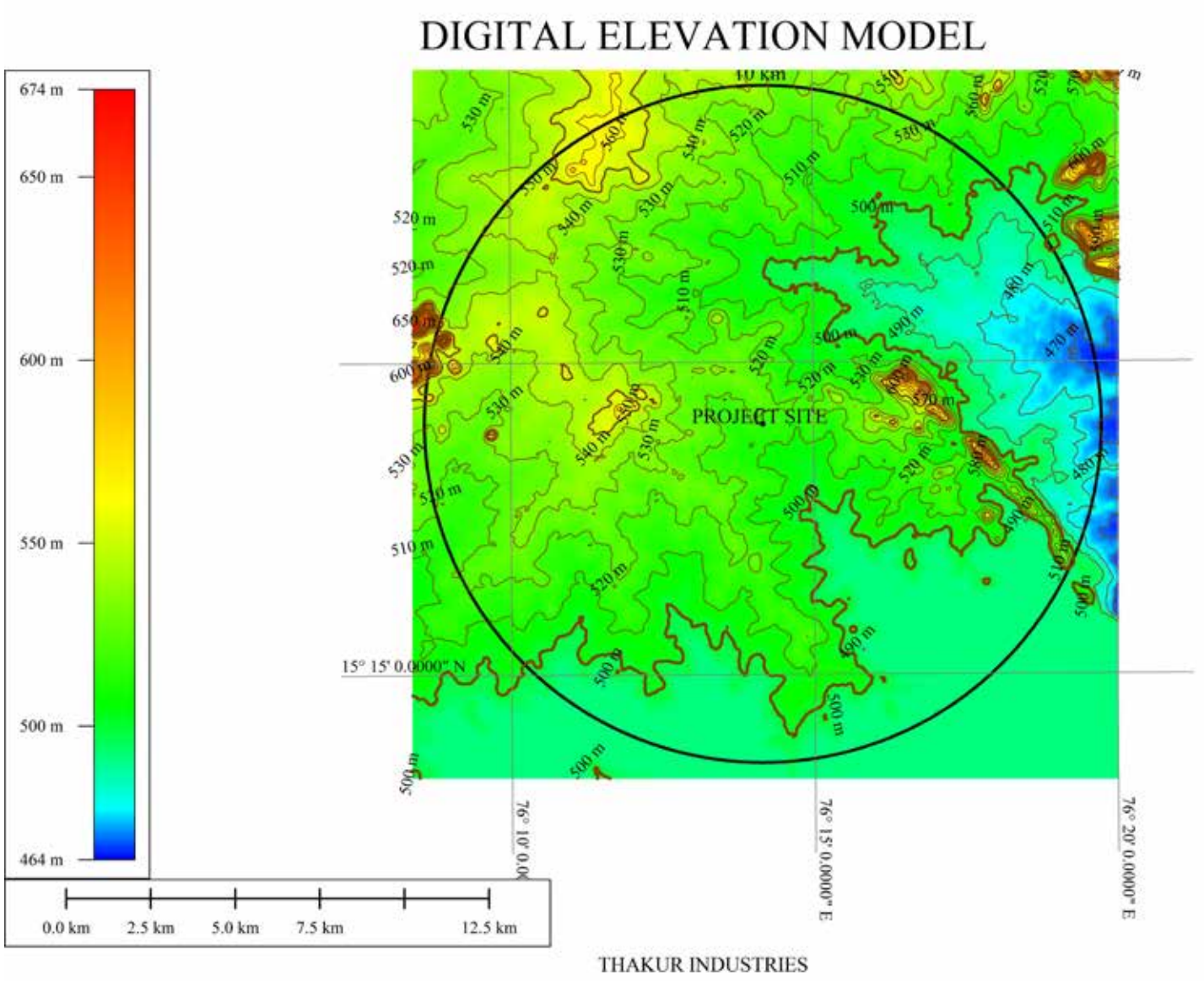


Fig. 3.2: 3D view of Digital Elevation Model of the location

3.5 Micro Meteorology

3.5.1 Methodology

Meteorology plays a vital role in determining the transport and diffusion pattern of air pollutants released into atmosphere. The principal variables include average wind speed and direction, atmospheric stability and topography of the area. Meteorological characteristics of an area are very much important in assessing possible environmental impacts and in preparing environmental management plan.

Since meteorological factors show wide fluctuations with time, meaningful interpretation can be drawn only from long-term reliable data. Such source of data is India Meteorological Department (IMD), which maintains a network of meteorological stations at several important locations.

The nearest IMD regional centre to the plant site is located in Bengaluru. The Meteorological data i.e. temperature, relative humidity, rainfall, wind speed, and wind direction, recorded at two synoptic hours i.e. 08:30 and 17:30 for Post-Monsoon 2016 Season (September to November 2016) was obtained from this station to study meteorology of the study area.

3.5.2 Micro Meteorology at Site

Meteorological station was set-up at site to record surface meteorological parameter during Post-Monsoon 2016 Season (September to November 2016).

Wind speed and wind direction data recorded during the study period has enabled identifying the influence of meteorology on the air quality of the area. Based on the collected meteorological data, relative percentage frequencies of different wind directions were calculated and plotted as wind roses for twenty-four-hour duration. Maximum and minimum temperatures including percentage relative humidity were also recorded simultaneously.

It was observed that the predominant wind direction for the study period was NE to SW direction. Wind speed during this period varied from 4.0 m/sec. Wind Rose Diagram during the study period is shown in **Figure - 3.3.**

Summary of the micrometeorology recorded at the site is given in **Table - 3.1**. Micrometeorology and Frequency Distribution for the study period has been enclosed as **Annexure No – VIII & IX.**

Table 3.1: Meteorological data during Post-Monsoon 2016

Parameter	Post-Monsoon 2016	
	Max.	Min.
Temp ^{0}C	31.6	16.1
Relative Humidity (%)	100	37
Total Rainfall (mm)	11.6	

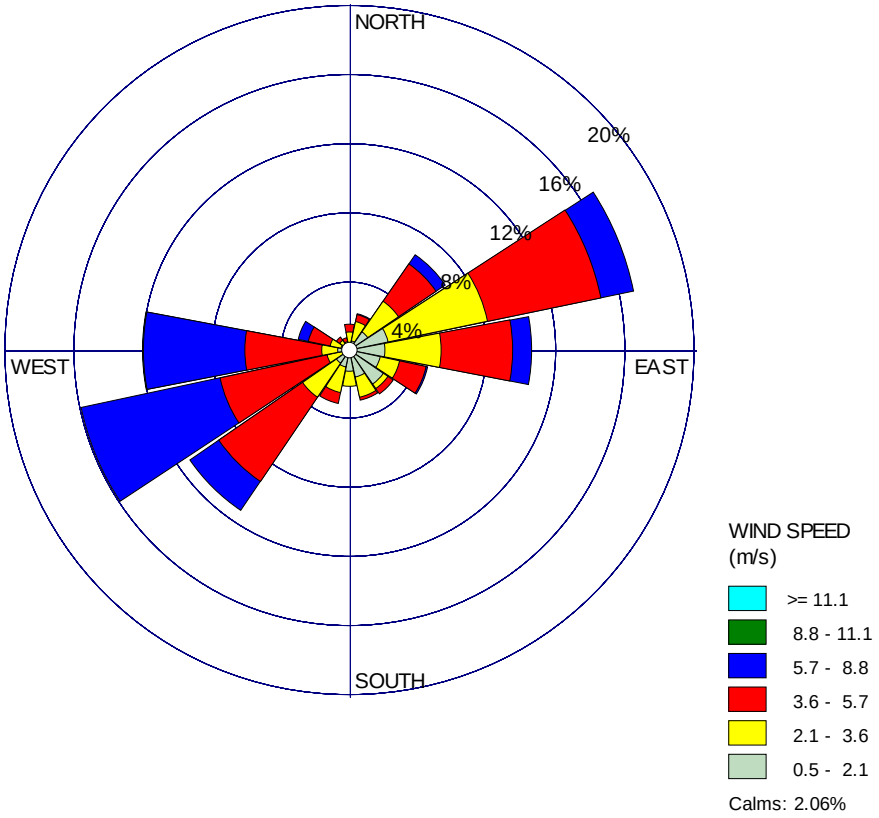


Fig 3.3: Wind Rose Diagram of Post-Monsoon 2016

3.6 Ambient Air Environment

Ambient air quality monitoring has been carried out to assess the ambient air quality at selected locations as part of baseline data. Samples were collected in the 10 km study area to assess general trend of air quality in the local area. It helps in providing a database for evaluation of effects of a project activity in that region. It will be also useful in ascertaining the quality of air environment in conformity to standards of the ambient air quality during operation phase of project.

3.6.1 Methodology

The air quality monitoring was done for Project site during Post-Monsoon Season (September to November 2016), within 10 km radius study area as per the Terms of Reference (ToR) issued by MoEF&CC, New Delhi vide their letter no. J-11011/208/2016-IA.II (I) dated 19th September 2016 for Enhancement in Production Capacity.

The samples were collected for the following air quality determinants:

- Sulphur Dioxide (SO_2)
- Oxides of Nitrogen (NO_x)
- Particulate Matter (PM_{10} and $PM_{2.5}$)
- Carbon Monoxide (CO)

The sources of air pollution in the region are dust rising from Plant activities, unpaved roads, domestic fuel burning, vehicular traffic, etc.

3.6.2 Sampling Schedule

The sampling was done continuously for 24 hours for SO_2, NO_x, PM_{10} and $PM_{2.5}$ with a frequency of twice a week for three months (24 observations for one location). The details of measurement methodology and test procedure are given in **Chapter – 6** (Environmental Monitoring Programme).

3.6.3 Sampling Locations

Sampling locations were selected for AAQ Monitoring keeping in view the pre-dominant wind direction prevailing in the area during the study period.

It can be observed from the wind rose diagram (Figure - 3.3) that the dominant wind direction during the study period was from NE to SW. Villages / locations have been selected in the upwind direction and as well as in the downwind direction for AAQ monitoring from the project site.

Monitoring stations selected for Ambient Air Quality Monitoring during the study period are given in **Table - 3.2** and shown in **Figure - 3.4.**

Table - 3.4: Locations of Ambient Air Quality Monitoring Stations

Code	Name of Sampling Location	Distance in Km.	Direction	Geographical Location	Selection Criteria
Core Zone					
FA-1	Near Office	--	--	**Longitude:** 76⁰ 14' 5.52" E **Latitude:** 15⁰ 19' 4.00" N **MSL:** 519 m	Core Zone
FA-2	Haulage Road	--	--		
FA-3	Crushing & Screening Area	--			
FA-4	Unloading/Ore Stock/Loading Area	--	--		
Buffer Zone					
A-1	Hirebaganal Village	1.0	S	**Longitude:** 76⁰ 14' 34.53" E **Latitude:** 15⁰ 18' 42.59" N **MSL:** 512 m	Falls in upwind of predominant wind direction
A-2	Kunikere Village	7.0	SWW	**Longitude:** 76⁰ 13' 8.06" E **Latitude:** 15⁰ 17' 11.31" N **MSL:** 509 m	Falls in upwind of predominant wind direction
A-3	Belanalu Village	4.0	NW	**Longitude:** 76⁰ 12' 6.29" E **Latitude:** 15⁰ 20' 44.65" N **MSL:** 520 m	Human habitation in the vicinity of industrial activity
A-4	Tenakanakallu Village	8.0	NNE	**Longitude:** 76⁰ 11' 6.26" E **Latitude:** 15⁰ 23' 21.51" N **MSL:** 533 m	Human habitation in the vicinity of industrial activity
A-5	Kanakapura Village	6.5	NE	**Longitude:** 76⁰ 15' 54.86" E **Latitude:** 15⁰ 20' 6.95" N **MSL:** 513 m	Human habitation in the vicinity of industrial activity

Code	Name of Sampling Location	Distance in Km.	Direction	Geographical Location	Selection Criteria
Buffer Zone					
A-6	Hirekasinkandi Village	4.5	SE	**Longitude:** 76^0 16′ 36.44″ E **Latitude:** 15^0 18′ 5.96″ N **MSL:** 515 m	Human habitation in the vicinity of industrial activity
* *Source: SOI Toposheet*					

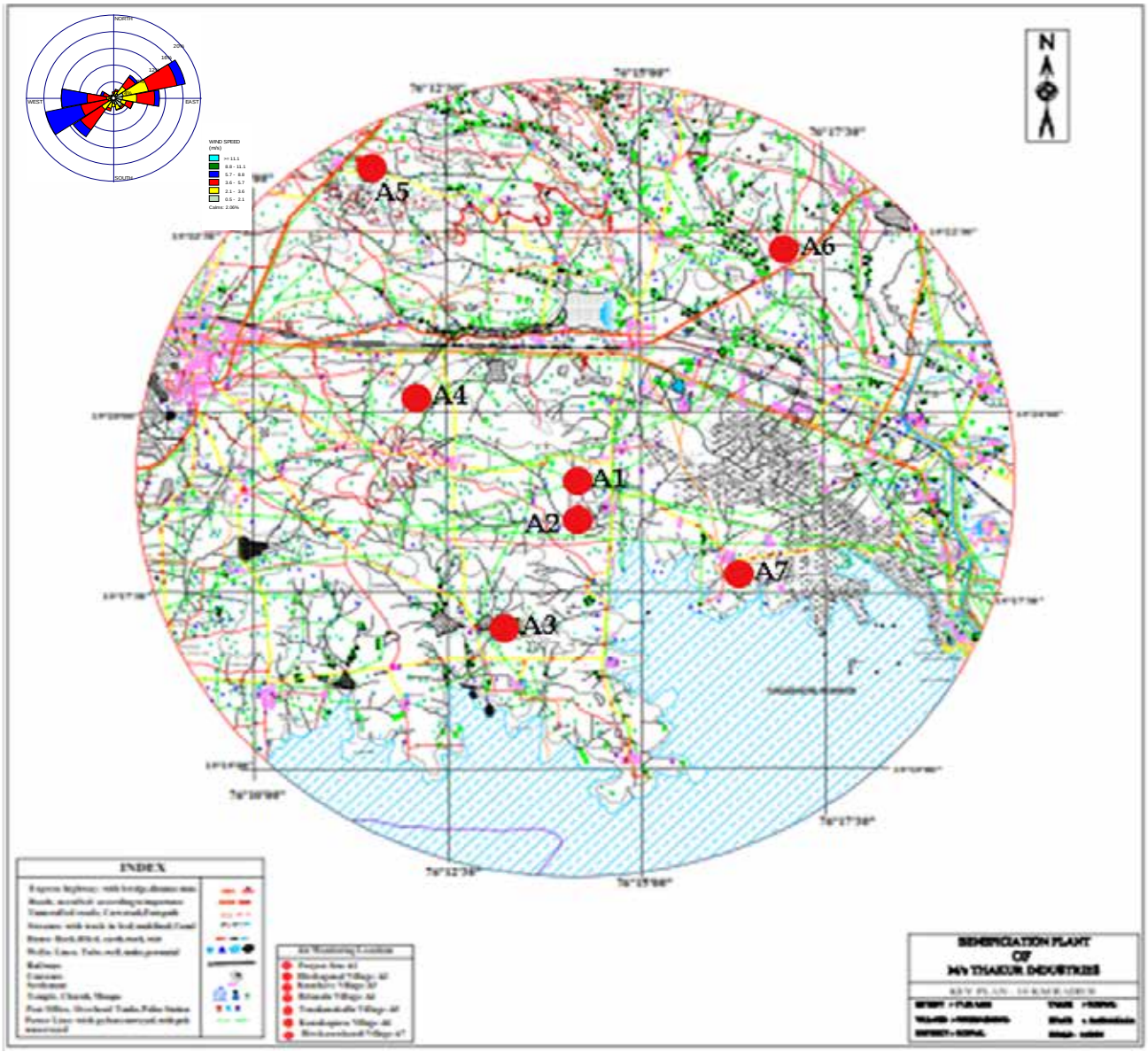


Fig 3.4: Air monitoring location showing around 10 Km Radius

3.6.4 Analysis of Baseline Concentrations

The Ambient Air Quality levels in the study area for the Month of Post-Monsoon 2016 are summarized in **Table 3.5 and Table 3.6**. The ambient air quality observed during the study period is well within the National Ambient Air Quality Standards prescribed by CPCB and the same is shown graphically in **Fig 3.5**. There are no predominant activities envisaged which can significantly contribute for the change in the ambient air quality of the surrounding environment after the implementation of the project. The Ambient Air Quality levels in all the monitoring stations are given as **Annexure No – X.**

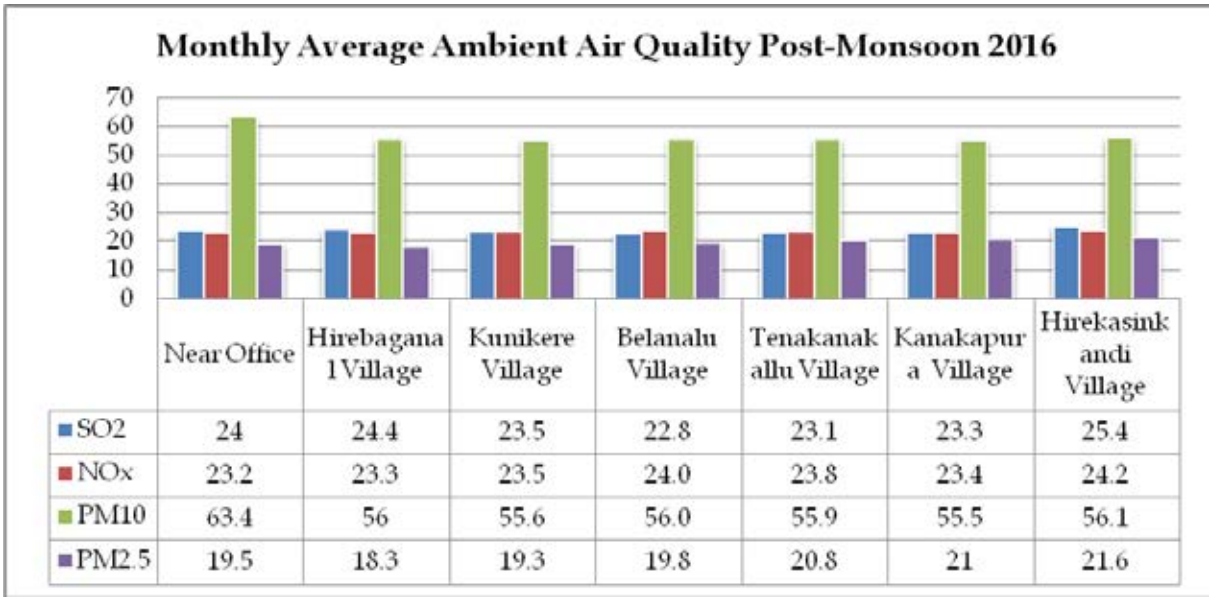
Table 3.5: Summary of Ambient Air Quality Data for the Month of Post-Monsoon 2016

(Units: µg / m^4)

Code	Name of Sampling Location	SO_2	NOx	PM_{10}	$PM_{2.5}$
Core Zone					
A-1	Near Office	24.0	23.2	63.4	19.5
Buffer Zone					
A-2	Hirebaganal Village	24.4	23.3	56.0	18.3
A-3	Kunikere Village	23.5	23.5	55.6	19.3
A-4	Belanalu Village	22.8	24.0	56.0	19.8
A-5	Tenakanakallu Village	23.1	23.8	55.9	20.8
A-6	Kanakapura Village	23.3	23.4	55.5	21.0
A-7	Hirekasinkandi Village	25.4	24.2	56.1	21.6

Table 3.6: Summary of Fugitive Emission Quality Data for the Month of October 2016

Code	Name of Sampling Location	PM
Core Zone		
F-1	Haulage Road	452
F-2	Crushing & Screening Area	375
F-3	Unloading/Ore Stock/Loading Area	449



	Near Office	Hirebagana l Village	Kunikere Village	Belanalu Village	Tenakanak allu Village	Kanakapur a Village	Hirekasink andi Village
SO2	24	24.4	23.5	22.8	23.1	23.3	25.4
NOx	23.2	23.3	23.5	24.0	23.8	23.4	24.2
PM10	63.4	56	55.6	56.0	55.9	55.5	56.1
PM2.5	19.5	18.3	19.3	19.8	20.8	21	21.6

Fig 3.5: Graphically Representation of Ambient Air

3.6.5 National Ambient Air Quality Standards

Table - 3.7 shows the NAAQS prescribed by CPCB on 16th Nov., 2009.

Pollutants	Time Weighted Average	Concentration in Ambient Air		Methods of Measurement
		Industrial, Residential, Rural and other Areas	Ecologically Sensitive Area (Notified by Central Government)	
Sulphur Dioxide (SO_2), µg/m^3	Annual * 24 Hours **	50 80	 20 80	-Improved West and Gaeke Method -Ultraviolet Fluorescence
Nitrogen Dioxide (NO_2), µg/m^3	Annual * 24 Hours **	40 80	30 80	-Jacob & Hochheiser modified ($NaOH$-$NaAsO_2$) Method -Gas Phase Chemiluminescence
Particulate Matter (Size less than 0µm) or PM_{10}, µg/m^3	Annual * 24 Hours **	60 100	60 100	-Gravimetric -TEOM -Beta attenuation
Particulate Matter (Size less than 2.5µm) or $PM_{2.5}$, µg/m^3	Annual * 24 Hours **	40 60	40 60	-Gravimetric -TEOM -Beta attenuation
Ozone (O_3) µg/m^3	8 Hours * 1 Hour **	100 180	100 180	-UV Photometric -Chemiluminescence -Chemical Method
Lead (Pb), µg/m^3	Annual * 24 Hours **	0.50 1.0	0.50 1.0	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
Carbon Monoxide(CO), mg/m^3	8 Hours ** 1 Hour **	02 04	02 04	-Non dispersive Infrared (NDIR) Spectroscopy
Ammonia (NH_3), µg/m^3	Annual * 24 Hours **	100 400	100 400	-Chemiluminescence -Indophenol blue method
Benzene (C_6H_6),µg/m^3	Annual *	05	05	-Gas Chromatography (GC) based continuous analyzer -Adsorption and desorption followed by GC analysis
Benzo(a)Pyrene (BaP) Particulate phase only, ng/m^3	Annual *	01	01	-Solvent extraction followed by HPLC/GC analysis
Arsenic (As), ng/m^3	Annual *	06	06	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper
Nickel (Ni), ng/m^3	Annual *	20	20	-AAS/ICP Method after

				sampling on EPM 2000 or equivalent filter paper

* Annual Arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 8 hourly or 1 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

NOTE: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigations.

3.6.6 Conclusion

Ambient Air Quality Monitoring reveals that the concentrations of PM_{10} and $PM_{2.5}$ for all the 7 AAQM stations were found between 18.3 to 21.6 µg/m^3 and 55.5 to 63.4 µg/m^3, respectively.

As far as the gaseous pollutants SO_2 and NO_x are concerned, the prescribed NAAQS of 80 µg/m^3 has never surpassed at any station. The concentrations of SO_2 and NO_x were found to be in range of 22.8 to 25.4 µg/m^3 and 23.2 to 24.2 µg/m^3 respectively.

3.7 Noise Environment

Noise often defined as unwanted sound, interferes with speech communication, causes annoyance, distracts from work, and disturbs sleep, thus deteriorating quality of human environment.

3.7.1 Source of Noise

There are several sources of noise in the 10 km radius of study area, which contribute to the local noise level of the area. Ambient noise sources in the vicinity of the project include the noise from traffic on road, human activities in villages and agricultural fields.

In order to know the baseline noise levels, in and around the project site, noise levels were measured at site and villages in the study area. The Locations showing Noise monitoring stations with distance within 10 km radius of the study area is given in **Fig 3.6**.

3.7.2 Sampling Schedule

The sampling was done during day-time and night-time once in the study period. Locations / stations selected for noise level monitoring are given in **Table - 3.8.**

Table 3.8: Noise monitoring Locations with Distance

Code	Name of Sampling Location	Distance in Km.	Direction	Geographical Location
Core Zone				
FA-1	Near Office	--	--	**Longitude:** 76^0 14' 5.52" E **Latitude:** 15^0 19' 4.00" N **MSL:** 519 m
FA-2	Haulage Road	--	--	
FA-3	Crushing & Screening Area	--		
FA-4	Unloading/Ore Stock/Loading Area	--	--	
Buffer Zone				
A-1	Hirebaganal Village	1.0	S	**Longitude:** 76^0 14' 34.53" E **Latitude:** 15^0 18' 42.59" N **MSL:** 512 m
A-2	Kunikere Village	7.0	SW	**Longitude:** 76^0 13' 8.06" E **Latitude:** 15^0 17' 11.31" N **MSL:** 509 m
A-3	Belanalu Village	4.0	NW	**Longitude:** 76^0 12' 6.29" E **Latitude:** 15^0 20' 44.65" N **MSL:** 520 m
A-4	Tenakanakallu Village	8.0	NNE	**Longitude:** 76^0 11' 6.26" E **Latitude:** 15^0 23' 21.51" N **MSL:** 533 m
A-5	Kanakapura Village	6.5	NE	**Longitude:** 76^0 15' 54.86" E **Latitude:** 15^0 20' 6.95" N **MSL:** 513 m
A-6	Hirekasinkandi Village	4.5	SE	**Longitude:** 76^0 16' 36.44" E **Latitude:** 15^0 18' 5.96" N **MSL:** 515 m

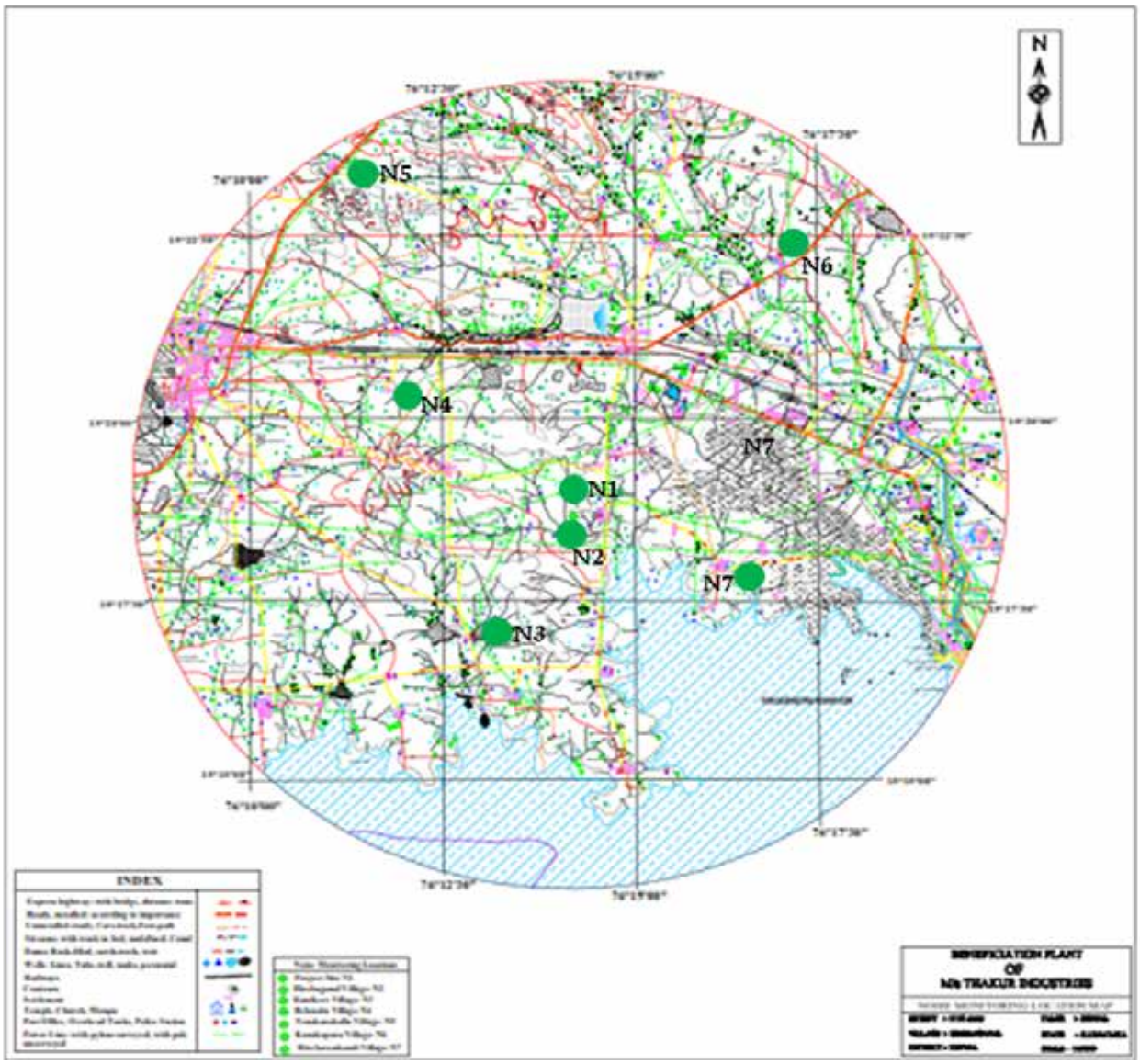


Fig 3.8: Noise monitoring location showing around 10 Km Radius

The Central Pollution Control Board has stipulated specific standard for ambient noise level in industrial, commercial, residential and silence zones for both day and night time. These are given below in **Table 3.9**.

Table 3.9: Ambient Noise Standards

Sr.No.	Category of the Area	Limits [Leq in dB (A)]	
		Day Time (06.00 AM – 10.00 PM)	Night (10.00 PM – 06.00 AM)
1.	Industrial Area	75	70
2.	Commercial Area	65	55
4.	Residential Area	55	45
4.	Silence Zone	50	40

- Day Time is from 6.00 AM to 10.00 PM.
- Night Time is reckoned between 10.00 PM to 6.00 AM
- Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.

Note: *Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply.*

Source: Central Pollution Control Board Norms (As per Noise Pollution (Regulation and Control) Rules, 2000.

3.7.3 Assessment of Noise Levels

The main objective of noise level assessment is to identify all the sources, acceptable and unacceptable in the study region. Acoustical environment varies dynamically in magnitude and character throughout most communities. The variation is also significant depending on the type of source and the capacity of the source to produce noise. The noise level variation can be temporal, spectral and spatial. Maximum impact of noise is felt in the urban areas, which is mostly due to the commercial / mining activities and vehicular movement during peak hours of the day.

The assessment of noise pollution in the study area has been carried out keeping the above stated considerations. The existing status of noise levels within the study zone has been undertaken through reconnaissance survey, identification of existing noise sources, land use pattern for monitoring of baseline noise levels. The noise levels were monitored using an electronic sound level meter for winter season at different sites when different activities were going on in the site. The noise levels measured at the 10 locations and the results obtained are given below in **Table 3.10**.

Table 3.10: Measured Noise Values

Villages / Parameters	Day (Min)	Day (Max)	Night (Min)	Night (Max)
Near Office	60.8	68.3	49.7	54.8
Main approach Road	68.0	76.9	51.6	56.2
Crushing and Screening Area	67.2	79.4	49.8	52.3
Unloading/ loading /Ore Stock area	66.9	75.6	51.3	53.8
Hirebaganal Village	43.5	52.3	36.7	38.7
Kunikere Village	46.7	55.6	37.2	39.8
Belanalu Village	44.8	52.3	36.7	38.6
Tenakanakallu Village	45.6	54.9	35.8	37.9
Kanakapura Village	44.6	55.6	36.6	38.2
Hirekasenkandi Village	43.8	49.1	39.8	41.3

It was observed that the values obtained were within the prescribed Ambient Air Quality Standards with respect to Noise. Measured noise levels are given as **Annexure VIII.**

Interpretation:

Noise levels were found high in the project site and approach road to the plant. However, the entire study area is having rural scenario and sparsely distributed industrial activities. The noise generation is intermittent and usually found high on the transportation routes. In the villages, where the concern of noise levels, it is found to be below standards for entire monitoring period.

3.8 Water & Hydrology Environment

The water is an important natural resource which is required for wellbeing of the mankind and also for survival of plant & animal life on the earth. It is also necessary to use the available water judiciously to conserve the natural potable water. Hence, it is necessary to assess the baseline data of different water sources available in the study area. It not only helps to use the water in an economic way, but also gives the changes in the water quality, if any, after the implementation of the project. The assessment of baseline data on water quality includes;

- £ Identification of surface water sources.
- £ Identification of ground water sources.
- £ Collection of water samples.

- Analyzing water samples collected for Physio-Chemical and Biological parameters.

The water samples were collected from the available ground water and surface water sources and have been analyzed to assess the quality of water and any impacts on the quality of water due to the proposed project. The water quality sampling location details are given in **Table 3.10** and **Table 3.11.**

3.8.1 Surface Water

There is no water body within the project site. However, two locations have been chosen for surface water monitoring. Tungabhadra dam which is at a distance of about 7.0 km towards south-east direction and Mundragi surface water which is 6.5 m towards South-South-west direction from the project site.

Table 3.10: Surface Water Sampling Locations with Distance

Code	Name of Sampling Location	Distance in Km	Direction
Surface Water Locations			
SW1	Tungabhadra Dam	7.0	SW
SW2	Mundrigi Surface Water	6.5	SE

3.8.2 Ground Water

Three Bore well has been selected to test the characteristics. One Bore well water has been selected at Project Site to test the characteristics. Bore well at Halavarti Village that is at a distance of 3.0 km towards West-North-West direction, Bore well at Hirebaganal Village which is at a distance 1.0 km towards South direction.

Table 3.11: Ground Water Sampling Locations with Distance

Code	Name of Sampling Location	Distance in Km	Direction
Ground Water Sampling Locations			
GW1	Project Site	-	-
GW2	Hirebaganal Village	1.0	S

GW3	Halavarti Village	3.0	WNW

The Locations showing Surface and Ground Water monitoring stations is given in **Fig 3.9.**

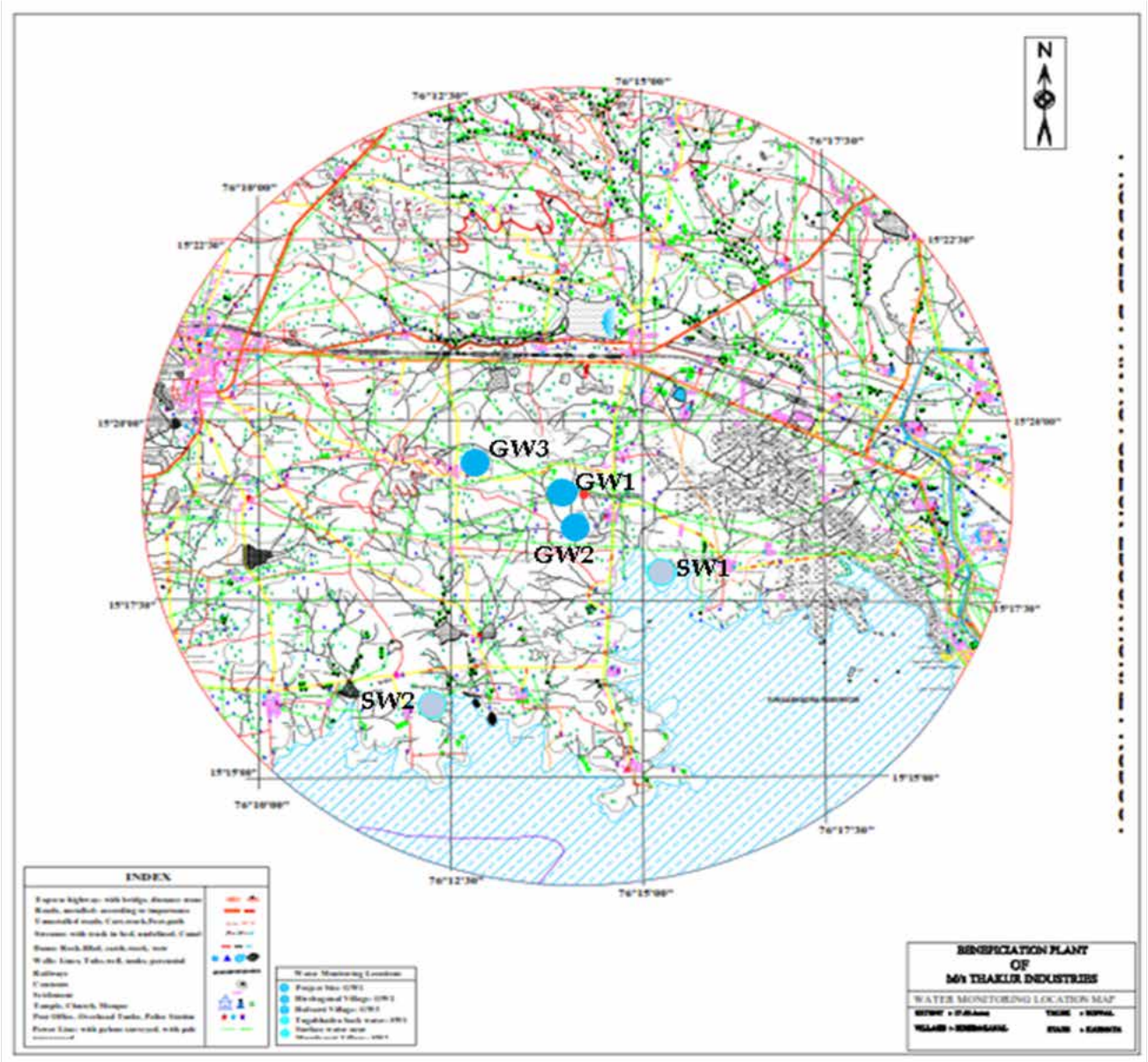


Fig 3.7: Locations showing Surface and Ground Water monitoring stations around 10 Km Radius

3.8.3 Analysis of Water Sample

3.8.3.1 Surface Water

The Analysis of Surface water in the study area in the month of **Post-Monsoon 2016** is summarized in **Table 3.12.**

Table No: 3.12: Summary of Water Quality

Sr. No.	Parameters	Protocol	Unit	Result	Standard IS 10500: 2012 (2nd Revision)	
					Acceptable Limit	Permissible Limit
A.	**PHYSICAL PARAMETERS**					
1.	Colour	IS:3025 (Part 4)	Hazen	BDL	5	25
2.	pH	IS:3025 (Part 11)	--	7.4	6.5 to 8.5	
3.	Turbidity	IS:3025 (Part 10)	NTU-	BDL	1	5
B.	**CHEMICAL PARAMETERS**					
4.	Chlorides, as Cl	IS:3025 (Part 32)	mg/L	45.77	250	1000
5.	Total Hardness as $CaCO_3$	IS: 3025 (Part 21)	mg/L	204.71	300	600
6.	Calcium as Ca	IS 3025 (Part 40)	mg/L	13.69	75	200
7.	Magnesium as Mg	IS 3025 (Part 46)	mg/L	41.45	30	100
8.	Total Dissolved solids,	IS:3025 (Part-16)	mg/L	448.8	500	2000
9.	Fluorides as F	IS 3025 (Part 60)	mg/L	0.6	1	1.5
10.	Sulphate, as SO_4	IS 3025 (Part 24)	mg/L	65.16	1	1.5
11.	Nitrate as NO_3	IS 3025 (Part 60)	mg/L	0.58	45	--
12.	Iron as Fe	IS 3025 (Part 53)	mg/L	BDL	0.3	1
13.	Alkalinity as $CaCO_3$	IS:3025 (Part 23)	mg/L	190	200	600
14.	Dissolved Oxygen (DO)	IS:3025 (Part 38)	mg/L	7.6	--	--
15.	Biochemical Oxygen Demand	APHA 22nd Ed 4500-	mg/L	BDL	Not More Than 10	--
16.	Chemical Oxygen Demand	IS:3025 (Part 58)	mg/L	BDL	Not More Than 50	--
17.	Conductance	IS:3025 (Part 14)	µS/cm	693	2000	
C.	**MICROBIOLOGICAL PARAMETERS**					
18.	Coliform organism/100ml	IS:1622-1981	MPN	<2	< 10	
19.	E. Coli Bacteria/100ml	IS:1622-1981	--	Not Detected	Shall not be detected in any 100 ml sample.	

Interpretation: Suitable for bathing and other domestic purposes.

3.8.3.2 Analysis of Ground Water Sample

The Analysis of Ground water in the study area in the month of **Post-Monsoon 2016** is summarized in **Table 3.13.**

Table No: 3.13: Summary of Water Quality

Unit: mg/l

Sr. No.	Parameters	Protocol	Unit	Result	Standard IS 10500: 2012 (2nd Revision)	
					Acceptable Limit	Permissible Limit
A.	**PHYSICAL PARAMETERS**					
1.	Colour	IS:3025 (Part 4)	Hazen	1	5	25
2.	pH	IS:3025 (Part 11)	--	7.4	6.5 to 8.5	
B.	**CHEMICAL PARAMETERS**					
3.	Chlorides, as Cl	IS:3025 (Part 32)	mg/L	54.6	250	1000
4.	Total Hardness as $CaCO_3$	IS: 3025 (Part 21)	mg/L	235.52	300	600
5.	Calcium as Ca	IS 3025 (Part 40)	mg/L	54.17	75	200
6.	Magnesium as Mg	IS 3025 (Part 46)	mg/L	11.62	30	100
8.	Total Dissolved solids,	IS:3025 (Part-16)	mg/L	488	500	2000
9.	Fluorides as F	IS 3025 (Part 60)	mg/L	0.55	1	1.5
10.	Sulphate, as SO_4	IS 3025 (Part 24)	mg/L	61.1	1	1.5
11.	Nitrate as NO_3	IS 3025 (Part 60)	mg/L	17.8	45	--
12.	Iron as Fe	IS 3025 (Part 53)	mg/L	0.12	0.3	1
13.	Alkalinity as $CaCO_3$	IS:3025 (Part 23)	mg/L	179.3	200	600
14.	Conductance	IS:3025 (Part 14)	µS/cm	865	2000	
C.	**MICROBIOLOGICAL PARAMETERS**					
15.	Coliform organism/100ml	IS:1622-1981	MPN	3	< 10	Absent
16.	E. Coli Bacteria/100ml	IS:1622-1981	--	Absent	Absent	Absent

The water analysis is given as **Annexure No – IX.**

Ground water data interpretation:
Overall quality of ground water is found good and suitable for drinking purpose.

3.8.4 Hydrology

Hydro geologically the study area can be grouped under hard rock's occupied by granite and granitic gneisses, the ground water occurs under confined conditions in the weathered mantle and under semi confined conditions in the joints, fractures, crevices etc. of the fresh rock below. Its occurrence is controlled by the intensity and depth of weathering and by the presence of the joints and fractures, which vary from place to place. The open place available for water to accumulate in fresh rock is extremely limited, while the weathered zone, which is more porous carrying most of the water that is available for development. The depth to water table in wells is governed to a large extent by the topography, the water levels being shallow in wells located in valleys than those located on high grounds.

There are small canal flowing in southern direction. The study area does not have any manmade big water tanks except for the natural ponds. Due to the scanty rainfall over the last few years, the tank and streams hold water only during and just after monsoon season.

3.8.4.1 Ground Water Potential

Ground water prospects of an area depend mainly on Lithology unit (rock type) occurring at that area. However, within each Lithology unit, the ground water conditions vary significantly depending upon the geomorphology, structure, slope, soil thickness, depth and nature of weathered material, presence of fractures / lineaments, surface water bodies, canals, irrigated areas, etc. All the parameters of the study area are studied and integrated to arrive at the ground water prospects. Ground water potential map showing in **Figure 3.8.**

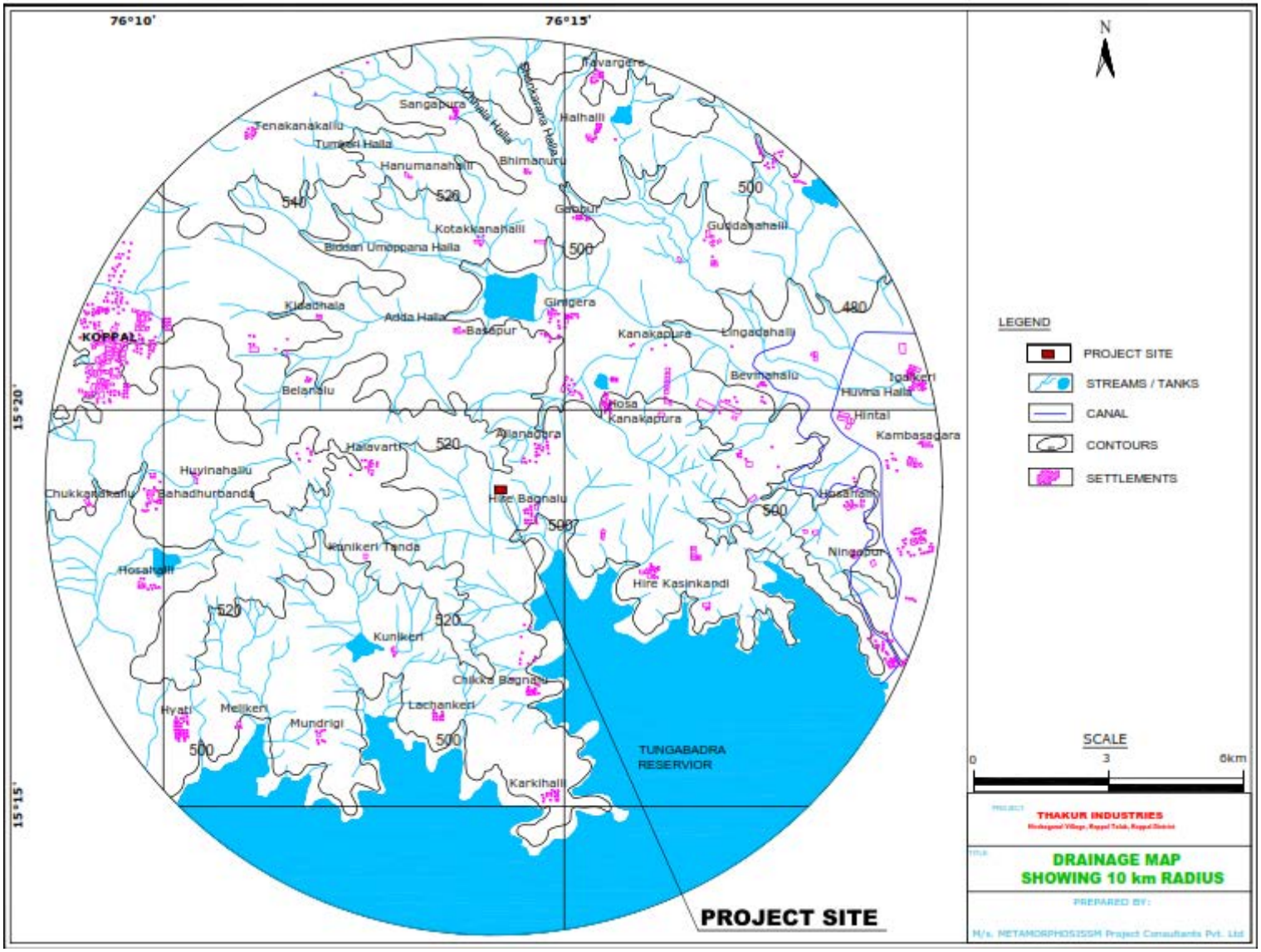


Fig 3.8: Ground water potential around 10 Km Radius

3.9 Soil Quality

The soil is generally formed due to slow process of weathering of rocks. The normal mineral compositions of plant are altered by alteration in soil condition. Existence of flora & fauna depends upon the quality of soil in the area. The soil characteristics like physical, chemical, erosion index, soil fertility has bearing on the surrounding environment. Therefore the quality of soil play a major role in planning proper mitigative measures like plantation program and green belt development by the project proponent and also for the construction of building for different purposes. The normal mineral composition of plants is altered by alteration in soil condition. Soil could well represent the topsoil cover, which is rich in nutrient content.

Six locations were selected for analyzing the soil quality status both in core & buffer zone. The soil samples were collected from the buffer areas. The samples have been analyzed for physio-chemical parameters. The details of the Soil Sampling, locations with distance from the Core Zone are given in **Table 3.14.**

Table 3.14: Soil Sampling Locations

Code	Name of Sampling Location	Distance in Km.	Direction
Core Zone			
S-1	Project site	--	--
Buffer Zone			
S-2	Agricultural soil in Hirebaganal Village	1.0	S
S-3	Agricultural soil in Kunikere Village	7.0	SW
S-4	Agricultural soil in Halavarti Village	3.0	WNW
S-5	Agricultural soil in Kanakapura Village	6.5	NE
S-6	Agricultural soil in Hirekasinkandi village	4.5	SE

The soil sampling locations are shown in **Fig- 3.9**.

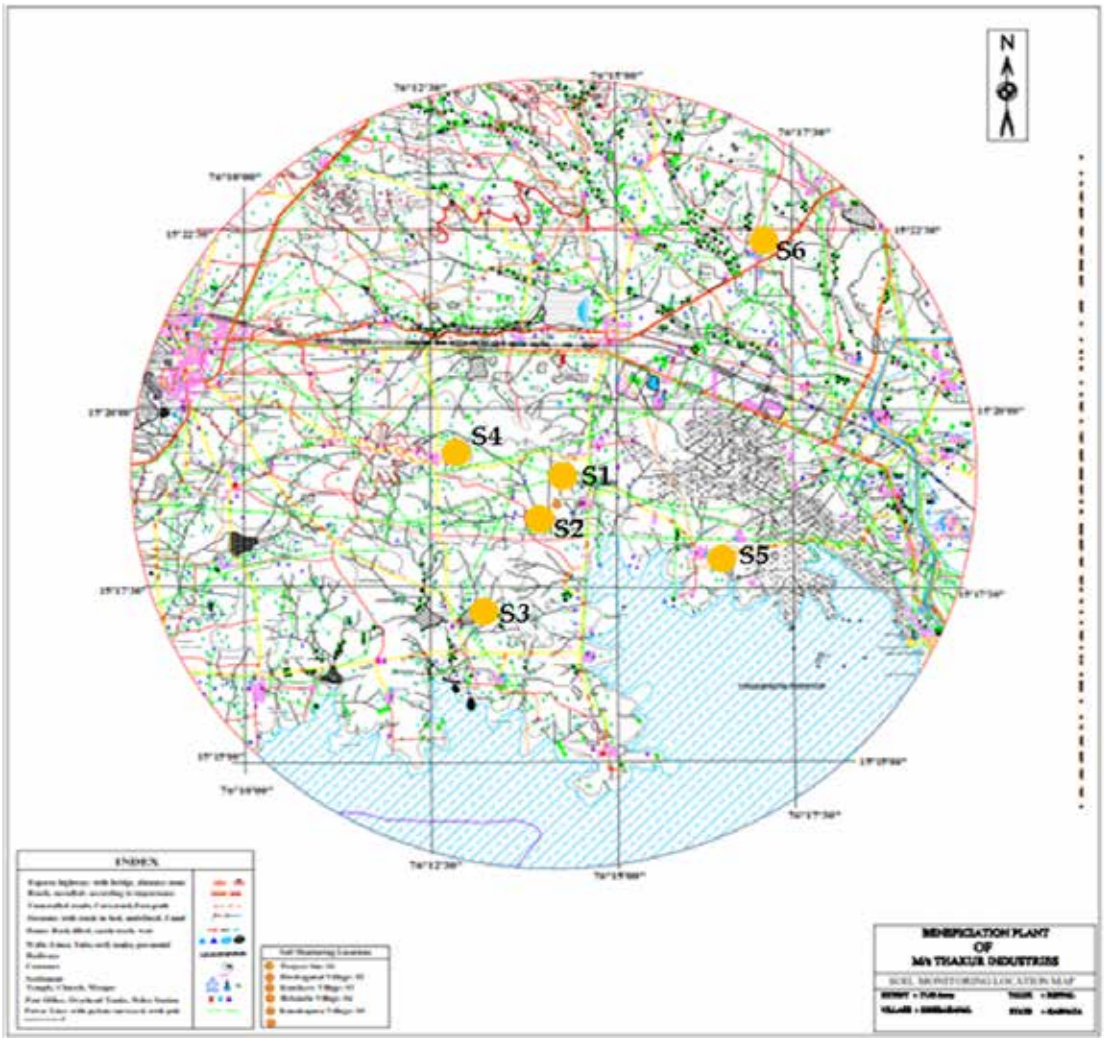


Fig- 3.9: Locations showing Soil sampling stations around 10 Km Radius

The soil quality analysis is given in **Annexure No - XIII** and summary of findings are given in **Table 3.15.**

Table 3.15: Summary of Soil Quality Analysis

Sr. No.	Parameters	Unit	Result
1.	pH	--	7.2
2.	Conductivity	µmhos/cm	226.5
3.	Potassium, as K	mg/100gm	0.41
4.	Sodium, as Na	mg/100gm	1.3
5.	Chlorides, as Cl	ppm	Nil
6.	Nitrogen	Kg/Hec	5.5
7.	Phosphorous	Kg/Hec	2.8
8.	Organic Carbon	%	6.0
9.	Calcium, as Ca	ppm	7.7
10.	Sulphate as SO4	ppm	Nil
11.	Magnesium, as Mg	ppm	58.8
12.	Texture	--	Silty Loam
	a. Sand content	%	17
	b. Silt content %	%	45.6
	c. Clay content %	%	21.1
13.	Sodium Absorption Ratio (SAR)	--	0.2

Interpretation:

The overall soil quality in the back water area is good and fertile. In the other samples taken in the agriculture fields also, the nutrients are moderate to high. It seems the soil quality is good enough for agriculture and not shown any impact of dust or silt.

3.10 Biological Environment

3.10.1 Introduction

Biological environment is the environment where the life form can exist. The sum of environments where the life forms exists is called the Biosphere, these includes a portion of land, water and air. Biological environment includes the Habitat (Place where the organism lives) and natural surroundings of all species (living organism species) of the particular area.

Biodiversity is the variety among living organisms and their interaction within ecosystems. Species diversity or biodiversity is a key component to healthy ecosystems. Biodiversity is also the basis of innumerable environmental services that keep us and the natural environment alive - from the provision of clean water and watershed services to the recycling of nutrients and pollination. Biodiversity (Species diversity) is the most characteristic feature of the nature, which includes ecological communities (viz.: Animals, Plants & Human species).

The main objective of the present study is to observe, document and evaluate during primary field survey carried out within 10 km radius of the study area.

3.10.2 Description of Project Site & Study Area

Sample survey was conducted	Post - Monsoon 2016
Location	Koppal Taluk and District
Climate & Rainfall	Semi-arid dry zone, Hot and humid climate with an annual rain fall of 572 mm
Soil type	Black soil and Clayey soil
Crops grown in the study area	Cotton, Jowar, Maize, Groundnut, Millet, etc.
Protected areas and ecologically sensitive areas within 10 km radius from the project site	Nil
Reserve Forest within the study area	Nil
Diversion of forest land	Nil
Rivers and streams	Tungabhadra Dam & Mundrigi Surface water

3.10.3 Approach and Methodology

3.10.3.1 Approach

To understand the ecological status, quadrate method for flora and transact method for fauna were used. Phyto-sociological parameters such as dominance, IVI, density were calculated and to understand the species diversity, Shannon - Wiener index were calculated. Methodology adopted for collection of primary data of Flora and Fauna is given **Table No 3.16 & 3.17.**

Table No 3.16: Primary data of Flora

Sl. No.	Habitat	Method	Size of the quadrate (m)	Number of quadrates	Time and duration of sampling
1	Trees	Quadrate	100 x 100	4	October 2016, Post-

2	Shrubs	method	25 x 25	4	Monsoon, One time data collection
3	Herbs and Grass		5 x 5	4	

Table No 3.17: Primary data of Fauna

Sl. No.	Habitat	Method	Size of the quadrate (m)	Number of quadrates	Time and duration of sampling
1	Fauna	Transect method	1000	4	October 2016, Post-Monsoon, One time data collection
2	Butterflies	Transect method	1000	4	
3	Avi-fauna	Point count method	--	4	

Photo 4.1: Interaction with the farmers at Tungabhadra reservoir back water area

Photo 4.2: Investigating the agricultural fields near the plant by FAEs

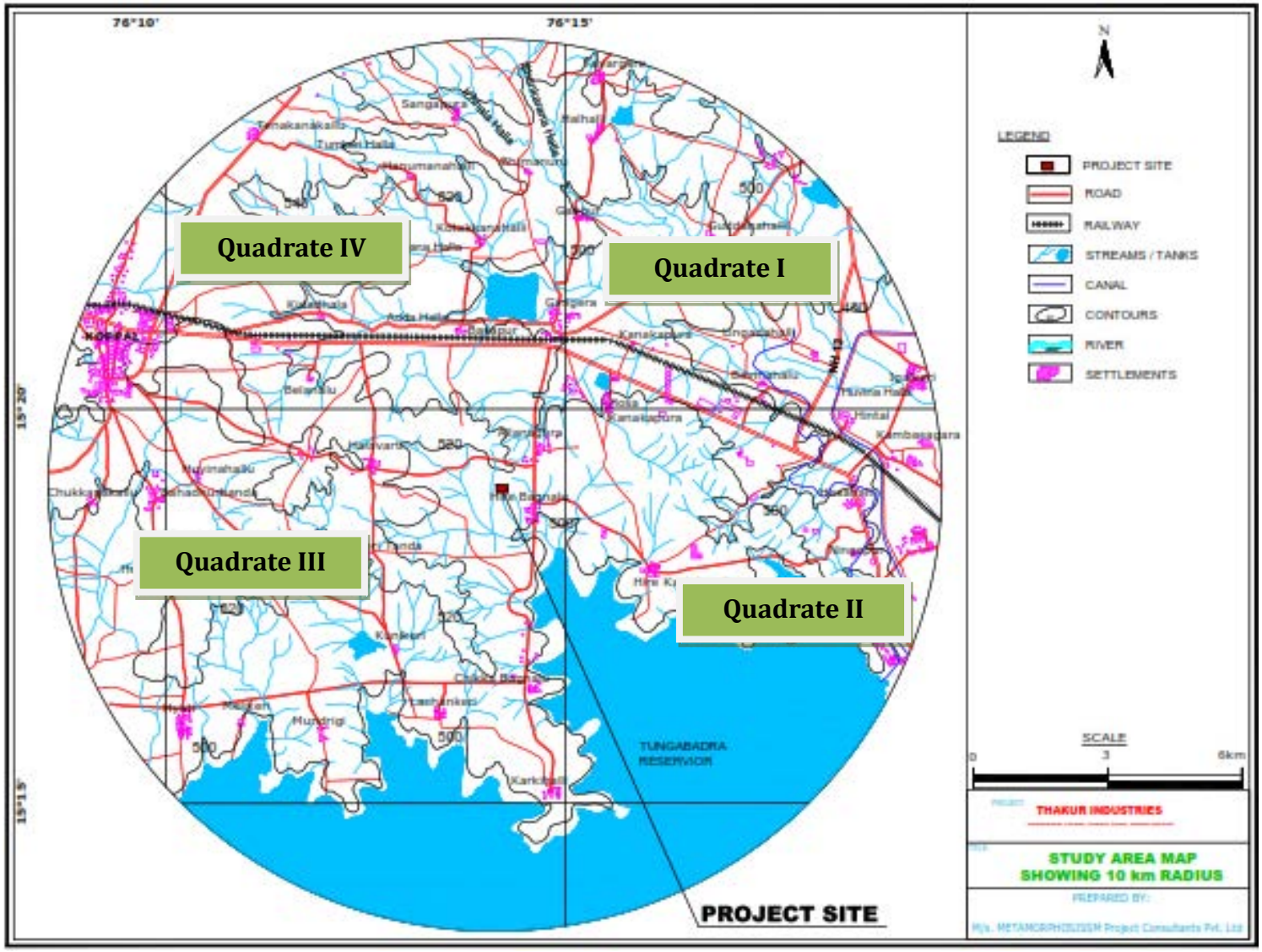


Fig 3.10: Ground water potential around 10 Km Radius

3.10.3.2 Secondary data

Forest working plan of Koppal division (2003), Botanical Survey of India (1990), Zoological Survey of India, IUCN Red Data Book, Wildlife Schedules of Wildlife (Protection) Act, 1972, Book of Indian Birds (Salim Ali, 1983 & 2012), ENVIS, FRLHT, Butterflies of India (Singh, 2011), Reptiles of India (Daniel, 2002) and Common Dry land Trees of Karnataka (Kavitha, 2012) were used for identification and validation of species. With the help of published literature, carbon sinking potential were calculated for the study area. CPCB Guidelines (2000) were referred for proposing Green Belt for the project. Local people are consulted during the site visit to understand the distribution of fauna in the region. Identified species have been cross verified and confirmed with the Field Guides, records, unidentified species has been photographed, and specimens' were collected.

3.10.3.3 Details of Sampling Locations

Alavandi-Betageri LIS command area of Koppal Taluk and District is characterized by large stretch of barren plains covered with black cotton soil and fragmented plantations. The sampling locations (villages) in the command area are deprived of the benefits from the existing irrigation schemes. Tungabhadra River is a major water body located in the proximity of the command area and hence supports variety of biodiversity.

3.10.3.4 Results and Discussion

3.10.3.4.1 Tree Community

The project area is existing land with sparse distribution of trees. During the survey, 12 tree species (69 trees) were identified in the study area belonging to 7 families. Fabaceae species (n=6) are commonly found tree species in the region. Azadirachta indica is widely spread across the study area (IVI-102.34) followed by Acacia nilotica (IVI-42.75) and Aegle marmelos (IVI-40.94) indicating dry, hot and humid climatic conditions of the region. Tectona grandis and Tamarindus indica are commonly observed tree species planted by the farmers in the agricultural bunds, which has high timber value. Phyto-sociological parameters for these trees and their uses are given **Table No. 3.18** and Phyto-sociological features of Tree species found in the study area is given in **Table No. 3.19.**

Table No. 3.18: Tree species found in the study area and their uses

Species Name	Local Name	Family	Conservation Status	Uses
Acacia catechu	Kaggali	Mimosaceae	Common	Timber, Fodder, Medicinal
Acacia ferruginea	Banni	Fabaceae	Common	Cultural
Acacia leucophloea	Bilijali	Fabaceae	Common	Medicinal
Acacia nilotica	Karijali	Fabaceae	Common	Timber, Agriculture Implements
Aegle marmelos	Bilvapatre	Rutaceae	Common	Medicinal, Timber, Agricultural Implements
Azadirachta indica	Bevu	Meliaceae	Common	Medicinal, Timber, Agriculture Implements
Cassia siamea	Hire tangedi	Fabaceae	Common	Edible, Medicinal, Agro forestry
Mangifera indica	Mavu	Anacardiaceae	Common	Medicinal, Timber, Edible
Pongamia pinnata	Honge	Fabaceae	Common	Medicinal
Tamarindus indica	Hunase	Fabaceae	Common	Medicinal, Timber, Edible
Tectona grandis	Tega	Lamiaceae	Common	Timber, Agriculture Implements
Ziziphus mauritiana	Bore/Elchi	Rahmnaceae	Common	Medicinal, Edible

Table No. 3.19: Phyto-sociological features of Tree species found in the study area

Sl. No	Species Name	Relative Frequency	Density	Abundance	IVI
1	Acacia catechu	10.34	1.50	3.00	19.93
2	Acacia ferruginea	5.17	1.00	4.00	15.82
3	Acacia leucophloea	5.17	0.25	1.00	7.00
4	Acacia nilotica	15.52	2.00	2.67	42.75
5	Aegle marmelos	33.33	1.25	5.00	40.94
6	Azadirachta indica	15.52	4.50	6.00	102.34
7	Cassia siamea	5.17	1.00	4.00	11.96
8	Mangifera indica	5.17	1.75	7.00	18.41
9	Pongamia pinnata	5.17	0.25	1.00	6.67
10	Tamarindus indica	6.90	1.00	4.00	21.89
11	Tectona grandis	15.52	2.25	3.00	32.30
12	Ziziphus mauritiana	5.17	0.50	2.00	8.14

3.10.3.4.2 Shrubs and Herbs Community

The diversity of shrubs in the study area is limited (n=7), herbaceous community (n=8) was dry as they are seasonal to monsoon and post monsoon. Propsopis juliflora and Calotropis procera are the chief shrub community found abundantly in the study area especially in agricultural lands. List of Shrubs and Herbs identified in the study area is given in **Table No. 3.20.**

Table No. 3.20: List of Shrubs and Herbs identified in the study area

Sl. No.	Species Name	Local Name	Family	Conservation Status
A.	**Shrubs**			
1	Calotropis gigantea	Aekka	Asclepiadaceae	Common
2	Calotropis procera	Bili aekka	Asclepiadaceae	Common
3	Cassia auriculata	Tangedi	Caesalpiniaceae	Common
4	Dodonaea viscosa	Bandarike	Sapindaceae	Common
5	Lantana camara	Kakke	Verbenaceae	Common
6	Parthenium hysterophorus	Congress grass	Asteraceae	Common
7	Prosopis juliflora	Jaali	Fabaceae	Common
B.	**Herbs**			
1	Agave americana	Kantala	Agavaceae	Common
2	Argemone mexicana	Datturigidda	Papaveraceae	Common
3	Capparis horrida	Balli	Capparaceae	Common
4	Datura stramonium	Datura	Solanaceae	Common
5	Dichanthium annulatum	Sheda Grass	Poaceae	Common
6	Heteropogon contortus	Black Speargrass	Poaceae	Common
7	Leucas aspera	Tumbe guda	Lamiaceae	Common
8	Tridax procumbens	Shavanthi	Asteraceae	Common
Note: Species identified by MPCPL team – Dr. Shanth A. Thimmaiah, Dr. B.C. Nagraj, Mr. Sreekantan Nair and Team.				

3.10.3.5 Fauna

There are no protected areas, eco-sensitive areas around and no specific wildlife habitat has been observed in the study area. However, list of commonly observed birds, butterflies, reptiles and mammals observed in the project site and study area are given in **Table No. 3.21.** Aviceda leuphotes, Hieraaetus fasciatus and Pavo cristatus are belongs to Schedule - I category. Bristled grass – Warbler Chaetornis striatus) is the

only Vulnerable avifaunal species identified in the study area. House sparrow (n=6), Black Drongo (n=7), Bee-eater (n=6) and Rose ringed parakeet (n=4) occurred frequently.

Thirteen species of butterflies were recorded in the study area and most of them are common to the region. Cabbage (n=5) followed by common tiger (n=4) and white-orange tip (n=3) are the most widely occurred species in the study area. List of birds and butterflies identified in the study area is given in **Table No. 3.21,** list of Butterflies recorded in the study area is given in **Table No. 3.22 and 3.23.** List of Reptiles & Mammals recorded in the study area.

Table No. 3.21: List of Birds recorded in the study area

Common name	Scientific Name	Occurrence	IUCN Conservation Status	WL(P)A, 1972 Schedule
Asian Brown Flycatcher	Muscicapa dauurica	1	LC	IV
Ashy prinia	Prinia socialis	2	LC	IV
Asian Koel	Eudynamys scolopacea	1	LC	IV
Black - Tailed Godwit	Limosa limosa	1	NT	IV
Black Baza	Aviceda leuphotes	1	LC	I
Black Drongo	Dicrurus macrocercus	7	LC	IV
Black Ibis	Pseudibis papillosa	1	LC	IV
Blue Bearded Bee - Eater	Nyctyornis athertoni	2	LC	-
Blue Rock Pigeon	Columba livia	4	LC	-
Blue-Tailed Bee-eater	Merops philippinus	1	LC	-
Bonelli's Eagle	Hieraaetus fasciatus	5	LC	I
Bristled grass-warbler	Chaetornis striatus	1	VU	IV
Cattle Egret	Bubulcus ibis	1	LC	IV
Common Egret	Ardea alba	3	LC	-
European White Stork	Ciconia ciconia	1	LC	IV
Great Grey shrike	Lanius excubitor	1	LC	-
Great stone plover	Esacus recurvirostris	1	NT	IV
House Crow	Corvus splendens	3	LC	V
House Sparrow	Passer domesticus	6	LC	IV
Indian Peafowl	Pavo cristatus	4	LC	I
Indian Pond Heron	Ardeola grayii	2	LC	IV
Jungle Crow	Corvus macrorhynchos	1	LC	IV

Common name	Scientific Name	Occurrence	IUCN Conservation Status	WL(P)A, 1972 Schedule
Large Egret	Casmerodius albus	1	LC	IV
Large Pied Wagtail	Motacilla maderaspatensis	1	LC	IV
Laughing Dove	Streptopelia senegalensis	2	LC	IV
Little Cormorant	Phalacrocorax niger	1	LC	IV
Little Egret	Egretta garzetta	1	LC	IV
Median Egret	Mesophoyx intermedia	1	NA	IV
Red - Wattled Lapwing	Vanellus indicus	2	LC	IV
Red–vented Bulbul	Pycnonotus cafer	2	LC	IV
Rose - ringed Parakeet	Psittacula krameri	4	LC	IV
Scarlet Minivet	Pericrocotus flammeus	1	NA	IV
Small Bee - Eater	Merops orientalis	3	LC	IV
Small Blue Kingfisher	Alcedo atthis	1	LC	IV
Small Sunbird	Nectarinia minima	4	LC	IV
White - Bellied Blue - Flycatcher	Cyornis pallipes	1	LC	IV
White - Bellied Minivet	Pericrocotus erythropygius	1	LC	IV
White Wagtail	Motacilla alba	1	LC	IV
Yellow Wagtail	Motacilla flava	1	LC	IV

Table No. 3.22: List of Butterflies recorded in the study area

Sl. No	Common name	Scientific Name	Occurrence	IUCN Conservation Status	WL(P)A, 1972 Schedule
1	Anar	Virachola isocrates	1	NA	--
2	Cabbage	Pieris rapae	5	NA	I
3	Common Mormon	Papilio polytes	1	NA	--
4	Common Tiger	Danaus genutia	4	NA	I
5	Common Yellow Swallowtail	Papilio machaon	1	NA	II
6	Dark clouded yellow	Colias fieldii	1	NA	--
7	Dark evening Brown	Melanitis phedima	2	NA	--
8	Indian Jezebel	Delias eucharis	1	NA	--

Sl. No	Common name	Scientific Name	Occurrence	IUCN Conservation Status	WL(P)A, 1972 Schedule
9	Painted Lady	Vanessa cardui	2	NA	--
10	Slate flash	Rapala manea	1	NA	--
11	Small Grass Yellow	Eurema brigitta	1	LC	--
12	White orange tip	Ixias marianne	3	NA	--
13	Yellow Orange tip	Ixias pyrene	1	NA	--

The study area has poor diversity of wild animals. Seven mammals and four reptiles were recorded in the study area. Grey langur (n=4) and Indian palm squirrel (n=3) were the commonly found mammals in the study area. All the reptiles and mammals recorded are common to the region and no Rare, Endangered and Threatened species were found in the study area. List of Reptiles & Mammals recorded in the study area is given in **Table No. 3.23.**

Table No. 3.23: List of Reptiles & Mammals recorded in the study area

Sl. No.	Common name	Scientific Name	Occurrence	IUCN Conservation Status	WL(P)A, 1972 schedule
A	**Reptiles**				
1	Oriental Garden Lizard*	Calotes versicolor	1	NA	--
2	Viper+	Daboia russelii	--	LC	--
3	Krait+	Bungarus caeruleus	--	NA	II
4	Indian Cobra+	Naja naja	--	--	II
B	**Mammals**				
1	Rhesus Macaque*	Macaca mulatta	1	NT	II
2	Grey Langur*	Semnopithecus entellus	4	NT	II
3	Small Indian Mongoose*	Herpestes javanicus	1	LC	II
4	Indian Palm Squirrel*	Funambulus palmarum	3	LC	--
5	Wild Boar+	Sus scrofa	--	LC	III
6	Spotted Deer+	Axis axis	--	LC	III
7	Indian Fox+	Vulpes bengalensis	--	LC	II
*Note: * - Species identified by MPCPL team, + - Secondary information from local people.*					

Interpretation :

The study area comprises, back waters, hills, agriculture fields and human activities. The area shows a diversified biota in a tropical semi deciduous system. Seasonally, bio diversity changes in its index as the in the tropical systems. The presence of wild boar, spotted deer, fox etc. indicates the wild fauna dependence on back waters of the Tungabhadra dam. However, the existence of the agriculture land provides the corridor and buffer to the wild fauna from the impact of industrial activities. The hilly terrains preserves the bio diversity in the overall area.

3.11 Socio Economic Environment

Socio-economic environment is an essential part of environmental study, which incorporates various facts related to socio-economic conditions in the area and deals with the total environment.

Socio - economic study includes demographic structure of the area, provision of basic amenities viz. housing, education, health and medical services, occupation, water supply, sanitation, communication, transportation, prevailing diseases pattern as well as feature of aesthetic significance such as temples, historical monuments etc. at the baseline level. This would help in visualizing and predicting the possible impact depending upon the nature and magnitude of the project.

Socio-economic study of an area provides a good opportunity to assess the socio-economic conditions of an area. This study will possibly estimate the change in living and social standards of the particular area benefitted due to the project. The gross economic production of the area will be increased substantially due to the existence of this project. It can undoubtedly be said that this plant will provide direct and indirect employment and improve the infrastructural facilities and living standards of the area.

This EIA will give a reasonably clear picture of the socio-economic conditions prevailing in the study area.

3.11.1 Objectives of the Study

The objectives of this socio-economic report consist of:

- To know the current socio-economic situation in the region
- To recommend practical strategic interventions in the sector
- To help in providing better living standards

3.11.2 Scope of Work

- To study the Socio-economic Environment of area
- Prediction of project impact
- Mitigation Measures

3.11.3 Methodology

Collection of Data: Data for this project were collected via primary sources (field survey) and secondary sources (i.e. Government department, maps, literature research etc) in the study area.

Presentation of Data and Analysis: The data collected were presented in a suitable, concise form for further analysis. The collected data were presented in the form of tabular, diagrammatic, or graphic form. These tabulated data were interpreted and analyzed with the help of various qualitative techniques and ideographic approaches.

3.11.4 Baseline Data and Analysis

The socio-economic study has been conducted during the Study period with FAEs on the basis of primary and secondary data. The study area was categorized on the basis of the distance of the villages from project site. Primary zone was identified from 0 to 3 km radius area, Secondary zone in 3 to 7 km and Outer zone in 7 to 10 km radius area from the project site. Primary Information was collected through field survey & secondary data from census 2011 and other various government departments like health department, agriculture department, IMD etc.

Photo 4.3.: Participatory Rural Appraisal-Technique-Hirebaganal Village

Photo 4.4: Primary data collection at Kasenkandi Village

Photo 4.5: Primary data collection at Allanagar Village

Photo 4.6: Primary data collection at Hirebaganal Village

Photo 4.7: Interaction with project beneficiaries by FAEs

The socio-economic assessment includes economic condition, community structure, institution and infrastructure, demographic condition, employment, community, gender, community resources etc. Analyze the impacts of the prevailing environmental conditions on the socio-economic structure of the study site.

The main aim of the survey was to identify and to prioritize their concerns and issues for development. The general objective of the baseline study is to collect socio-economic data for the mining site to be used in among other things to gauge the anticipated changes that might occur due to the intended intervention from the proposed expansion of the plant.

The research tools for the survey included both quantitative and qualitative tools. The tool for the quantitative survey was Household schedule canvassed among the heads of households who are likely to be affected by the project.

The household survey questionnaire included information on-

- ***Demography of affected population-*** Age, sex, Religion, education, livelihood, Average family size, languages known, Occupation, Category, Status of Household, Marital Status, Utility assets of Hosehold.
- ***Economic Aspects of Affected Population*** - Land, Income from farm activities, main sources of irrigation available, main crops, Access to market for agriculture, mode of transportation of Agricultural Products, Agricultural Asset holdings, Income from renting agricultural equipments, availability of seeds and Use of Fertilizers, insecticides and Pesticides.
- ***Livestock Aspects of Affected Population-*** Income from livestock, Livestock holdings, Market available for Livestock and availability of Veterinary services.
- ***Common property-*** Income from Value added products and Income from Common Property resources.
- ***Trade/Business/ service/ Wage and Others-*** Types of Trade.
- ***Household Expenditure of Affected Population -*** Annual expenditure, Savings.
- ***Education***
- ***Sanitation and Health***

Moreover, to fulfill this aim the socio economic base line survey is an important tool. This will enable them to design and take up appropriate intervention strategies for the integrated development of the area. The survey will provide the company with the different dimensions of the community related with quality of life, infrastructural facilities livelihood and others.

The broad objectives were to explore the present livelihood patterns and alternate livelihood options that can be taken up for sustainable livelihood program as well as improving the status of life of household on parameters such as employment, health, sanitation, social infrastructure and education. The information was collected on five broader aspects namely Demographics of household, Economic and livelihood options, Household Expenditure, Education and Health & sanitation.

3.11.5 Secondary Data Collection

The secondary data regarding number of population, occupation, literacy level etc., were obtained from census data 2011. The Socio-economic study was conducted in the buffer-zone covering 10 kms radius.

The socio economic condition is summarized below in **Table 3.24.**

Table 3.24: Socio Economic Condition

Total Population	Total Literate Population	Total Non-Literate Population	Working Population	Non working population
3727244	2184506	1542738	1734207	1993037

3.11.5.1 Population

The population break-up of all the villages coming within the buffer-zone, as per 2011 census data is given in **Table 3.25** and graphically shown in **Fig 3.11.**

Table 3.25: Population Details

Population	Total No of House Holds	Total Population	Others			S.C		S.T	
			M	F	T	M	F	M	F
2011 Census	710242	3727244	1313129	1292988	2606117	338047	338930	223496	220654

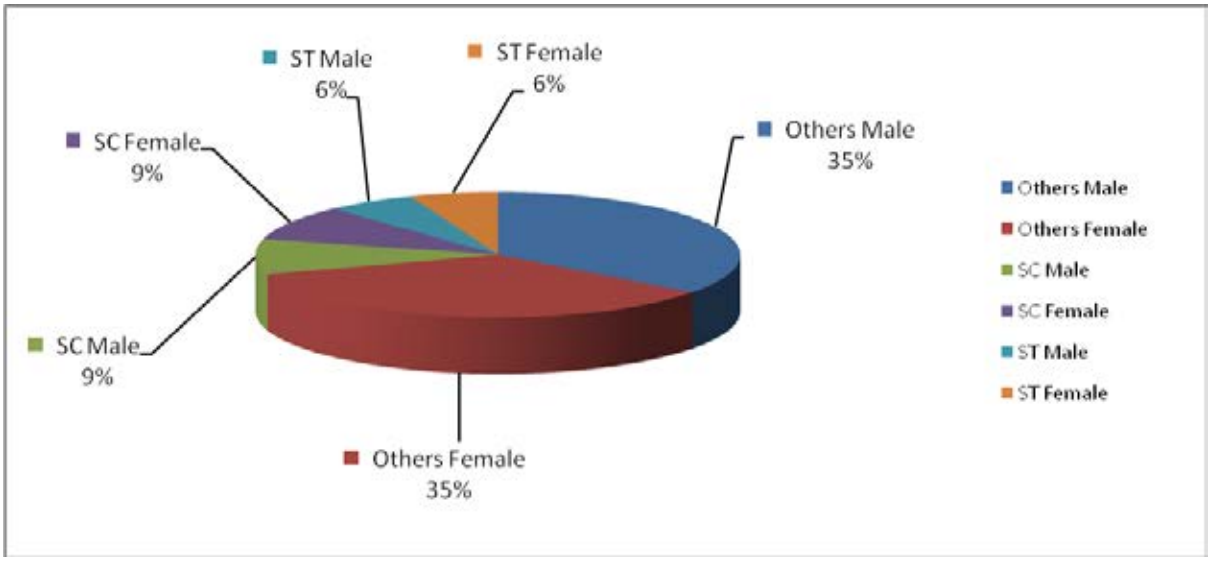


Fig 3.11: Population Break-up details in Buffer Zone

3.11.5.2 Literacy Level

The distribution of male and female literates and illiterates with-in the buffer zone is given in **Table 3.26** and the same is graphically shown in **Fig. 3.12.**

Table 3.26: Details of Literacy Level

Population Lit.	Male Lit.	Female Lit.	Population Illiterate	Male Illiterate	*Female Illiterate*
2184506	1260057	924449	1542738	614615	928123

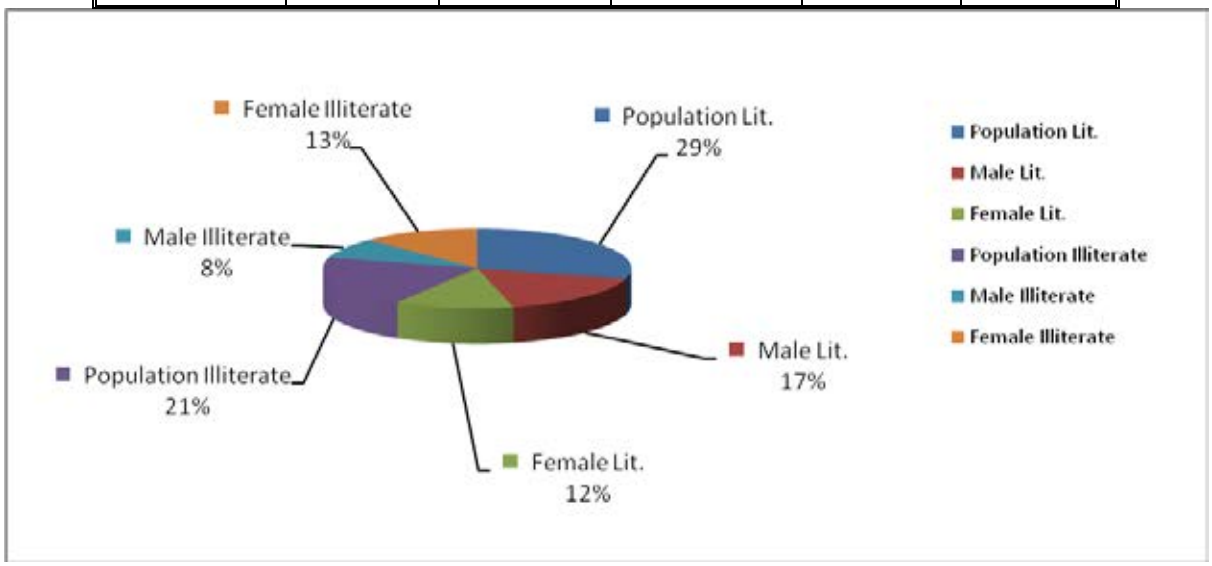


Fig. 3.12: Literacy of Villages in Buffer Zone

The literacy level in the villages of buffer-zone is 29%. The literacy level among males is higher than females as per 2011 Census data. The population and literacy details of all villages in the study area are given in **Annexure No. XIV.**

3.11.5.3 Occupational Structure

The strength in each of the category is given in **Table 3.27** and graphically shown in **Fig 3.13.**

Table 3.27: Occupational Structure

Total worker Population	Total Worker Male	Total worker Female	Main worker Population	Main worker Male	Main worker Female

1734207	1037523	696684	1336792	877187	459605
Marginal workers Population.	Marginal workers Male	Marginal workers Female	Non workers Population	Non workers Male	Non workers Female
397415	**160336**	**237079**	**1993037**	**837149**	**1155888**

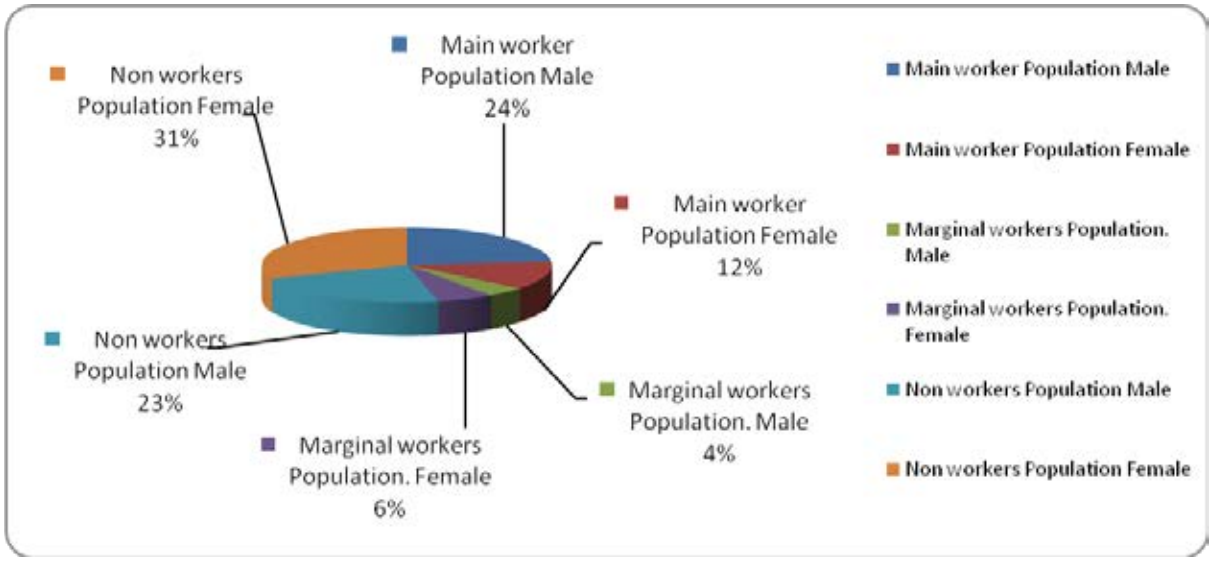


Fig.3.13: Occupational Structure in Study Area

The occupational details for all the Forty villages in the study area are given in **Annexure No. XV.**

3.11.5.4 Medical and Educational Facilities

In the study area there are 20 Primary Schools, 14 Middle Schools and 4 Secondary Schools. The details of educates, educational and medical facilities are given in **Annexure XVI** and **XVII** and also the detailed questionnaires as enclosed as **Annexure XVIII.**

During the survey, respondents were found to be reluctant on disclosing about the household assets. The analysis of data in this section pertains to dependence of household on different livelihood options. Sources of income were broadly divided in two spectrums, agriculture based activities and non- agriculture/industrial based activities.

From the survey, the major Livestock in all the 4 villages were Cow, Buffalo, Sheep, Goat, Bullock/ox and Hen.

The major source of drinking water in the area was well followed by public hand pumps and public Taps. The presence of tap water in few houses also indicates that some of the schemes of the Govt. must be working, though the penetration is insignificant.

In the study area, it was found that people were having mainly three types of houses. Kachcha houses (made by wood and mud), Semi-pucca houses (walls made by bricks or stones and roof made by woods mud) where as third category of the houses were those houses which were made by concrete and bricks.

There are no predominant diseases the prevail in the 4 villages that were surveyed. People generally reported good health. According to the survey, percentage of population affected by water borne or poor sanitation related diseases like malaria, Jaundice, Dehydration etc was negligible.

Interpretation:

There is scope for improving quality of primary education in the vicinity, improve basic sanitation & clean drinking water facilities at schools, Augment transport infrastructure facilities, provide sports infrastructure & organize sporting events, increase awareness on personal hygiene, sanitation and preventive health care through campaign and community advocacy, to promote the use of Non- Conventional sources of energy, Training and capacity building for promoting environmentally sustainable harvesting practices, increase the green belt in the community areas of the villages for sustainable use.

Corporate Social Responsibility is the commitment of the companies towards the sustainable economic development of the society and community in which it operates. Corporate Social Responsibility can substantially improve social cohesion, build healthy foundation for sustainable economic development of the society, and create better quality of life for the community leading to a congenial atmosphere for the corporate to carry out its business. As a first step for the corporate social responsibility, it is important to identify corporate social responsibility priorities that are meaningful in the local context and to play a role in strengthening appropriate local initiatives. Recent experiences tell us that the development process and possibilities of success are greatly increased when CSR initiatives are aligned to the felt need of the community. Moreover, the process of development will be faster and smooth if it is endorsed by the people in consensual approach and accepted by all the stakeholders.

Livelihood of poor cannot be understood in isolation. It consists of integrated approaches using methods and theories from social, cultural, economic, psychological, technical and political dimensions.

Therefore the myriad socio-economic factors that are influencing a wide range of changes in the rural society needs to be understood in great detail as many of these changes are long lasting and likely to bring structural changes in the local economy.

Accordingly, it was felt imperative to understand these transformations in detail and outline the implications it has on the present livelihood pattern and the various livelihood options that can be made available based on the present resource and skill base that exist in the area.

The Household Socio- economic Survey, it is felt, will help M/s. Thakur Industries to identify the priorities of the affected persons living around the plant areas in the nearby 4 villages namely Hirabaganal, Allanagar, Halvarthi & Kasankandi villages. This in turn would provide project proponent with relevant indicators that would help to identify appropriate Livelihood and CSR programs for the project-targeted people.

3.11.5.5 Primary Data and interpretation

M/s. Thakur Industries 'Baseline Socio-economic study and Village Resource Mapping'. The prime objective of the study was to explore the present socio-economic status, available livelihood patterns and alternate livelihood options suitable for a sustainable livelihood programme. Further, the survey probed other social areas of the households and its output has been used to prioritize programme areas to be covered under the proposed CSR Programme of ore beneficiation plant.

Farming and agricultural practices is common in all the villages & craft and art were practiced by a few. Lack of irrigation facilities in the region has also been observed. The incidence of landlessness was also found to be high. The level of agriculture was below subsistence level and mainly rain fed.

Corporate Social Responsibility Practices sets a realistic agenda of grassroots development through alliances and partnerships with sustainable development approaches. At the heart of solution lies intrinsic coming together of all stakeholders in shaping up a distinct route for an equitable and just social order. The framework of CSR has been given **Figure 3.14.**

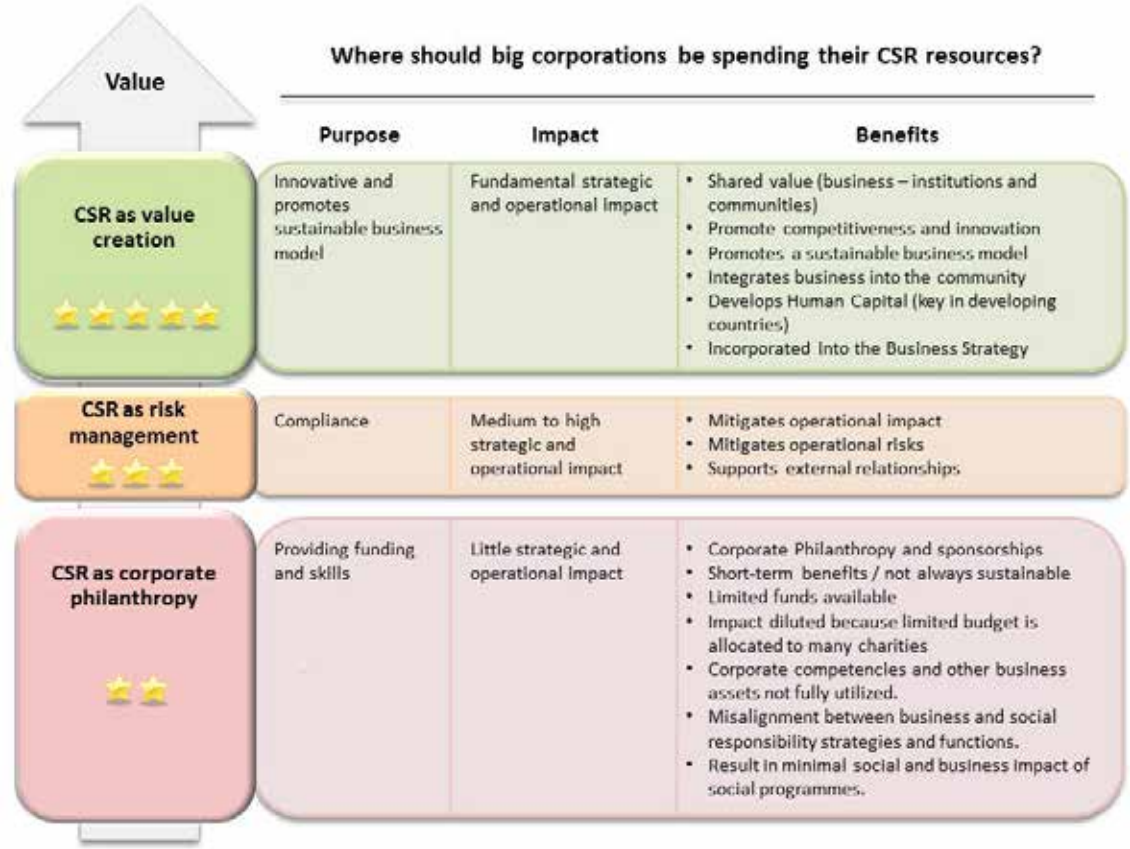


Fig. 3.14: The framework of CSR

3.12 Interpretation

The environment baseline study was conducted in the project area by primary and secondary data. Abiotic factors including air, water and soil were studied for the core and buffer zone.

It was found that most of the parameters were within the limits as per the Indian Standards. Similarly, the study for the biotic factors was conducted. It can be concluded that the present environment status of the study area is good enough for the proposed enhancement activity. Adoption of adequate pollution control measures will protect the surrounding environment.

CHAPTER-4

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATIVE MEASURES

FINAL EIA REPORT

CHAPTER-4

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATIVE MEASURES

4.1 Introduction

The economic growth and environment are not necessarily opposites and can be complimentary. The environmental impact may be defined as any alteration of existing environmental conditions or creation of a new set of environmental conditions, (adverse or beneficial), caused or induced by the action/s under consideration. The proposed expansion of beneficiation plant will have both positive and negative effects on its surroundings due to resultant impacts. This impact could be either beneficial or detrimental to the environment. The net impact could be determined by evaluating the impact on various parameters.

The rapid industrialization and associated human activities leads to the generation of unwanted byproducts, which have an impact on the surrounding, both, biotic and abiotic environmental components. However, environment has a limited inherent capacity to support such activities by assimilating pollutants, beyond which, the environment becomes polluted. To avoid such situation, activities with adverse impact have to be nullified or kept at minimum level by taking suitable corrective measures. With a proper understanding of cause and effect and designing suitable measures, it is possible to mitigate negative impacts and maximize positive impacts on the environment.

4.2 Need for Environmental Impact Assessment

For proper assessment of environmental changes in the coming years, impacts predicted due to proposed industry are presented for each environmental parameter is shown in **Table 4.1.**

Generally, environmental impacts can be categorized as primary or secondary. Primary impacts are those, which are attributed directly by the project, and secondary impacts are those that are indirectly induced and typically include associated investments and changed patterns of social and economic activities by proposed plant. The impacts depend upon type of topography, magnitude of operation, degree of mechanization, density of traffic on roads, extent of infrastructural facilities, existing land use pattern and post project land use pattern, consumption of non-renewable resources like fossil fuels, water, power etc.

The beneficiation plant would cause some adverse impacts on its surrounding environment, unless proper environmental management plan is adopted. Adopting mitigative measures as per the guidelines prescribed by various statutory authorities enables to minimize the envisaged negative impacts.

The impact prediction due to the proposed expansion of project has been made in respect of the parameters considered in present scenario. The quality attributes of ambient air, water, noise, socio-economic aspects, inventory of flora and fauna in core and buffer-zone are monitored /measured. These would help in prediction of impacts precisely. For this purpose, existing base line data generated, needs to be superimposed by impacts from different activities, which becomes part of the proposed expansion project. With such a superimposition of anticipated impacts on each of environmental parameter indicative of base-line status, will enable to assess the impact on each of the parameters to be objectively assessed. With such an idea, baseline scenario of environmental parameters is studied for the season **Post-Monsoon 2016.**

While assessing the impacts due to the proposed expansion plant, practical approach has been made to all the parameters on higher side. The impact assessment is made on the air quality. Further, environmental management plan will nullify the negative effect due to proposed expansion. This impact assessment focuses on the study area i.e. 10 Km. radius from the project site.

Table 4.1: Comparative Chart of Various Impacts

Component	Impact Due to Plant & its Management
Air Environment	
Air Quality	Impact scenarios of air component due to the proposed expansion plant emissions are significant. However the predicted concentrations are well within the standards as prescribed by CPCB.
Meteorology	The meteorological data collected confirmed that the climatic status of the study area is consistent with regional meteorology. The industrial activity that is coming up has very negligible influence on the meteorology of the region. As such, the same pattern may continue.
Water Environment	
Water	Surface water quality will not get affected as entire quantity of effluent generated from sanitary uses will be treated within the plant site. The process water will be recycled back to the process. Thereby decrease in the makeup water. The storm water during rainy season is harvested from roof tops, vacant plots, landscaping and

Component	Impact Due to Plant & its Management
	paved roads. The harvested water is infiltrated and percolated into the ground water table.
Water Supply	The water used for the industrial purpose is very Significant. Water will be drawn from the Borewell within the project site, about 3150 KLD. The impact on the water resources in and around the industry is significant. Water conservation practices, especially Rainwater harvesting and subsequent recharge into ground water table would likely improves the groundwater potential on a local basis.
Noise Environment	
Noise	There may be slight increase in noise levels due to the beneficiation plant activities such as crushers, screeners, material handling systems etc., There is no direct or indirect impact on nearby residence due to the noise produced in the plant. The noise level beyond one kilometer from the industry is insignificant.
Land and Biological Environment	
Forests	No impact on forests and endangered plant species.
Flora and Fauna	Greenbelt has a positive impact on flora. Slight dislocation of fauna due to increased human activity.
Land use	Plant site, which is 17.50 Acres (7.08 ha), is utilized for various establishments. As human activities increases around the plant site, land prices may likely to increase
Landscape	Plant erection and rich plantation improve the visual effect.
Livestock	Positive impact due to demand for milk, eggs and meat.
Waste Management	
Solid waste	Industrial solid waste generated in the plant will be only dry tailing that will be sold to nearby cement or brick industry. Domestic waste will be disposed off in CPCB approved soak pit and septic tank.
Hazardous waste	Waste oil from vehicle and machinery will be stored and sold to KSPCB authorized recyclers/reprocessors.
Socio Economic Environment	
Educational Facilities	No significant impact is anticipated immediately. However Project authority committed for the overall development of the area adopting “Corporate Social Responsibility”.
Medical	Industry is already initiated the medical facilities not only to the plant employees, it extended to the nearby villager’s also.
Occupational Facilities	Plant is already under operation, due to expansion of its capacity additional 55 personnel will be employment within the study area.
Transportation	Slight impact due to increase in vehicular traffic. Regular water sprinkling will be adopted to arrest the dust.

4.3 Air Environment

Following are the sources of air pollution identified from the proposed expansion project, for which control measures are to be implemented:

- Raw material handling areas.
- Beneficiation Plant.
- Movement of vehicles.
- HMMEs

4.3.1 Raw Material Handling

The raw material handling from stock pile and fines dump in open area, crushing and screening units of Beneficiation plant will result in emission of fugitive dust.

Apart from the above sources, material transfer point of conveyor system will also generate fugitive dust emission in localized areas. In order to control fugitive dust, following measures will be implemented in the raw material handling area:

- Raw material storage area will be covered to control fugitive dust.
- Water sprinkling system will be provided at raw material storage area for sprinkling water at regular intervals.
- A closed conveyor system will be provided for transportation of raw material from the stock yard to the respective plant.
- Conveyor systems, crushers, screens and finished product area will have independent dust extraction units of adequate capacity.
- Dust extraction system will be provided.

4.3.2 Beneficiation Plant

Feed to the plant will be of dry in nature. Entire stretch of belt conveyor will be covered to avoid escape of air borne dust particles into open atmosphere. Entire beneficiation process is wet in nature, thereby air pollution from the process is negligible. Dust generated during movement of vehicles will be main source of pollution. The pollution control equipment for Beneficiation Plant is given in **Table 4.2**

Table 4.2: Pollution Control Equipment for Beneficiation Plant

Plant /Air Pollution Control Equip.	Cyclones	Thickeners	Filter Press for Tailings
Beneficiation Plant	2	1	1

4.3.3 Vehicular Traffic

For Vehicle movement, metalled roads will be constructed to control dust emissions. Water sprinkling on solid waste dump and also on the sides of the haulage road will reduce the dust emissions to a significant level.

4.3.3.1 Impact due to Transportation

The total raw materials which will transport to the plant site would be 1.6 million tones/annum. Apart from this finished product of 1.5 million tones/annum.The estimation of trucks for transport of the materials is given in **Table 4.3**

Table 4.3: Estimation of Trucks for Transport

Particulars	Raw Material	Finished Product
Total Quantity, mtpa	1.6	1.5
Capacity of each truck, tones	35	35
Number of trucks for total quantity	20571	17142
Operational days	300	300
Number of trucks per day	68	57
Operational hours for trucks in a day	16	16
Number of trucks per hour	4	3

From the above table, it can be seen that the total number of trucks for transport of the above material will be 5 trucks/hr for raw materials and 4 trucks/hr for finished product and traffic density details are given in **Table 4.4.**

Table: 4.4 Hourly Existing Traffic Load on the Road

	Belanalu to Ginigera	Ginigera to Belanalu
Cycle	--	--
2 wheeler	4	6
3 wheeler	--	--
Car/Jeep	9	8

LCV	6	9
HCV	10	7
Bus	5	4

Traffic Census data clearly indicates that the existing road from Belanalu Village – Ginigera Village is catering to average density of traffic and that expected incremental increase in road traffic due to the proposed project and its activities would not exceed has 10 trucks per hour and would make no significant changes on the traffic load situation at project site. Further, following measures will be implemented for better transportation:

- Tarpaulins will be covered on trucks during transportation of materials.
- Frequent water sprinkling to prevent dust dispersion
- Periodic maintenance of transportation vehicles.

4.4 Meteorological Data

The meteorological data was recorded continuously during the month of Post-Monsoon 2016 hourly basis on different parameters like wind speed, wind direction and temperature. The same has been processed to extract the 24 hourly mean meteorological data as per the guidelines of MoEF for application of ISCST3 model. Stability classes computed for mean hours are based on guidelines issued by CPCB on modeling. For mixing heights, representative of the region have also been taken from available published literature to improve the efficiency of the result.

4.4.1 Application of ISCST3

The ISCST3 model with following options has been employed to predict ground level concentrations due to emissions from various sources.

- The area being rural, rural dispersion parameters are considered.
- Predictions have been carried out to estimate concentration values over radial distance of 10 km around the sources.
- Cartesian receptor network with elevated terrain has been considered.
- Emission rates from point sources and area sources were considered as constant.
- Settling velocity of particles is considered.
- Calm winds recorded during study period were also taken into consideration.
- 24 hourly mean ground level concentrations were estimated for using the meteorological data of **Post-Monsoon 2016** (Table 5.3).

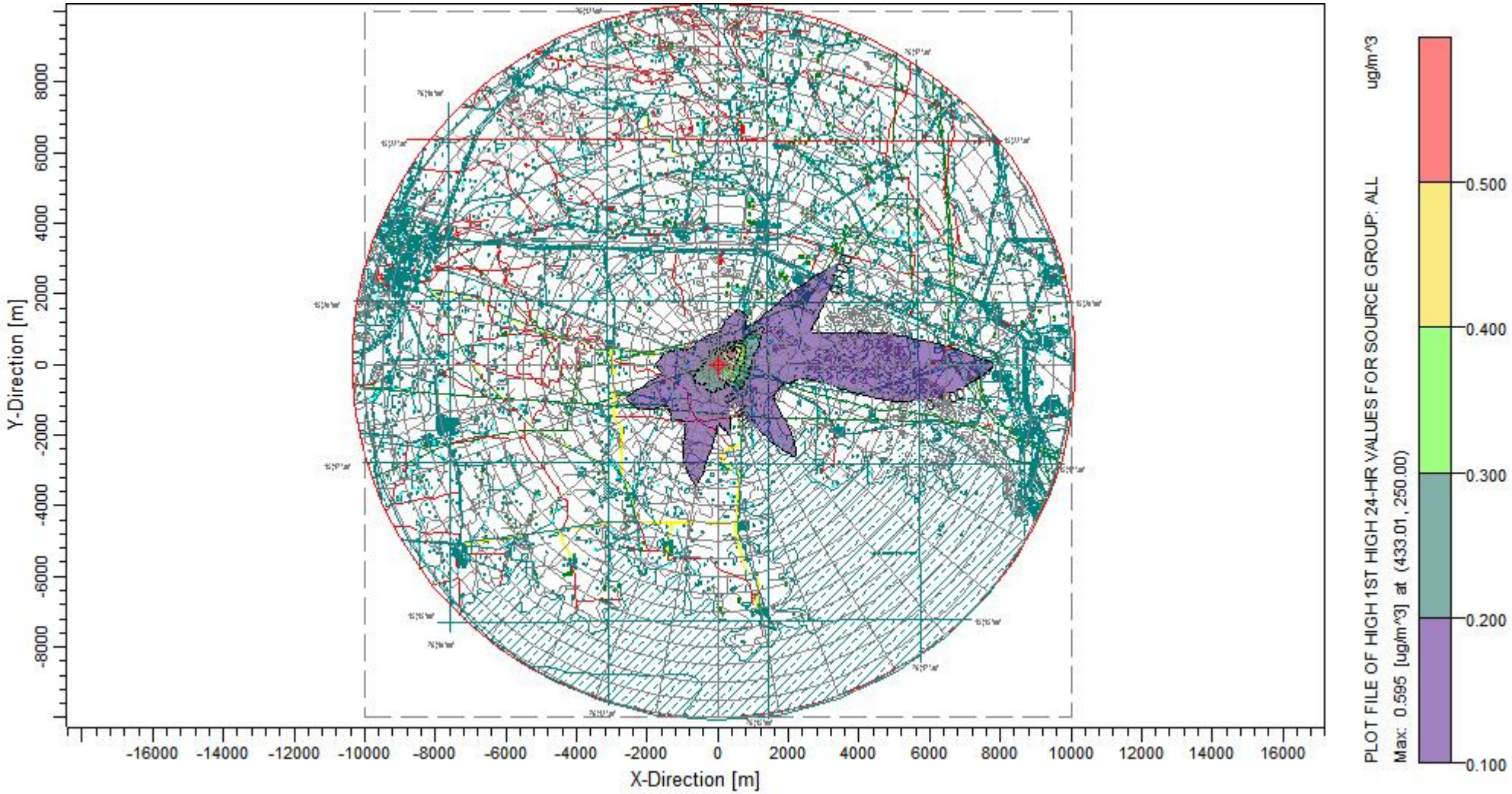


Fig 4.1: Predicted Ground Level Concentrations of Particulate Matters

Table 4.6: Predicted Ground Level Concentrations of Particulate Matter Season: Post-Monsoon 2016

RANK	CONC (µg/m^3)	RECEPTOR (XR,YR) (m, m)	TYPE
1	29.56265	(-513.56, -90.25)	GP
2	29.31831	(-550.50, -11.25)	GP
3	28.86275	(-550.50, -11.25)	GP
5	28.71563	(-513.56, -90.25)	GP
5	27.12189	(-572.95, 72.95)	GP
6	25.59531	(-330.55, -273.25)	GP
7	25.18525	(-513.56, -90.25)	GP
8	25.11053	(-550.50, -11.25)	GP
9	23.67129	(-572.95, 72.95)	GP
10	22.73507	(-550.50, -11.25)	GP
11	21.7033	(-550.50, -11.25)	GP
12	21.07815	(-501.95, -223.26)	GP
13	20.2802	(-550.50, -11.25)	GP
15	20.2715	(-251.56, -310.09)	GP
15	19.85555	(-563.57, -161.63)	GP
16	19.8153	(-251.56, -310.09)	GP
17	19.77515	(-580.55, 159.76)	GP
18	19.36282	(-513.56, -90.25)	GP
19	19.15152	(-251.56, -310.09)	GP
20	19.05371	(-563.57, -161.63)	GP
21	18.8226	(-330.55, -273.25)	GP
22	18.77255	(-580.55, 159.76)	GP
23	18.55837	(-572.95, 72.95)	GP
25	18.3625	(-513.56, -90.25)	GP
25	18.0936	(-572.95, 72.95)	GP
26	17.8901	(-1020.25, -182.26)	GP
27	17.55552	(-501.95, -223.26)	GP
28	17.23312	(-956.58, -350.25)	GP
29	17.15619	(-501.95, -223.26)	GP
30	16.95693	(-501.95, -223.26)	GP

4.4.2 Maximum Ground Level Concentrations

The ground level concentrations of PM, SO_X and NO_X were estimated using mean meteorological data to project incremental increase of concentrations due to emissions from the plant. It was found that, with coal firing, PM, SO_2 and NO_X were 42.0, 24.8 and 24.7 µg/m^3 respectively.

4.4.3 Overall Scenario

For estimating the overall scenario, the maximum ground level concentration due to emissions from the plant is superimposed on the maximum baseline concentrations obtained during the study period. The overall scenario with predicted concentrations over the baseline is given below in **Table 4.7**.

Table 4.7: Overall Scenario

Parameters	PM (µg/m^3)	SO_X (µg/m^3)	NO_X (µg/m^3)
Baseline value (max)	40	23.7	23.6
Maximum predicted ground level concentration (max)	2.0	1.2	1.18
Overall Scenario	**42.0**	**24.8**	**24.7**

4.5 Air Pollution Control Measures

Air pollution control measures are necessary to reduce the impact of the proposed expansion project on the air environment. It not only reduces the impact, but also increases the assimilative capacity of the air environment. The measures to control air pollution will ensure ambient air quality standards as laid down by Central Pollution Control Board for industrial and mixed-use areas. In addition, emissions from chimneys will be kept below the permissible limits of statutory norms for dust. Gaseous emissions will be released through stacks of required height, so as, not to exceed ambient air quality norms due to project plant. Roads inside the plant premises will be asphalted to reduce dust emissions like re-suspended dust.

4.6 Noise Pollution Control Measures

There will be marginal increase in noise levels during construction phase which is temporary. No significant impact is envisaged as most of construction equipment produces noise level below 75 dB (A). The major noise generating sources are plant machinery and HEMMs will perform continuously within noise limit of standard specification, but not more than 75 dB at 1meter distance from any equipment or sub-equipment. Proper encasement of noise generating sources will be done to control the

noise levels below 75 dB (A) at plant boundary. During the maintenance of equipments, the personal working near steam turbine generator building will be provided with ear muffs.

A scientifically designed thick green belt will be developed all around the plant which will act as a noise barrier. Further, following methods will be adapted to control noise pollution from the project site.

- Use of concrete and masonry walls and barriers, keeping in mind the benefits of stiffness and weight.
- Use of complete or partial enclosures.
- Attenuation by use of sound absorbents on walls and fixed or suspended ceilings.
- Introduction of control and monitoring rooms having good sound proof insulation properties.
- Reduction or elimination of noise leakage paths.
- Use of vibration insulation technique.

4.7 Water Environment

The impact on the water environment has been considered based on the impact that is going to cause by the proposed industry on the following:

- Impact on ground water source.
- Impact on surface water bodies.
- Storm water management.

4.7.1 Water Requirement

The total anticipated water requirement for the proposed expansion project is 3150 KLD. This will be met from the Borewell within the project site.

4.7.1.1 Impact on Ground Water Bodies

The raw material to the plant i.e., the iron ore fines, is non-toxic in nature, hence there will not be any pollution to ground water even if there is seepage. It is proposed to meet the water demand by drawing groundwater, to be complimented by judicious water use such as recycling and rainwater harvesting. Further, Central Ground Water Authorities have permitted the withdrawal of groundwater with exception of some districts. The project site does not fall in those districts.

4.7.1.2 Impact on Surface Water Bodies

There are no surface water bodies Tungabhadra dam which is at a distance of about 7.0 km towards south-east direction and Mundragi surface water which is 6.5 m towards South-South-west direction from the project site. The proposed expansion project requires about 3150 KLD of water and is mainly used for washing and domestic purpose. Hence there is no trade effluent generation from the proposed activity. As such there is no chance of overflow of any type of waste water from the premises and hence there is no impact anticipated on the surface water bodies from the implementation of the expansion project. Further, efficient rain water harvesting program will be implemented both on the roof top and also from the vacant land, to store monsoon run-off from the plant premises. Effective bunds will be provided to prevent runoff and to arrest fine silt flowing along with surface water during monsoon. Since entire monsoon run-off from the plant premises will be arrested within the plant, judicious water use plan will be implemented, further, there will not be any water pollution to the surface water bodies. We have to design the rain water harvesting pond.

4.7.1.3 Treatment Method

Domestic waste water will be treated in the Soak Pit or Septic Tank.

Sanitary Sewerage

The main sources of domestic waste water are from canteen, toilets, and bathrooms. The chemical analysis of the iron ore does not show any toxic substance, which can dissolve and pollute water quality. The following measures will be undertaken to prevent the water pollution from the expansion project.

- Construction of parapet wall of appropriate dimension all along the toe of ore stock.
- Contour trench of appropriate width and depth all along the ore stock dump.
- Systematic drainage system for diverting the surface run-off during monsoon.
- Plantation of local species, so that there will be fast and healthy growth of vegetation.
- Regular monitoring and analyzing the quality of water.
- Domestic Sewage will be disposed off in soak pit and septic tank.
- The process waste water will be completely reused back in the process.

4.8 Occupation Health & Safety

The detailed measures taken as per the requirement for occupational Health and Safety along with the explanation is given below in **Table 4.8**

Table 4.8: Requirement for occupational Health and Safety

Sr.No	Requirement	Explanation	
1.	What principal environmental and occupational risks are likely to be created.	Instant	Long term
		Accident during plant operation Accident during transportation of material & finished goods.	Hearing loss due to continuous exposure to noise generating equipment, and or location.
2.	Rank the risks to public health in order of severity.	Negligible.	
3.	How will risks be assessed.	Design of hazard risk assessment matrices for ranking occupational health risks in mineral processing industries.	
4.	Measures to communicate these risks to people and steps for prevention & control of the anticipated risk.	All the risks and steps for prevention & control will be communicated during induction training. Periodical refresher training will be conducted to all the workers to educate the workers at the time of accidents and also to overcome risk hazardous. Providing display boards at the approach road and other critical locations in local language and in English.	
5.	How would the health impact assessment undertaken, if needed.	The health status will be obtained by carrying out reconnaissance survey of both the employees and the nearby villagers on regular basis and if necessary free annual health camp will be organized to help the villagers and the workers as social obligation.	
6.	Does project provide a hiring a person with established credentials to be able to undertake such activities.	In house facilities with specialized person in occupation health with established credentials will be hired.	
7.	Name specialized agency to undertake an environmental health study, if needed.	In house facility will be provided.	
8.	Budget for environmental and occupational health activities.	Designated amount has been earmarked for taking up environmental & occupational health activities.	
9.	Breakup of the budget for every activity proposed to be undertaken.	Provided in EMP	
10.	List of hazardous operations / activities that are likely.	In the Chemical Analysis, Laboratory, DG Operation Etc.	
11.	How long are they expected	During the Plant operation period.	

	to be employed.		
12.	Would a safety committee be constituted.	Yes	
13.	Who will be the members of safety committee.	1. Plant Manager. 2. Safety Officer 3. Worker's representative	
14.	What will be the function of safety committee and who will head it.	Function	To implement the proposed OHAS management plan & Environmental Program and to take proper mitigative measure proposed in the EIA.
		Head	Plant Manager
15.	Will there be a budget to allow it to hold meetings.	Budget has been allocated under Recurring Annual Cost For Environmental Protection	
16.	Is there a provision of induction training for workers health and safety.	Yes (Half Yearly), Under occupational Category	
17.	How workplace exposures will be assessed.	By internal audit (Medical Officer of the Plant) and periodical medical check up.	
18.	How these will be communicated and explained to the workers.	Non conformance will be made as circular and will be displayed at the relevant places.	
19.	Who will conduct training and education in occupational health and safety.	Health & Safety Officer and Occupational Health Practitioner.	
20.	Where will health surveillance be undertaken.	All the plant workers will be sent to local hospital once in a year.	
21.	What occupational illness are anticipated in view of the hazardous exposure	Not enisaged.	
22.	Who will pay for the tests and the treatment of non occupational illness.	All expenditure related to health check up and treatment of the workers will be borne the by organization.	
23.	Who will compensate the workers for health impairment due to injury or illness.	All the workers will be covered under ESI /Medical Reimbursement. The management will make their contribution towards subscriptions.	
24.	The amount of compensation: List the minimum and maximum amount stipulated	As per ESI Act/ Worksmen Compensation Act.	
25.	How will and how long the records of health checkups be maintained and what will happen to records when the	Individual health record of every worker will be maintained till the end of service. Annual health check report will be submitted to	

	project ends	the local health center.	
26.	Who will identify occupational disease early to prevent serious damage	Internal Occupational Health Practitioner.	
27.	What measure are to be undertaken for following		
28.	Preventing heat stress	Not Applicable	
29.	Preventing noise exposure	Individual	Providing ear muff / ear plug to all the employees working in the high noise area and reducing the exposure time.
		Common	Regular maintenance of transportation vehicles and
30.	Preventing injuries	Environmental Safety Policy and Preventive actions shall be displayed at relevant places, awareness program will be conducted periodically to educate the workers on different components of health, safety and the environment.	
31.	Providing ergonomic support	Ergonomic support will be provide by Ergonomic Program Manager (EPM) who is trained under OH&S.	
32.	Who will undertake administration of Personal Protective Equipment	Plant Manager and Administration Officer.	
33.	What if any action is proposed when the project ends, workers become exposed and have latent disease which may appear in future	At the end of service of the workers, the health certificate will be provided from district medical officer after thorough checkup from the environmental budget of organization.	

4.9 Land Environment

The site preparation for setting up of various process units in the proposed expansion in the plant will slightly be alter the environmental conditions resulting in air and noise pollution. However this scenario is of short duration. There are no settlements in the site and hence no displacement of the people is required. The existing land use pattern of the project site and around 10 Km radius is shown **Fig. 4.2.**

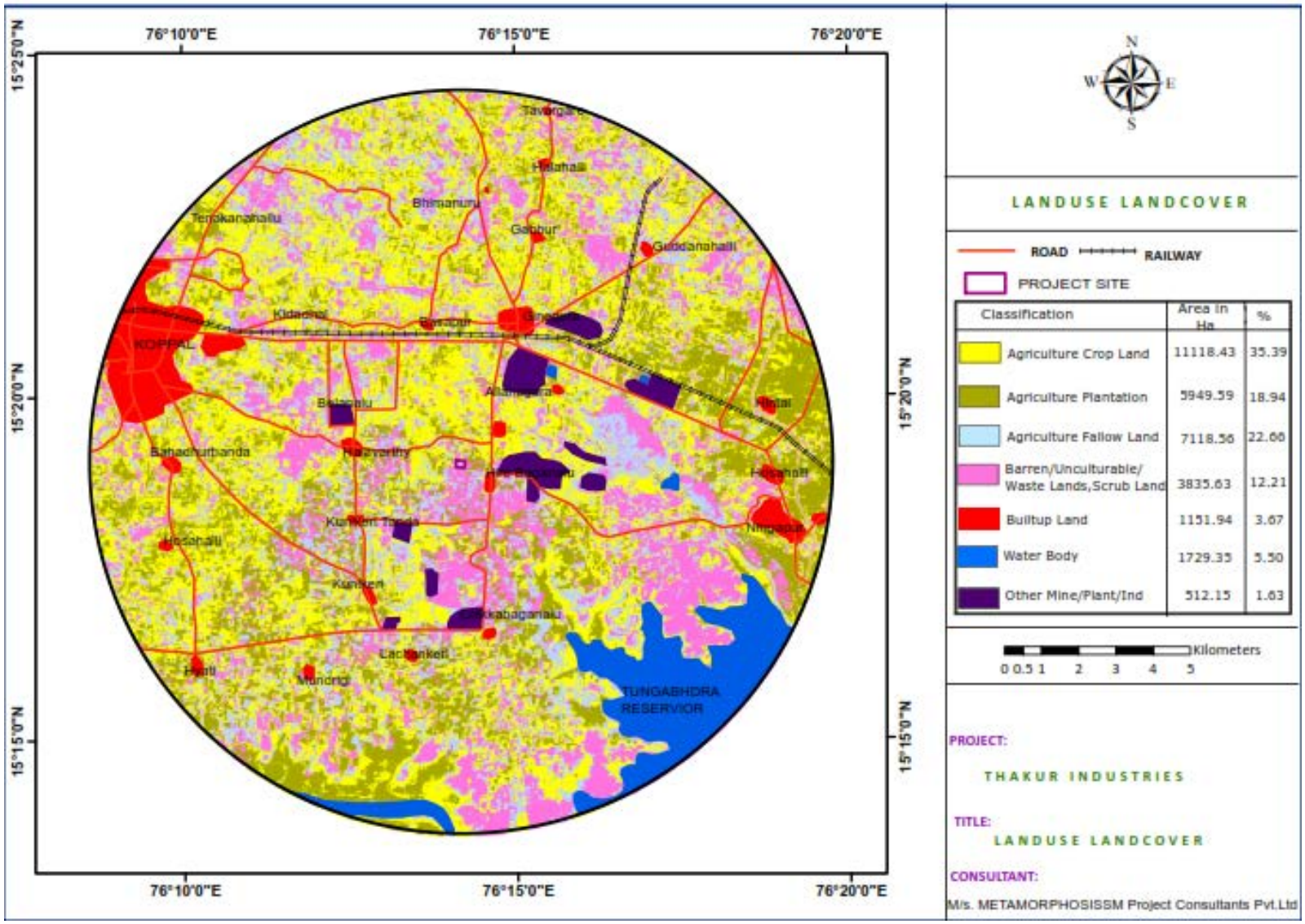


Fig 4.2: Landuse/Land Map within 10 km Radius of the Study Area

Assessment of existing land use pattern and land quality

- The project site is a berried land with gentle undulations towards South-East direction. There are no activities are being carried-out at present.
- There are no surface bodies within the project area.
- Estimation of anticipated impacts on soil quality and land use pattern and related activities due to project expansion.
- Delineation of land Environmental Management Plan.

4.10 Solid Waste Generation

The waste material generated from the technological processes would be reutilized to the extent possible. Other waste materials which cannot be reused that will be sold to cement or brick manufacturing industry.

The Solid waste and Hazardous waste generation from the proposed expansion is given in **Table 4.9** and **4.10.**

Table 4.9: Solid Waste Management

Plant	Waste	Quantity	Utilization Plan
Beneficiation Plant	Liquid Effluent	Waste water	Process wastewater will be reused back in the process, green belt development and dust suppression. Domestic wastewater will be disposed off in the CPCB approved soak pit and septic tank.
	Slurry from the tailing area	0.8 MTPA	Will be sold to brick and cement manufacturing industry.

Table 4.10: Hazardous Waste Management

Plant	Waste	Quantity	Utililization plan
Generator/ Lubricants	Used oil	100-150 KL per year	Shall be sold to the approved/authorized recycler/reprocessors.

4.10.1 Mitigative Measures

There will be no negative impact due to solid waste generation from the plant, it will be effectively stored and sold to bricks and cements manufacturing industry.

4.11 Biological Environment

4.11.1 Recommended Plants for Green Belt Development

Greenbelts are an effective mode of control of air and noise pollution, where green plants form a surface capable of absorbing air pollutants and forming a sink of pollutants. Leaves with their vast area in a tree crown, absorbs pollutants on their surface, thus effectively reduces pollutant concentration in the ambient air. Often the adsorbed pollutants are incorporated in the metabolic pathway and the air is purified. Plants grown to function as pollution sink are collectively referred as greenbelts.

An important aspect of a greenbelt is that the plants are living organism with their varied tolerance limit towards the air pollutants. A green belt is effective as a pollutant sinks only within the tolerance limit of constituent plants. Planting few, known pollutant sensitive species along with the tolerant species within a green belt however, do carry out an important function of indicator species apart from function as pollution sink, greenbelt would provide other benefit like aesthetic improvement of the area and providing suitable habitats for birds and animals.

4.11.2 Selection of plants for Green Belts:

The main limitation for plants to function as scavenger of pollutants are, plant's interaction to air pollutants, sensitivity to pollutants, climatic conditions and soil characteristics. While making choice of plants species for cultivation in green belts, due consideration has to be given to the natural factor of bio- climate. Xerophytes plants are not necessarily good for greenbelts; they with their sunken stomata can withstand pollution by avoidance, but are poor absorber of pollutants.

Character of plants mainly considered for affecting absorption of pollutant gases and removal of dust particle are as follows;

- **For absorption of Gases:**

  - Tolerance towards pollutants in question, at concentration, that is not too high to be instantaneously lethal.
  - Longer duration of foliage.
  - Freely exposed foliage.
  - Adequate height of crown.
  - Openness of foliage in canopy.

- £ Big leaves (long and broad laminar surface).
- £ Large number of stomatal apertures.

· **For Removal of Suspended Particular matter**

- ¤ Height and spread of crown.
- ¤ Leaves supported on firm petiole.
- ¤ Abundance of surface on bark and foliage.
- ¤ Roughness of bark.
- ¤ Abundance of axillaries hairs.
- ¤ Hairs or scales on laminar surface.
- ¤ Protected Stomata.

4.11.3 Plantation along Road Sides

Automobiles are the source of pollution of gaseous and particulate pollutants. Component of green belt on roadside hence should be with both absorbers of gases as well as of dust particles. The choice of plants for roadside should include shrubs of height 1 to 1.5 meter and trees of 3-5 meter height. Medium sized trees, alternating with shrubs are ideal for sorption of particulates and gases.

Table 5.15: Recommended Plant Species for Green Belt Development

Plant species	Habit	Tolerance limit	Stomatal index	Mode of Regeneration
Acacia auriculiformis	Tree	Tolerant	10.9	Seeds
Azadirachta indica	Tree	T	29.2	Seeds
Bougainvillea spectabilis	Shrub	T	32.53	Cutting
Delonix regia (Gulmohur)	Tree	Sensitive	15.38	Seeds /stem cutting
Euphorbia tirucalli	Shrib	T	NA	Cuttings
Hibiscus rosa-sinensis	Small tree	T	23.32	stem cutting
Ixora arborea	Small tree	T	17.3	stem cutting
Ixora rosea	Small tree	T	20.30	Stem cutting
Lawsonia inermis (Mendi)	Shrub	T	17.0	Seeds /stem cutting
Mangifera indica (Am)	Tree	T	30.77	Seeds/ grafting/
Melia azadirachta	Tree	T		Seeds /stem cutting
Nerium indicum	Shrub	T	15.7	Cutting
Peltophorum pterocarpum	Tree	T	16.68	Seeds
Polylathia longifolia	Tree	T	22.27	Seeds
Sesbania sesban (	Shrub	T	19.2	Seeds
Tamarindus indica	Tree	T	18.5	Seeds

Tectona grandis	Tree	T	23.58	Seeds
Terminalia alata	Tree	T	NA	Seeds /stem cutting
Thespesia populnea	Tree	T	29.81	Seeds /stem cutting
Thevetia peruviana	Shrub	T	27.8	Seeds /stem cutting

T: Tolerant, NA =Not available **Sources: CPCB (March, 2000) PROBES/75/1999-2000**

4.11.4 Top Soil

M/s. Thakur Industries is purchased total area of 17.50 Acres (7.08 ha) land and converted for industrial purpose. Top soil available in the area will be removed carefully and same will be utilized for plantation/Afforestation.

4.12 Other Issues related to Environmental Protection

4.12.1 Clean Technologies/ Measures

The management of **M/s. Thakur Industries,** is committed to adapt best available technology. Tar-free runner linings will be used. Best available indigenous materials will be used. Suppression of fugitive emissions using nitrogen gas or other inert gas will be done as per the best available technology. Reduction of Green House Gases, by reduction in power consumption and by regular energy auditing will be done.

CHAPTER- 5

ANALYSIS OF ALTERNATIVES

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Chapter – 5

Analysis of Alternative (Technology & Site)

5.1 Analysis of Alternative Technology

M/s. Thakur Industries has established and operating ore beneficiation plant with a throughput capacity of 0.6 m.t.p.a. with the help of special equipment known as high gradient magnetic separator for beneficiation which is the best technology available with the filter press technology to reduce the usage of non-renewable resources. From the technology of filter press the plant will be operated adopting the principle of "**Reduce-Recycle-Reuse**" especially towards consumption of water as ore beneficiation plants are always water intensive.

5.2 Analysis of Alternative Sites

Project proponent proposes for increase of annual throughput to 1.50 m.tp.a. in the existing facility where in Environmental Clearance obtained after completing public consultation process and Consent from State Pollution Control Board is already available for 0.60 m.t.p.a. throughput capacity. Therefore exploring the alternative sites does not arise.

The plant has sufficient land of total extent 17.50 Acres (7.082 Ha) to accommodate the proposed expansion and the plant operation depends on the availability of raw material at economically viable distance and other factors such as infrastructure facilities. Presently abundant low-grade ore is available in Ballari-Hosapete-Sandur sector (around 50-70kms), Chitradurga-Tumakuru region (160-220kms) and the same can be procured through e-auction. Water requirement will be met though ground water as the area is declared "**SAFE**" zone by CGWA.

CHAPTER- 6

ENVIRONMENTAL MONITORING PROGRAMME

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ENVIRONMENTAL MONITORING PROGRAMME

6.1 Technical aspects of monitoring the effectiveness of mitigation measures (including measurement methodologies, frequency, location, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules).

The Environmental monitoring is the primary tool for assessing the prevailing quality of air, water, noise, soil, land etc. It helps in suggesting and taking intermediate corrections, if found necessary. It is not only provides the existing scenario, but helps to identify the changes that are going to take place after the implementation of the proposed expansion. The monitoring of different environmental attributes on regular basis helps to identify the critical changes that may occur on any of the specific attributes and suggests mitigative/preventive measures to be undertaken by the project authorities.

The monitoring of various environmental parameters will be carried out on a regular basis to ascertain the following:

- Status of pollution within the plant and in its vicinity due to proposed increased throughput capacity from 0.6mtpa to 1.5mtpa to ore beneficiation plant.
- Generate data for predictive or corrective purpose in respect of pollution.
- Examine the efficiency of pollution control systems installed in different area of process.
- To assess environmental impacts on the immediate surroundings due to plant activities.

The monitoring shall be regular and shall comply with the guidelines of statutory authorities. Monitoring studies for Ambient air quality, Water quality, Noise levels and Soil quality shall be carried-out by the project proponent, as per the approved standard procedures and schedules to record the resultant quality parameters on a regular basis. Necessary funds shall be allocated by the project proponent for the same, as environmental protection has been identified as an integral part of plant operation.

Necessary advice if necessary will be sought from appropriate authorities, which also helps to go a long way in improving the environment. The frequency of monitoring of various environmental components to be monitored for the proposed expansion.

6.2 Measurement Methodology, Attributes and its Monitoring Frequency

6.2.1 **Measurement Methodology -** To know the effectiveness of environmental mitigation measures in view of proposed expansion, environmental monitoring program will be strictly followed as per statutory requirements as per Notification from Ministry of Environment, Forests & Climate Change, G.S.R. 809(E) dated 4th Oct 2010.

- ¥ Fugitive emissions will be monitored as per CPCB/MOEF & CC norms.
- ¥ All air pollution control systems will be taken-up for maintenance as per prescribed dates and always ensure compliance with norms.
- ¥ KSPCB will also carry out ambient air quality at regular intervals. This will also help in cross checking the performance of pollution control systems implemented in the plant.

The environmental attributes, Methodology and its frequency of monitoring during the plant operation are given in the **Table – 6.1.**

Table 6.1: Details of Environmental Attributes, Methodology and Frequency

Attributes	Methodology	Frequency of Monitoring	Place of Monitoring	Parameters
Meteorological Studies	--	Every month - 24 hourly.	Study Area of 10 km radius	Min, Max Temperature, Relative Humidity, Rainfall, Wind Speed and Direction.
Fugitive Emission monitoring (Core Zone)	Fugitive emissions shall be monitored in the predominant down wind direction at a distance of 25(+-) 2.0m from the source of fugitive emission.	Once in a month	a. Haulage Road b. Crushing & Screening Area c. Stock yard	Particulate Matter

Attributes	Methodology	Frequency of Monitoring	Place of Monitoring	Parameters
Ambient Air Quality Studies (Buffer Zone)	As per CPCB Guidelines	24 hourly samples twice a week 8 hourly for SO_2 & NO_X.	As per Approved ToR	PM_{10}, $PM_{2.5}$, SO_2 & NOx
Water Quality (Surface & Ground Water)	IS 3025 (Part 14), 2013.	Once in a month	As per Approved ToR	Parameters are considered as IS 10500.
Noise Level Measurement	Using integrated sound level meter in dB (A) – NABL Calibrated.	Once in season **Day Time:** 6 am – 10 pm **Night Time:** 10 pm – 6 am.	As per Approved ToR	Minimum, Maximum and Leq
Soil Sampling	--	Once in a season (not too dry, not too wet)	As per Approved ToR	NPK and other parameters

6.3 Data Analysis

All the parameters will be analyzed as per IS procedures specified for those parameters. All water samples will be analyzed for various parameters as per IS: 10500 with the specified procedures.

The methodology adopted for monitoring & analysis of $PM_{2.5}$ & PM_{10} is as per IS: 5182 Part IV SO_2 & NOx as per IS: 5182 Part II & Part VI respectively. Samples were analyzed for SO_2 using improved West-Gaeke method for air samples using a spectrophotometer at a wavelength of 560 nm.

Samples were analyzed for NOx using Jacob and Hochheiser modified method, for Air samples using a spectrophotometer at wavelength of 560 nm. $PM_{2.5}$ & PM_{10} in ambient air are found by using APM 550 Dust Sampler.

6.4 Reporting Schedule

The monitoring and analysis reports as well as half compliance status will be submitted to the Ministry of Environment & Forests, Bengaluru and Karnataka State Pollution

Control Board on regular basis. Copies of the reports will be maintained in the plant and will be made available to the concerned inspecting authorities.

6.5 Emergency Procedures

In case of emergency shutdown, all the safety precautions will be taken as per the procedure given by the supplier. All precautions will be taken to prevent any environmental and safety related aspects during emergency.

6.6 Detailed EMP Budget

After an in-depth examination of the environment management plan, the management has made a time specific budgetary cost allocation towards carrying out environmental related works on a continuous basis and the same is given below in **Table 6.3**. Necessary funds will be allocated towards Corporate Social Responsibility for social upliftment of the surrounding villagers. Developmental work like water supply/sanitation, health care facility, bus shelter, school, helping the children through free distribution of books, bags, uniform etc will also be undertaken as a part of social responsibility by the management.

The budget proposed for existing granted project along with proposed enhancement project and that for the environmental protection measures is given as below:

Capital Cost of the Project: Rs. 220 Lakhs
Cost for Environmental Protection Measures:

- Capital Cost: **Rs. 109.48 Lakhs**
- Recurring Cost: **Rs. 72.60 Lakhs/annum.**

Table 6.3: Proposed Costing Towards Environmental Protective Measures

Sr. No.	Activity	Initial cost (Lakh Rs.)	Recurring expenses proposed/ annum (Lakh Rs.)
1	Air Pollution Control Measures such as covering of belt conveyors, providing mist spray system at feed points, wind barricades etc.	65.50	15.00
2	Plantation and After Care Measures	4.48	2.10

Sr. No.	Activity	Initial cost (Lakh Rs.)	Recurring expenses proposed/ annum (Lakh Rs.)
3	Socio-Economic Welfare Measures as a corporate social responsibility (CSR) a. Provision of ambulance facility b. Construction of compound wall at nearby school.	 20.00 10.00	 4.00
4	Water Pollution Control Measures	5.50	3.50
5	Occupational Health & Safety (provision of first aid room and shelter)	4.00	3.50
6	Environmental Monitoring	Nil	9.50
7	Preventive and corrective maintenance of plant and machinery to reduce noise pollution and consumption of non renewable resources (2.5% of the plant & machinery cost).	-	35.00
Total		**109.48**	**72.60**

CHAPTER - 7

ADDITIONAL STUDIES

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7.0 ADDITIONAL STUDIES

7.1 Public Consultation

Karnataka State Pollution Control Board conducted public Consultation on 18/08/2017 in consultation with Deputy Commissioner, Koppal. Karnataka State Pollution Control Board issued the public notice 30 days in advance in the News paper i.e. Kannada Prabha and Times of India dated 17/07/2017 and in Local News Paper Nagaika dated on 18.07.2017. Photos of the public consultation are given in **Photo 7.1.**

7.1: Photographs of Public Consultation

Sr. No	Issues Raised	Response/Commitment of Project Proponents	Time Schedule	Budgetary Allocation
PART A: Point raised in Public Hearing and its Compliance				
1. Mr. Manjunath Majge, Allanagar Village				
	He welcomed the expansion project whole-heartedly and express that after the establishments have made lot of improvements to their village by providing Drinking water supply, Roads, School Buildings, Provided employment opportunity for the local people and also anticipated more employment to their educated unemployed youths of the village. He has requested to provide more plantations in the area to maintain good green cover.	£ Project proponent welcomed and agreed to develop avenue plantation with native species either sides of the roads, schools, other public places by consulting the local bodies.	2 years	2,00,000.00
2. Mr. Mallekarjuna Swamy, Hirebaganal Village				
	He welcomed the expansion project and it is beneficial for the society. Further, requested that expansion project can be implemented without causing Environmental Hazardous.	£ Project proponent welcomed and agreed the point raised during public consultation and also assured that no harms for the environment and also surrounding area due to expansion of the project. Also informed that, regular monitoring of environmental attributes as part of EMP is being carried-out by recognized Laboratory, company will take mid-course corrections based on the monitoring results, if required.	-	-

Sr. No	Issues Raised	Response/Commitment of Project Proponents	Time Schedule	Budgetary Allocation
PART A: Point raised in Public Hearing and its Compliance				
3. Mr. Ravi, Lorry Owner, Hirebaganal Village				
	Lorry / trucks owners are getting all the benefits from the industry indirectly and also expressed that the villagers are benefited economically and welcome the project.	£ Project proponent is committed for the welfare of the community while proposing the expansion.	--	--
4. Mr. Hemanna Devarmane, Gram Panchayath President, Hirebaganal Village				
	He welcomed the expansion project and requested provide basic needs for the villagers.	£ Project proponent welcomed the statement and agreed community developmental activities in consultation with Skill Counsel of India in the state/district in the nearby villages for training in motor repairing, generators, electrical and mechanical works, industrial welding etc. PP will provide equipment to local skill center.	2 years	5,00,000.00
5. Mr. Jagadish Kerahalli – Gram Panchayath Member, Hirebaganal Village				
	He welcomed the proposed expansion scheme and expressed that the industry has done lot of good things for their villagers by providing employment, education and financial help for their village functions etc.,	£ Expression by the villager is evident that the project proponent is given due importance to the community views while proposing the expansion proposal.	--	--

Sr. No	Issues Raised	Response/Commitment of Project Proponents	Time Schedule	Budgetary Allocation
PART A: Point raised in Public Hearing and its Compliance				
6. Mr. Ravi Patil, Vice President - Lorry Association, HireKasenkadi Village				
	He expressed that there is direct and indirect job opportunities for all lorry owners and stressed that due to expansion of project the job opportunities will be increased.	£ Project proponent appreciated the opinion/feelings of the public.	--	--
7. Mr. Kumar Majge – Allanagar Village				
	He opined that due to the existing industry local people have employment, which avoids the migration of local people to outside. Due to enhancement of production there will be more opportunities to the educated people.	£ Project proponent respects the opinion of the villagers.	--	--
8. Mr. Abdul Wahid, Lorry Union President, Hosahalli Village				
	There are about 120 lorries/trucks operating in the industry for ore transportation and other works. The increase of production will results in the more job opportunities.	£ Project proponent welcomes the view expressed by the public.	--	--
9. Mrs. Tara Magalamukhi, - Hirebaganal Village				
	She welcomed the expansion project and it's beneficial for the society. Further, requested that expansion project can be implemented without causing Environmental Hazardous.	£ Project proponent noted positive expression about the project. Assured that effective preventive and corrective environmental mitigative measures will be implemented to ensure that there will not any impact on environment and	-	-

		ecology in the surrounding area.		

Sr. No	Issues Raised	Response/Commitment of Project Proponents	Time Schedule	Budgetary Allocation
PART A: Point raised in Public Hearing and its Compliance				
10. Somangowda Mali Patil, Hirebaganal Village				
	The local agriculturists are taking compensation from the industry on the grounds of crop loss, there shall not be over demand for crop loss from the farmers, and it should on realistic ground. There should be harmony between industry and formers.	£ Project proponent agrees the view expressed from the public.	--	--
11. Mr. Mahendra Chopra, Municipal Corporation President, Koppal				
	He welcomed the expansion project. Further, expressed that he is having land adjacent to the industry and not facing any issues till date. Also requested proponent to take more precaution about environmental hazards during implementation of expansion activities.	£ Project proponent appreciated the aspect raised during public consultation and also assured that no harms for the environment and also surrounding area due to expansion of the project. Also informed that, regular monitoring of environmental attributes as part of EMP is being carried-out by recognized Laboratory, company will take mid-course corrections based on the monitoring results, if required.	-	-

7.2 Risk Assessment

Risk assessment has been carried out for the proposed expansion of beneficiation plant capacity from 0.6 m.t.p.a to 1.5 m.t.p.a through-put at Hirebaganal Village, Koppal Taluk and District, Karnataka State.

Elimination of hazards will require prompt action by operators and emergency staff using for e.g., fire-fighting equipment, emergency shut-off values and water sprays. Minimizing the effects will include rescue, first aid, evacuation, rehabilitation and giving information promptly to people living nearby.

The process technology and detailed engineering of the plant would be made adopting the latest eco-friendly systems with strong plant design and engineering.

During the operation of the mineral beneficiation plant, following risks have been identified.

- Fire
- Risk during plant operation

Risk due to Fire:

Basically the processing plant is operating on wet process. However, the machinery in the plant shall be electrically powered. Occurrence of electrical fires constitutes a major risk. To guard against the same, necessary design precautions shall be taken. Rats and mice can damage electrical insulation leading to fires. To prevent the same pest control exercises shall be undertaken at regular intervals. Sufficient nos. of portable fire-extinguishers shall been provided in office buildings, near electrically powered machinery, electrical panels etc. to take care of any eventuality. The distribution and selection of extinguishers shall be done in accordance with the requirements of Bureau of Indian Standards (BIS): 2190-92.

All areas shall be covered by manual protection system i.e. portable extinguishers, sand buckets. In emergencies, if necessary additional fire fighting resources can be made available from district head quarters Koppal, which is situated within 10 km distance of the plant location.

As soon as any fire is reported the shift-in-charge shall assume the function of disaster controller. In case of serious fire and depending on the gravity of the situation, the Plant Manager may be summoned to assume charge. Personnel

trained in dealing with fires will be summoned. Meanwhile the hospital will be informed to standby to handle casualties. The fire area will be cordoned off till the fire is fully extinguished and remain so until all wreckage and debris is cleared away.

Hazard is a physical situation which may cause damage to property or the environment or may cause injury or some combination of these.

There could be fire accidents due to electrical short circuiting, diesel fuel getting into contact of naked flames, machineries developing excessive heat due to imperfect lubrication of bearings etc.

Regular proper maintenance of equipment including, electrical fittings to avoid catching of fire. Important personal working at the risky areas will be provided with wireless communication system with a closed loop to police/fire protection agency apart from the internal security for quick passing of information for any assistance in case of any emergency.

Required training will be imparted to all the employees about emergency preparedness. Mock drills will also be conducted at regular interval to handle the emergency situation. Refresher awareness programs will also be planned among the employees.

7.2.1 Action Plan to prevent occurrence of Fire

- On the surface premises, cutting burners, welding appliances and other fires of any kind, which are fire risk, shall be used with proper safety equipment with necessary precaution.
- Fire extinguishers should be kept at all the sensitive places like engine room generator, workshops etc.
- Fire hydrant will be provided within the plant premises.
- A competent trained person shall examine all the equipments, material and arrangement provided for firefighting at least once in a month and record of the examination shall be maintained in a register.
- At least once in 3 months, all the fire extinguisher and fire hydrant equipments shall be examined by a competent person. A logbook shall be maintained in this regard for verification.

7.3 Disaster Management and Emergency Preparedness Plan

A major emergency in a plant is one which has the potential to cause serious injury or loss of life. It may cause extensive damage to the property and serious disruption both inside and outside the plant. Sometimes, it would require the assistance of outside agencies.

7.3.1 Scope

The aim of hazard control and disaster management is concerned with preventing accidents through good design, operation, maintenance, inspection and the management by which it is possible to reduce the risk of an accident but it is not possible to eliminate it. Since, absolute safety is not achievable an essential part of major hazard control must also include mitigating the effect of a major accidents.

An important element of mitigation is emergency planning, i.e., recognizing that accidents are possible, assessing the consequences of such accidents and deciding on the emergency procedures both onsite and offsite that would need to be implemented in the event of an emergency.

7.3.2 Objectives

The overall objectives of an emergency plan are;

- To localize the emergency and eliminate it, if possible.
- To minimize the effects of the accidents on people and property.

The Risk assessment is a common factor applicable at all stages of the plant execution and operation. Such risks can be categorized as (a) Environmental Risk, (b) Safety and Health Risk (c) Community and Social Risk (d) Legal and Financial Risk and (e) Technical Risk. In order to minimize the above-mentioned risk following mitigative measures shall be proposed:

- All the operations will be planned and designed in such way to eliminate or reduce any hazards that may arise during the operations of the plant.
- All efforts will be made to achieve the desired standard of safety by implementing rules and regulation.
- Improvement will be done in working condition.
- All the material and monetary resources shall be provided for the smooth and efficient execution of the safety plans.
- Continual efforts will be made to improve the living conditions and health of all the employees.

- All the working floors will be furnished with required equipments/materials that ensures free from recognized occupational hazards likely to cause injury or illness.
- Ensuring the prevention, suppression, treatment, collection and removal of the harmful dust at all times, it is proposed to provide efficient dust control system and consistently used to dust suppression equipment.
- Ensuring good light & ventilation within the process building and in all the working floors and also with proper washing and sanitary facilitates.

7.3.3 Health Hazard

The first-aid centre will be maintained within the premises to meet the basic medical needs of employees at emergency. A qualified medical officer assisted by a nurse will attend the medical needs of the employees and their family members. The first-aid centre will be provided with all essential life saving drugs and day-to-day first aid medicines. As the plant will be operated mechanically with automation, protection of worker's health is the main concern of the project proponent. All the employees were protected from all types of environmental & occupational hazardous within the plant premises.

Precautions such as proper maintenance of equipments and transport vehicles shall reduce gaseous emissions such as SO_2, NOx & CO so that their emissions are always below the permissible limit in the environment. However, the management will be providing Personnel Protective Equipment (PPE) to all the people working within plant premises. Further, periodic health check-up will be carried out for all employees.

7.3.4 Emergency Plan

7.3.4.1 Organization Plan

Organization plan will be evolved clearly stating the line of command and the responsibilities of each person involved in case of emergency situation. It also depicts the reporting responsibility of individual in case of emergency.

7.3.4.2 Equipment Plan

The corrective & preventive maintenance of Plant and Machinery and other transport vehicles will be carried out regularly for their upkeep and safety operations. It also helps to improve the efficiency of these equipments. Maintenance of various machinery and equipment will be recorded regularly in the maintenance register and Machine History Card which will be

maintained in the workshop for regular inspection. Any changes will be observed and attended to immediately.

7.3.4.3 Purpose and Scope of Emergency Plan

The purpose of the emergency plan is to describe procedure for emergency preparedness and response. The scope of the emergency plan covers all the emergency conditions. The sensitive area identified for this purpose is Fire, Flood, or any major Accident.

7.3.4.4 Functions of the emergency preparedness team

- The emergency preparedness team will be constituted within the organization consisting of the senior officials from managerial level from different departments like production, health & safety, environmental, material handling, security to handle the emergency situations.
- The team will meet once in six months to discuss the possible or probable causes / instances leading to any disaster that may occur in and around the plant premises.
- The team will assess the required resources to deal with the situation that may be identified as above.
- The team leader will lay down a detailed procedure or oral information to each member to follow in case of any impending or possible or actual disaster.
- The team will conduct mock drill once in a year to understand the practical problems that may arise while implementing the Emergency Preparedness
- Action Plan including the response time and take necessary steps to make the system effective.
- The team will make necessary recommendations/suggestions to the management for identifying/monitoring/dealing with any possible or probable disaster.
- The minutes of the meeting of the team shall be prepared including the probable cause of incident, response time and corrective & preventive actions required to be taken to avoid the reoccurrences of the same and kept as record.
- The team may draw an Action Plan and modify the same from time to time.

- The Emergency Preparedness Team will come into force in case of any disaster by establishing the control room at an appropriate place nearer to the affected area.
- The team shall record the actual performance/procedure followed/short comings while dealing with any actual disaster, which will be discussed at various levels to strengthen the plan and approach.
- The Plant Manager shall inspect all the places where disaster occurred, along with Emergency Preparedness Team.
- He shall ensure that all the affected places are safe to resume the normal works, and then give permission to start the Plant operations.

7.3.4.5 Assembly Point & Control

All Senior Officials shall meet to discuss about the actions to be taken, to deal with disaster at office / Control room. All the workers shall be directed to assemble at pre-decided assembly points to ensure safety. All the activities connected to emergency shall be controlled from nearest convenient and safe place or from the office as may be necessary.

7.4 Occupational and Safety Hazards

Occupational and safety hazards in the beneficiation plant are given in **Table 7.1.**

Table 7.1 Preliminary Hazard and Analysis

Equipment	Process	Potential Hazard	Mitigation Measures already in place
Stacker & Reclaiming (raw material)	Stacker & Reclaiming of raw material	Stacker & Reclaimer can overrun, which overturn the equipment.	Proximity – switches are provided along with mechanical stoppers for stopping of over travel.
		Air Pollution	Dust collector is installed / water sprinklers are provided at various dust generated location.

Type of Hazard	Area	Mitigation
Dust ¥ Respiratory Infection ¥ Skin Allergy ¥ Pulmonary Disorder	¥ Material Yard ¥ Stacker – Reclaimer ¥ Storage tank	¥ Continuous water spraying ¥ Storage in covered area & bins ¥ Adequately designed cyclone and pollution control equipment. ¥ Periodic medical check-ups ¥ Adequate Medical Facilities ¥ Continuous medical surveillance.
Noise ¥ Nausea ¥ Head Aches ¥ Loss of Hearing	¥ Screening ¥ Crushers	¥ Provision of Insulation ¥ Use of dumping materials ¥ Shock absorption techniques are adopted ¥ Ear Muffs are provided ¥ Greenbelt corridor is developed along the periphery of the plant.

7.5 Rehabilitation & Resettlement Action Plan

As proposed expansion project is establishing in the existing plant premises. Hence NO Rehabilitation & Resettlement is required.

CHAPTER- 8.0

PROJECT BENEFITS

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CHAPTER – 8

PROJECT BENEFITS

8.1 Project Benefits

Any industrial activity will help in improving the socio-economic status in the area like employment, communication, education etc. It improves the living standard of the people, supports for education and increase the ability of people to understand the changes. The expansion project will also help to improve the basic infrastructure of the society, thereby there is an overall improvement in the economic status of the people. The following paras will discuss the benefits from proposed expansion of beneficiation plant within the existing plant premises.

8.2 Improvement in the Physical Infrastructure

The expansion project is expected to yield a positive impact on the socio-economic environment within the study area. It helps to sustain the development of this area including further development of physical infrastructural facilities. The following physical infrastructure facilities will improve due to proposed expansion of the project.

8.3 Improvement in Social Infrastructure

The proposed expansion project will provide additional 55 numbers of direct and an equal number of indirect employment opportunities to the eligible youths of the surrounding villages. The employment is expected to increase during civil construction period, in trade, afforestation works and other ancillary services. Employment in these sectors will be primarily temporary or contractual and involvement of unskilled labour will be more. A major part of this unskilled labour force will be mainly from local villages, which are expected to engage themselves both in agriculture and project activities. This will enhance their income and lead to overall economic growth of the surrounding area. The following changes in socio-economic status are expected to take place with these expansion activities.

i) The expansion project will have a strong positive employment opportunity and income effect, both direct as well as indirect. Migrant – non-migrant ratio shall shift towards migrant side, because a number of people shall migrate towards the central region of study area in the years to come. This will happen because of better indirect employment opportunities due to this project.

ii) The expansion project is going to have positive impact on consumption behavior by way of raising average consumption and income through multiplier effect.

iii) People perceive that the expansion project will help in the development of social infrastructures/such as.

- Education facilities.
- Banking facilities.
- Post offices and Communication facilities.
- Medical facilities.
- Recreation facilities.
- Business establishments.
- Community facilities.

8.4 Employment Potentiality of the Project

The socio – economic status in the study area is found to be moderate with respect to livelihood, amenities etc. In view of the proposed increase in annual throughput of Ore Beneficiation of M/s. Thakur Industries, will generate additional 55 employment opportunity and an equal number of indirect employment will also be generated.

8.4.1 Infrastructure facilities to the workers

- The management will actively participate in the efforts by the local bodies and the Government to improve the health and social status of the population living in the buffer zone villages. The management already extending the medical assistance to the local needy people by engaging a part time Medical Officer on a regular basis.
- However, management allocates 2 percent of the profit towards community developmental activities in the buffer zone villages to improve the facilities such as school, health, road, infrastructure etc.

8.4.2 Reaching out to the Community

The **M/s. Thakur Industries** will propose to undertake the various community welfare programmes for the local villages in addition to the already existing populous community developmental activities:

- Nearest village to the plant site will be provided with all basic infrastructure facilities.
- A dispensary with doctor will be provided to the nearby village.

- Fodder for the cattle will be distributed to the nearby village.
- Priority for jobs will be given to local eligible people.
- The management proposes to increase literacy levels within buffer zone, by way of support to school going children through free distribution of books and by way of supporting NGO's for adult education.
- The proposed expansion of the project is being developed to meet the raw material requirement for various Pellet and Integrated Steel Plant in the surrounding areas/places.
- Identification of local needs/requirements and implementing the same through creating self help groups among the community.

8.5 Other Tangible Benefits

The proposed expansion project is likely to have other tangible benefits as given below.

- Indirect employment opportunities to local people in contractual works like housing construction, transportation, sanitation, for supply of goods and services to the project and other community services.
- 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 in addition to the seasonal agricultural income.
- The State Government will also benefit directly from the proposed expansion project, through increased revenue from royalties, excise duty.

8.5.1 Corporate Social Responsibility

- The management proposes to increase literacy levels within buffer zone, by way of support to school going children through free distribution of books and by way of supporting NGO's and self help groups.
- Management will actively participate in the efforts by the local bodies and the Government to improve the health and social status of the population living in the buffer zone villages. Management proposes to extend the medical assistance to the local needy people by engaging a part time Medical Officer on a regular basis.

- Management allocates necessary funds towards community developmental activities in the buffer zone villages to improve the facilities such as school, health, road, infrastructure, etc., once the plant completes its expansion program.

8.5.2 Activities Undertaken by M/s. Thakur Industries, Koppal

Based on the needs assessment, the ESC programmes are customized and implemented while partnering with government agencies, NGOs, local Panchayats for implementation. 'Village Development Committees' will be formed to engage with the community; plan, monitor and coordinate the ESC activities. Major areas that are undertaken by M/s. Thakur Industries under ESC activities have been given in **Table 8.1.**

Table 8.1: Major Areas under ESC Activities (2016-17)

Sr. No	Particulars	Description of Activities	Venue	No. of Program	No. of Beneficiaries
Health					
1	Health, Hygiene and Sanitation mass awareness program organized	Child Marriage awareness		1	40
		Alcoholism and its Disadvantage	Munirabad Village	1	20
		HIV-AIDS awareness	Munirabad Village	1	45
2.	Health camps	Examination and Distribution of Free medicine	Munirabad Village	2	160
3.	Ambulance Provision	Provided Ambulance to take care of patients in emergency case under program area.	Hirebaganal Village	1	-
4.	Meeting with the Health functionaries	for smooth Implementation of CSR activities frequent meeting with Government official	Munirabad Village	3	-

Sr. No	Particulars	Description of Activities	Venue	No. of Program	No. of Beneficiaries
Education					
1.	Organize scholarships distribution program:	Scholarship given to toppers student from class 1st to 10th in project area villages	Hirebaganal Village	1	65
2.	School competitions	Organized school Competition Rangoli, Mehandi and Memory test	Kunikere Village	1	20
3.	Distribution Bags, Books etc.,	Given from class 1st to 10th in project area villages	Allanagar Village	1	200
Sustainable Livelihood Program					
1.	Cutting and tailoring	Basic orientation of women's cloth Stitching	Allanagar Village	3	140
2.	Sensitization of Women's group and SHG Formation	Self Help Group Importance and Benefits of SHG Formation & Started Income generation work	Allanagar Village	2	30
Social Issues					
1.	Support to Local programmes	Organizing the Religious program at Hirebaganal Village	Hirebaganal Village	1	1000
2.	Swatch Bharath Abhiyan	Providing Toilets, conducting plantation programme, etc.,	Allanagar Village	3	300
3.	Celebration of National Days	Distributed Sweets and Conducted school competition	Project villages	6	3000
4.	Mass marriages	Financial Assistance to Mass Marriage	Hirebagnalu Village	1	25

Sr. No	Particulars	Description of Activities	Venue	No. of Program	No. of Beneficiaries
Infrastructure Development					
1.	Samudhaya Bhavana	Contributed construction items to Karnataka Electricity Board Samudaya Bhavan at Koppal.	Koppal	1	150
2.	Anjuneya Temple	Roof for Anjuneya Temple at Hirebaganal Village	Hirebaganal Village	1	1500
3.	Facility Provided to Govt. Hospital	Distributed 36 Chairs, LED Lamps and Equipments to Munerabad Govt. Hospital Operation Theater	Munerabad Village	2	--
Others Program					
1.	Liaison	Meeting with the Panchayat members for Sharing the Thakur Industries aspect on Rural development	--	-	-
2.	Exposure visit	Conduction of Exposure visits for farmers and SHG group to understand the New technologies & replicate same in our area.	Hirebaganal Village	3	40
3.	Viilage Utsav	Financial Support to Village for celebration of local Utsav	Hirebagnal Kunikere Allanagar	3	2000
4.	Rural sports	Support to local youth for conducting the Rural sports program	Hirebagnal Hirekasinkandi Allanagar	1	450

8.5.3 Expenditure on ESC Activities

Expenditure on ESC activities incurred during two years by M/s. Thakur Industries is given **Table 8.2.**

Table 8.2: Expenditure Incurred on ESC Activities

Sr. No.	Duration	Total Amount (Rs. In Lakhs)
1.	2016-2017	40.00
2.	2017-2018	15.25
Total		**55.25**

Photographs of various activities carried out under ESC by M/s. Thakur Industries

Roof for Anjuneya Temple at Hirebaganal Village

Distributed note books and other necessary things to Allanagar Govt. School Children's

Distributed 36 Chairs to Munerabad Govt. Hospital

Distributed LED Lamps and Equipments to Munerabad Govt. Hospital Operation Theater

Organized World Diabetic Camp with Arogya Raksha Samiti at Munerabad Village

ಕರ್ನಾಟಕ ಸರ್ಕಾರ

ಗ್ರಾಮ ಪಂಚಾಯತ ಹಿರೇಬಗನಾಳ ದೂರವಾಣಿ ಸಂ: 08539-246003
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ಸಂಖ್ಯೆ : ಗ್ರಾ.ಪಂ.ಹಿ/2018-19   ದಿನಾಂಕ : 15-08-2018

ಮಾನ್ಯ ನಿರ್ದೇಶಕರು,
ಠಾಕೂರ್ ಇಂಡಸ್ಟ್ರೀಸ್
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ವಿಷಯ: ಕಲಕೇರಿ ಗ್ರಾಮದ ಶ್ರೀ ಪತ್ರೇಶ್ವರ ಜಾತ್ರೆಯ ಅಂಗವಾಗಿ ದಿನಾಂಕ:15-08-18 ರಂದು ಜರುಗುವ ಸಾಮೂಹಿಕ ಮದುವೆಗೆ ಧನ ಸಹಾಯ ಮಾಡುವ ಕುರಿತು.

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ಈ ಮೇಲ್ಕಾಣಿಸಿದ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದಂತೆ ತಮ್ಮಲ್ಲಿ ವಿನಂತಿಸಿಕೊಳ್ಳುವದೇನೆಂದರೆ,ಹಿರೇಬಗನಾಳ ಗ್ರಾಮ ಪಂಚಾಯತಿ ವ್ಯಾಪ್ತಿಯಲ್ಲಿಯ ಬರುವ ಕಲಕೇರಿ ಗ್ರಾಮದ ಶ್ರೀ ಪತ್ರೇಶ್ವರ ಜಾತ್ರೆಯ ಅಂಗವಾಗಿ ದಿನಾಂಕ: 15-08-18 ರಂದು ಜರುಗುವ 25 ಜೋಡಿ ಸಾಮೂಹಿಕ ಮದುವೆಗಳಿದ್ದು ಈ ಒಂದು ಪುಣ್ಯ ಕಾರ್ಯಕ್ಕೆ ತಮ್ಮ ಕಂಪನಿಯಿಂದ ಧನಸಹಾಯ ಮಾಡಬೇಕೆಂದು ಈ ಮೂಲಕ ತಮ್ಮಲ್ಲಿ ವಿನಂತಿಸಿಕೊಳ್ಳುತ್ತೇನೆ.

"ವಂದನೆಗಳೊಂದಿಗೆ "

ತಮ್ಮ ವಿಶ್ವಾಸಿ

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ಮಾಜಿ ಅಧ್ಯಕ್ಷರು ಹಾಗೂ ಸದಸ್ಯರು
ಗ್ರಾಮ ಪಂಚಾಯತ ಹಿರೇಬಗನಾಳ

CHEQUE IN FAVOUR OF
JAGADISH KE
9844358353.

give cheque
Prakash M

Financial Assistance to Mass Marriage at Hirebagnalu Village

Contributed construction items to Karnataka Electricity Board Samudaya Bhavan at Koppal

[illegible]

ಸಂ: 31/51   ದಿನಾಂಕ: 23 JUN 2016

[illegible]

1.	2.5 Sq mm PVC Cable	-	10 Bundle
2.	4 Sq mm PVC Cable	-	4 Bundle
3.	12 Watts LED Bulbs (for POP)	-	15 Nos
4.	18 Watts LED Bulbs (for POP)	-	15 Nos
5.	ROMA Switches	-	30 Nos
6.	LED Strip Lights	-	5 Nos
7.	Wall mounted plugs and boards	-	10 Nos

[illegible]

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8.5.4 Proposed CSR Activities and Annual Allocation of Fund

Projects will be implemented based on community priorities and with significant local contributions. This approach will strengthen the groups, empower the members and will develop a high sense of ownership. Action Plan for proposed ESC activities are given in **Table 8.3.**

Table 8.3: Action Plan for proposed ESC with Budgetary provision for Proposed Activities

Sector	Rs in Lakhs		
	1st yr	2nd yr	Total Amount
Plantation in public places, schools, avenue plantation along roads etc.	1.0	1.0	2.0
Skill development	2.5	2.5	5.0
	3.5	3.5	7.0

CHAPTER- 9

ENVIRONMENTAL COST BENEFIT ANALYSIS

FINAL EIA REPORT

CHAPTER – 9

ENVIRONMENTAL COST BENEFIT ANALYSIS

9.1 Introduction

The Environmental cost-benefit analysis or CBA, refers to economic appraisal of policies and projects that have the deliberate aim of improving the provision of environmental services or actions that might affect (sometimes adversely) the environment as an indirect consequence due to increase in annual throughput to the ore beneficiation plant.

In the existing facility itself, the project proponent is proposed for expansion of ore beneficiation. Hence, cost benefit analysis is not applicable, as it is not recommended at the Scoping stage.

CHAPTER- 10

ENVIRONMENTAL MANAGEMENT PLAN

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10.0 ENVIRONMENTAL MANAGEMENT PLAN

10.1 Introduction

The major objective and benefit of utilizing Environmental Impact Assessment in project planning stage itself, is to prevent avoidable losses of environmental resources and conservation of the same to the maximum extent and values as a result of Environmental Management. The Environmental Management includes protection/mitigation/enhancement measures to be adopted by the project proponents, as well as suggests revision of project site or operation to avoid adverse impacts or often additional project operations may have to be incorporated in the conventional operation.

The industrial development in the study area needs to be intervened with judicious utilization of non-renewable resources of the study area and with in the limits of permissible assimilative capacity. The assimilative capacity of the study area is the maximum amount of pollution load that can be discharged in the environment without affecting the designated use of that area and is governed by dilution, dispersion, and removal of pollutants due to Physico-chemical and biological processes. The Environment Management plan (EMP) is required to ensure sustainable development in the study area of the proposed plant site, hence it needs to be an all encompassive plan for which the proposed industry, Government, Regulating agencies like pollution control Board working in the region and more importantly the affected population of the study area needs to extend their cooperation and contribution. It has been evaluated that the study area has not been affected adversely and is likely to get new economical upliftment. The affected environmental attributes in the region are air quality, soil, land use, ecology, public and public health.

The Management Action plan aims at controlling pollution at the source level to the possible extent with the available and affordable technology followed by treatment measures before they are discharged.

The Environmental Management aims at the preservation of ecosystem by considering proposed establishment of pellet plant within the existing premises of integrated steel plant pollution abatement has become an integral part of planning and design along with Techno economic factors.

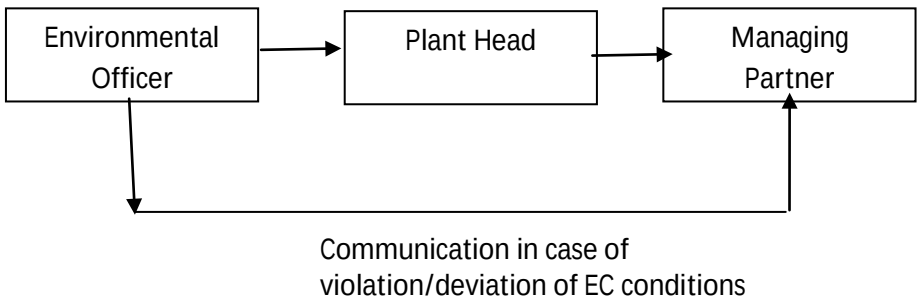
Corporate Environment Policy:

The PP laid down the following corporate environmental policy for the company. The policy has been placed before the partners of the company for including the same in the EMP. The crucks of the policy is here under.

· integrate the consideration of environmental concerns and impacts into our decision making and activities,
- minimise our waste and then reuse or recycle as much of it as is possible.
- minimise energy and water use within our buildings and processes in order to conserve supplies and minimise the consumption of natural resources.
- train, educate and inform our employees about environmental issues that may affect their work,
- promote environmental awareness among our employees and encourage them to work in an environmentally responsible manner,
- communicate our environmental commitment to clients, customers and the public and encourage them to support it
- where required by legislation or where significant health, safety or environmental hazards exist, develop and maintain appropriate emergency spill response programmes.

Reporting Mechanism:

At present, the PP has only the existing project as their mineral processing business. The total manpower for the project is 50 nos. At present environmental monitoring is being carried out by the environmental consultant and the day by day environmental issues particularly in the operations (equipment, recycling of water, slime handling and disposal for use) are being looked after by the plant head supported by Environmental Officer. The reporting mechanism in case of violation or any deviation in the implementation of environmental concerns /existing environmental conditions as below.



10.2 Environmental Management during Operation Stage

10.2.1 Air Environment

The negative impact is reversible and is less significant when proper standards are followed. The mitigation measures needs to be adopted during the operation stage to control the negative impacts on air environment of the surrounding of the project area given below:

- The raw material stock pile will be sprinkled with water to avoid dust escape due to wind,
- Feed point to the belt conveyor will be provided with mist spray arrangement,
- Regular water spraying shall be adopted at loading and unloading points, storage yards and near solid waste dumping yards which will reduce fugitive emissions due to movement of truck.
- All the internal roads shall be asphalted to reduce the fugitive dust due to truck movement.
- Feed belt conveyor will be covered throughout the length so as to avoid wind coming in contact with the dry raw material,
- Wind barricades with sufficient height shall be erected around feed hopper area,
- Feed hopper will be provided with **"Dust Hood"** to avoid dust dispersion from the feed point. Tipper bodies will be checked for any leakages through the body and corrective action will be taken.
- Entire beneficiation process will be closed circuit (in-house) and wet in nature, hence no air pollution from the plant,
- As the processed ore will have moisture content, transportation of the same through public roads will not generate dust,
- Ore carrying trucks will be effectively covered with tarpaulin,
- Overloading of tippers will be avoided so that there is no spillages on the public road and wastage of non-renewable resources,
- Transport vehicles will be regularly checked for their environmental fitness like pollution under control and fitness etc,
- Development of Green belt with tall growing thick foliage plants species will be developed around the plant premises to arrest noise transmission and dust dispersion,
- For safety of workers at site, engaged at strategic locations/dust generation points Personnel Protective Equipment (PPE) would be provided and ensured for using the same,

- ø Environmental monitoring of air quality to take mid-course correction, if required to keep the pollution constituent with-in the permissible limits always.

10.2.2 Water Environment

The water requirement for proposed expansion will be fulfilled by Borewell within the project site and about 3150 cum/day. The water will be used mainly for washing purposes. The process water will be recycled and reused. There will be labour workers quarters for 30 persons in the project site towards upwind direction. The wastewater generated from canteen and labour workers quarters will be treated in the CPCB approved septic tank and soak pit.

The pollutants present in the waste water will be reduced to acceptable levels by adoption of the following schemes

- Ø The processed water will be recycled & reused to maximum extent (70%) through use of Highrated thickener
- Ø Treating the domestic sewage in Soak pit and septic tank.
- Ø Storm Water Drainage –
  - v Storm water drainage system shall consist of well-designed open surface drains network so that all the storm water is efficiently drained off without any water logging.
  - v Based on the rainfall intensity of the proposed area drainage system shall be designed on the basis of the storm water flow and the depth available at the out fall point so as to ensure no back flow.
  - v Storm water drains shall be provided on both sides of roads. Rectangular drains shall be provided based on the quantity of storm water to be conveyed and depth limitations.

10.2.3 Noise Environment

Various measures has already undertaking to reduce noise pollution include reduction of noise at source, provision of acoustic lagging for the equipment and suction side silencers, selection of low noise producing equipment, isolation of noisy equipment from working personnel. In some areas where due to technological process, it is not feasible to bring down the noise level within acceptable limits, personnel working in these areas will be provided with noise reduction aid such as ear muffler and also the duration of exposure of the personnel will be limited as per the norms.

- Necessary steps will be taken to reduce noise generation from noise generating sources.
- A green belt will be made by selecting thick foliage and tall growing plants around the plant premises which will act as acoustic barriers in arresting noise transmission,
- Providing PPE (Personal Protective Equipment) to the personnel who are exposed continuously to the high noise zone/ operation area.
- Display of sign boards at high noise generation zones.
- Corrective & preventive maintenance of plant & machinery including transport vehicles.
- Providing rubber lining at screening decks to reduce noise generation,
- Transport vehicles engaged are ensured for not over speeding, their fitness certificate, pollution under control (PUC) certificate etc.

10.2.4 Solid Waste & Hazardous Waste Generation

There is no significant production Solid and Hazardous Waste from the Proposed expansion project. The solid waste generated will be dry tailings which will be sold to nearby cement and brick industries. The hazardous waste will be used oil from D.G. Sets, it will be collected and stored in drums/ barrels and disposed to KSPCB authorized reprocessors. Any other solid waste generated from the facility will be disposed off by using proper disposal mechanism in a scientific manner.

The proposed Solid waste and Hazardous waste generation from the plant is given in **Table 10.2** and **10.3.**

Table 10.2: Solid Waste Management

Plant	Waste	Quantity	Utilization Plan
Beneficiation Plant	Domestic Effluent	--	The process waste water will be recycled back in the process and the domestic waste water will be disposed off to CPCB approved soak pit and septic tank.
	Dry Tailing	0.8 MTPA	Entire solid waste shall be sold to Brick Manufacturing / Cement Industry units.

- Organic waste from workers quarters & canteen will be composted with suitable composting technique and the general inorganic solid waste shall be disposed to municipal authorities.

- Hazardous waste (Used Oil) generated from D.G Sets will be collected and stored in barrels or drums and later handed over to Karnataka State Pollution Control Board (KSPCB) authorized reprocessors.

Table 10.3: Hazardous Waste Management

Plant	Waste	Quantity	Utilization plan
Generator/ Lubricants	Used oil	100-200 KL per year	Shall be sold to the approved/authorized recycler/reprocessors.

- The dust particles from air pollution control equipment will be collected and reused back in the process.

10.2.5 Biological Environment

10.2.5.1 Green belt

Adequate green belt will be provided all around the plant and inside the plant premises in addition to already existing green belt. Overall about 33% of the plant area will be covered under green belt development and mostly with local tree species.

10.2.5.2 Ecological Aspects

The following measures are proposed to have minimum impact on ecology of the Project area:

- Zero discharge of wastewater from the project during the operation stage.
- Continuing greening efforts in and around the project site.

- Conservation of existing vegetation and afforestation are covering larger areas near and around existing project area.

Table 10.4: Recommended Plant Species for Green Belt Development

Plant Species	Habit	Tolerance limit	Stomatal Index	Mode of Regeneration
Acacia auriculiformis	Tree	Tolerant	10.9	Seeds
Azadirachta indica	Tree	T	29.2	Seeds
Bougainvillea spectabilis	Shrub	T	32.53	Cutting
Ixora rosea	Small tree	T	20.30	Stem cutting
Lawsonia inermis (Mendi)	Shrub	T	17.0	Seeds /stem cutting
Peltophorum pterocarpum	Tree	T	16.68	Seeds
Polylathia longifolia	Tree	T	22.27	Seeds
Sesbania sesban	Shrub	T	19.2	Seeds
Tamarindus indica	Tree	T	18.4	Seeds
Tectona grandis	Tree	T	23.48	Seeds
Terminalia alata	Tree	T	NA	Seeds /stem cutting
Thespesia populnea	Tree	T	29.81	Seeds /stem cutting

10.3.6 Action Plan and Management System

Management has proposed the following action plan for various environmental, social and economical issues as detailed in the below **Table No. 10.5.**

Table No. 10.5: Action Plan for various Environmental, Social and Economical Issues

Sr. No.	Type of Pollutions	Action Plan	
		During Construction Phase	During operation Phase
1.	Air Pollution	· Constructions materials will be stored in covered go down or enclosed spaces to prevent the windblown fugitive emissions. · Stringent construction material handling /	· Stack/Air/Fugitive Emission monitoring will be carried-out to ensure proper functioning of different major pollution control

		overhauling procedures will be followed. · Truck carrying soil, sand, stone dust and stone will be ensured for covering to avoid spilling and fugitive emissions. · It will be ensured that all construction equipment and vehicles are in good working conditions, properly tuned and maintained to keep emission within the permissible limits.	equipment as per statutory requirement. · Green barriers with tall growing thick foliage plants species will be developed around the plant premises to arrest noise transmission and dust dispersion. · Environmental monitoring of air quality to take mid-course correction, if required to keep the pollution constituent with-in the permissible limits always. · Entire beneficiation process will be closed circuit (in-house) and wet in nature, hence no air pollution from the plant.
2.	Noise Pollution	· All the construction work will be carried out during the day time. · Will be ensured that all the construction equipment and vehicles used are in good working condition, properly lubricated and	· Providing PPE (Personal Protective Equipment) to the personnel who are exposed continuously to the high noise zone/ operation area. · Corrective & preventive

		maintained to keep noise within the permissible limits and engines tuned off when not in use to reduce noise. · Personnel Protective Equipments (PPE) such as earplugs, earmuffs, safety shoes, eye glasses, etc will be to construction personnel exposed to high noise levels as preventive measures and are strictly adhered to minimize/eliminate any adverse impact.	maintenance of plant & machinery including transport vehicles. · Transport vehicles engaged are ensured for not over speeding, their fitness certificate, pollution under control (PUC) certificate etc. · Providing rubber lining at screening decks to reduce noise generation. · All the equipment in different new units be designed /operated in such a way that the noise level shall not exceed 85 dB (A) as per statute.

3.	Water Pollution	· All the washable construction material will be stored under sheds or enclosed space by fencing it with brick or earth in order to prevent spillage into the drainage network, so that the same does not find its way into the surface water runoff. · Sources of domestic waste water are mainly from temporary workers quarters, canteen, toilets, and bathrooms will be disposed off to septic tank and soak pit.	· Construction of parapet wall of appropriate dimension all along the toe of ore stock. · Regular monitoring and analyzing the quality of water. · Systematic drainage system for diverting the surface run-off during monsoon. · The company has proposed to take up extensive afforestation works, rain water harvesting system and water shed management in the area.
4.	Soil Pollution	· Top soil will be removed and stored in closed shed.	· Regular monitoring will be conducted.
5.	Solid & Hazardous Waste Management	· Part of Construction wastes will be reused for filling and the rest will be disposed off to authorized recyclers.	· Shall be completely recycles as water is mainly used for cooling purposes. There is no trade effluent generation. · Used oil will be sold to authorized reprocessor/recycler. · Domestic waste water will be treated in the CPCB approved septic tank and soak pit.

6.	Green Belt Development	· Avenue plantation will be taken up and plantation around the property will be initiated.	· 33% of the total area 170.55 Acres (69.0 ha) will be reserved for Green Belt Development. · A six monthly review of the health of the plants planted is being carried out. · Regular watering, manuring and hoeing of the area of the plantation are carried out.
7.	Occupation Health & Safety	· Preliminary screening of all the employees for their baseline health condition. · Medical evaluation of workers condition before joining to the duty. · Educating the workers w.r.t. the safety conditions & occupational health diseases.	· Database will be created for individual worker and will be updated regularly to compare health status. · Doctor specialized in Occupational health will be appointed for special needs · Regular health checkups for all the employees will be conducted.
8.	Road infrastructure	· Mud road will be creating to transport construction material to the site.	· Development of Approach Roads for all the identified Villages.

9.	Socio-Economic Development	· Additional 55 employment will be provided for · Water requirement will be fulfilled by Borewell within the project site for drinking and construction purpose.	· In 148 employments, priority will be given to local eligible population. · Once in six months medical services will be provided in the nearby villages. · Involving Women in Plantation Programme. · Drinking water will be provided to the nearby villages, · Sanitary facilities will be given to nearby schools.
10.	Emergency Preparedness	· Training to all unit personnel in fire fighting.	· An emergency organization including key personnel has been established. · A control room equipped with all emergency equipment and communication facilities has been established.

CHAPTER 11

SUMMARY & CONCULSION

FINAL EIA REPORT

CHAPTER-11

11.0 SUMMARY and CONCLUSION

11.1 Introduction

M/s. Thakur Industries operating an ore beneficiation plant with throughput capacity of 0.6 million tons per annum (m.t.p.a.) over an area of 17.50 Acres of Hirebaganal Village, Koppal Taluk & District, Karnataka. Accordingly Environmental Clearance was obtained from Ministry of Environment, Forests & Climate Change (MOEF & CC), New Delhi, vide letter ref no. J-1015/257/2010-IA.II (M), dated 19th April, 2012. Consent for Establishment (CFE) for setting up of Iron Ore Beneficiation Plant of 0.6 m.t.p.a was obtained from Karnataka State Pollution Control Board (KSPCB), vide letter ref. no. 20/PCB/MIN/CFE/2012-13/238 dated 28th May 2012.

Now the project proponent proposes to enhance the Ore beneficiation throughput capacity from 0.60 m.t.p.a to 1.50 m.t.p.a by adding additional beneficiating equipments in the existing facility covering an area of 17.5 Acres of Sy. Nos. 234/B, 235/B, 235/C, 234/2 & 234/3 Hirebaganal Village, Koppal Taluk & District, Karnataka.

Accordingly, Terms of Reference (ToR) from MOEF & CC, for the propose expansion obtained vide letter ref no. J-11011/208/2016-IA.II (I), dated 19th September 2016.

M/s. Thakur Industries, engaged the services of **METAMORPHOSIS^{SM} Project Consultants Pvt. Ltd.**, for preparation of Environmental Impact Assessment to seek Environmental Clearance from Ministry of Environment, Forests & Climate Change. This DRAFT EIA Report submitted to Karnataka State Pollution Control Board (KSPCB) for carrying out Public Consultation as per the TOR condition no. 8.0.

The proposed expansion activity is categorized as **'Category – A'** project as per Environmental Impact Assessment (EIA) Notification 2006 and subsequent amendments.

11.2 Site Location and Accessibility

The project site is located at survey nos. Sy. Nos. 234/B, 235/B, 235/C, 234/2 & 234/3 of Hirebaganal Village, Koppal Taluk and District, Karnataka State. Total land acquired 17.50 acres. The Project area is covered in survey of India Topo sheet no. 57 A/3.

Agricultural land is covered towards North, South and East side of the project site and there is road connectivity from Kunikere to Hirebaganal towards West side of the project site.

Accessibility - The accessibility and transportation of heavy equipment to site by road or rail is easy. No problem is envisaged in accessibility and transportation of heavy equipment to site by road or rail. The nearest railway station is Ginigera which is about 6.0 Km from the site. Road connectivity is through NH-63 located at distance of 2.5 Km from the plant.

11.3 Topography

The entire 17.50 acres of land is private and converted for industrial use & designated as the core zone, is a plain/plateau with an altitude of 517 m above MSL. There are no water courses within the project site. This area is totally converted for industrial purpose. No forest land is involved.

11.4 Drainage

The drainage pattern of the area is dendritic to sub-dendritic in nature. The nallahs are seasonal in nature and remain dry most of time excepting during the short period of actual rainfall. There are no perennial sources of water in core zone.

11.5 Process

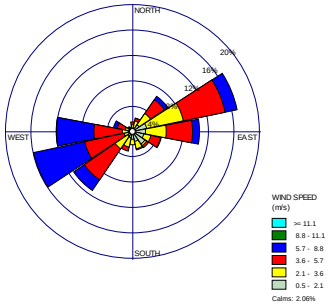
Inferior sources of iron ore generally required beneficiation. Beneficiation," means the following as applied to iron ore: milling (crushing and grinding); washing; filtration; sorting; sizing; gravity concentration; magnetic separation; flotation; and agglomeration. Flotation is primarily used to upgrade concentrates from magnetic separation by reducing the silica content of the concentrate.

11.6 Waste Disposal

Processed water will be recycled in the process itself, domestic waste water will be treated in the CPCB approved septic tank and soak pit. The solid waste which is in the form of dry tailings will be sold to cement/brick industries as raw material. Workshop hazardous waste (used oil, cotton waste, filters etc) will be disposed to pollution control board approved vendors.

11.7 Employment Potential

The proposed expansion project will create additional employment potential up to 55 people and preference will be given to local community.



11.8 Environmental Description

11.8.1 Meteorology

Study Period

Post-Monsoon 2016

Predominant wind direction is NE to SW.

11.8.2 Baseline Ambient Air Quality

The design of monitoring network in the air quality study program was based on topography/terrain of the study area, human settlements, Wind Pattern, representation of regional background levels, accessibility of monitoring sites, resource availability and as per CPCB guidelines.

The scenario of the existing Ambient Air Quality in the study region has been assessed through a network of 6 Ambient Air Quality locations in the buffer zone and 3 monitoring location within the project site. The data thus obtained is considered for preparing this report. Summary of Ambient Air Quality is given in **Table 11.1.**

Table 11.1: Summary of Ambient Air Quality

Code	Name of Sampling Location	PM_{10}	$PM_{2.5}$	SO_2	NO_X
Core Zone					
FA-1	Near Office	24.0	23.2	63.4	19.5
Buffer Zone					
A-2	Hirebaganal Village	24.4	23.3	56.0	18.3
A-3	Kunikere Village	23.5	23.5	55.6	19.3
A-4	Belanalu Village	22.8	24.0	56.0	19.8
A-5	Tenakanakallu Village	23.1	23.8	55.9	20.8
A-6	Kanakapura Village	23.3	23.4	55.5	21.0
A-7	Hirekasinkandi Village	25.4	24.2	56.1	21.6

The ambient air quality observed during the study period is well within the prescribed National Ambient Air Quality Standards prescribed by CPCB. However, the higher

concentration at few villages is due to movement of public and load/empty tippers plying due to many industries located in the buffer zone and also local activities.

11.8.3 Ambient Noise Levels

Ambient noise monitoring was carried out during post-monsoon 2016 at various locations both in core & buffer zone. Noise monitoring data (baseline) in the study area is given in **Table 11.2.**

Table No: 11.2: Noise data

Villages / Parameters	Day (Min)	Day (Max)	Night (Min)	Night (Max)
Near Office	60.8	68.3	49.7	54.8
Main approach Road	68.0	76.9	51.6	56.2
Crushing and Screening Area	67.2	79.4	49.8	52.3
Unloading/ loading /Ore Stock area	66.9	75.6	51.3	53.8
Hirebaganal Village	43.5	52.3	36.7	38.7
Kunikere Village	46.7	55.6	37.2	39.8
Belanalu Village	44.8	52.3	36.7	38.6
Tenakanakallu Village	45.6	54.9	35.8	37.9
Kanakapura Village	44.6	55.6	36.6	38.2
Hirekasenkandi Village	43.8	49.1	39.8	41.3

It is observed that the noise values obtained were within the prescribed Ambient Air Quality Standards with respect to Noise. The noise observed during the monitoring in the villages was mainly due to movement of public and other transport.

11.8.4 Water Quality

The water samples were collected from the available ground water and surface water sources and have been analyzed to assess the quality of water and any impacts on the quality of water due to the proposed Expansion project. The surface and ground water quality details are given in **Table 11.3 & Table 11.4**

11.8.4.1 Surface Water Quality

Tungabhadra dam which is at an aerial distance of about 7.0 km towards south-east direction and Mundragi surface water which is 6.5 m towards South-South-west direction from the project site. However, the Tungabhadra back water is at an aerial distance of 2.5km dried during the baseline data collection period.

Table No: 11.3: Summary of surface Water Quality

Unit mg/l

Sr. No.	Parameters	Protocol	Unit	Result	Standard IS 10500: 2012 (2nd Revision)	
					Acceptable Limit	Permissible Limit
A.	**PHYSICAL PARAMETERS**					
1.	Colour	IS:3025 (Part 4)	Hazen	BDL	5	25
2.	pH	IS:3025 (Part 11)	--	7.4	6.5 to 8.5	
3.	Turbidity	IS:3025 (Part 10)	NTU-	BDL	1	5
B.	**CHEMICAL PARAMETERS**					
4.	Chlorides, as Cl	IS:3025 (Part 32)	mg/L	45.77	250	1000
5.	Total Hardness as $CaCO_3$	IS: 3025 (Part 21)	mg/L	204.71	300	600
6.	Calcium as Ca	IS 3025 (Part 40)	mg/L	13.69	75	200
7.	Magnesium as Mg	IS 3025 (Part 46)	mg/L	41.45	30	100
8.	Total Dissolved solids,	IS:3025 (Part-16)	mg/L	448.8	500	2000
9.	Fluorides as F	IS 3025 (Part 60)	mg/L	0.6	1	1.5
10.	Sulphate, as SO_4	IS 3025 (Part 24)	mg/L	65.16	1	1.5
11.	Nitrate as NO_3	IS 3025 (Part 60)	mg/L	0.58	45	--
12.	Iron as Fe	IS 3025 (Part 53)	mg/L	BDL	0.3	1
13.	Alkalinity as $CaCO_3$	IS:3025 (Part 23)	mg/L	190	200	600
14.	Dissolved Oxygen (DO)	IS:3025 (Part 38)	mg/L	7.6	--	--
15.	Biochemical Oxygen Demand	APHA 22nd Ed 4500-	mg/L	BDL	Not More Than 10	--
16.	Chemical Oxygen Demand	IS:3025 (Part 58)	mg/L	BDL	Not More Than 50	--
17.	Conductance	IS:3025 (Part 14)	µS/cm	693	2000	
C.	**MICROBIOLOGICAL PARAMETERS**					
18.	Coliform organism/100ml	IS:1622-1981	MPN	<2	< 10	
19.	E. Coli Bacteria/100ml	IS:1622-1981	--	Not Detected	Shall not be detected in any 100 ml sample.	

11.8.4.2 Ground Water Quality

Ground water samples were collected to study the physico-chemical properties including micro-biological parameters. Accordingly, one bore well water samples were collexted at Project Site, Halavarti Village, Hirebaganal Village Bore and analyzed. The analysis summary report is given in **Table 11.4.**

Table No: 11.4: Summary of Ground Water Quality

Unit mg/l

Sr. No.	Parameters	Protocol	Unit	Result	Standard IS 10500: 2012 (2nd Revision)	
					Acceptable Limit	Permissible Limit
A.	**PHYSICAL PARAMETERS**					
1.	Colour	IS:3025 (Part 4)	Hazen	1	5	25
2.	pH	IS:3025 (Part 11)	--	7.4	6.5 to 8.5	
B.	**CHEMICAL PARAMETERS**					
3.	Chlorides, as Cl	IS:3025 (Part 32)	mg/L	54.6	250	1000
4.	Total Hardness as $CaCO_3$	IS: 3025 (Part 21)	mg/L	235.52	300	600
5.	Calcium as Ca	IS 3025 (Part 40)	mg/L	54.17	75	200
6.	Magnesium as Mg	IS 3025 (Part 46)	mg/L	11.62	30	100
8.	Total Dissolved solids,	IS:3025 (Part-16)	mg/L	488	500	2000
9.	Fluorides as F	IS 3025 (Part 60)	mg/L	0.55	1	1.5
10.	Sulphate, as SO_4	IS 3025 (Part 24)	mg/L	61.1	1	1.5
11.	Nitrate as NO_3	IS 3025 (Part 60)	mg/L	17.8	45	--
12.	Iron as Fe	IS 3025 (Part 53)	mg/L	0.12	0.3	1

13.	Alkalinity as $CaCO_3$	IS:3025 (Part 23)	mg/L	179.3	200	600
14.	Conductance	IS:3025 (Part 14)	µS/cm	865	2000	
C.	**MICROBIOLOGICAL PARAMETERS**					
15.	Coliform organism/100ml	IS:1622-1981	MPN	3	< 10	Absent
16.	E.Coli Bacteria/100ml	IS:1622-1981	--	Absent	Absent	Absent

11.8.4.3 Soil Quality

Seven locations were selected for analyzing the soil quality status both in core & buffer zone.

The findings are given in **Table 11.5.**

Table 11.5: Summary of Soil Quality Analysis

Sr. No.	Parameters	Unit	Result
1.	pH	--	7.2
2.	Conductivity	µmhos/cm	226.5
3.	Potassium, as K	mg/100gm	0.41
4.	Sodium, as Na	mg/100gm	1.3
5.	Chlorides, as Cl	ppm	Nil
6.	Nitrogen	Kg/Hec	5.5
7.	Phosphorous	Kg/Hec	2.8
8.	Organic Carbon	%	6.0
9.	Calcium, as Ca	ppm	7.7
10.	Sulphate as SO4	ppm	Nil
11.	Magnesium, as Mg	ppm	58.8
12.	Texture	--	Silty Loam
	a. Sand content	%	17
	b. Silt content %	%	45.6
	c. Clay content %	%	21.1
13.	Sodium Absorption Ratio (SAR)	--	0.2

11.8.4.4 Socio Economics

There is no human habitation in the core zone. The socio economic condition is summarized as below. Population Details at study area is given in **Table 11.6.**

Table 11.6 Population Details

Total Population	Total Literate Population	Total Non-Literate Population	Working Population	Non working population
3727244	2184506	1542738	1734207	1993037

11.1.1 Biological Environment

There are no endemic or endangered species found in the study area.

11.9 Environmental Impacts and Management Plan

11.9.1 Air Environment

Proponent proposes to enhance beneficiation plant capacity within the existing plant premises covering an area of 17.50 Acres (7.08 ha) at Hirebaganal Village, Koppal Taluk, Koppal District. Main source of air pollution in a plant is from various works in the plant. Main sources of fugitive emissions are raw material unloading, raw material handling, material transfer points, storage bin etc. in addition to this, dust generation due to operation of HEMMs in the project site and tipper movement on the road.

11.9.1.1 Mitigation Measures

Management proposes the following effective control measures;

- The raw material stock pile will be sprinkled with water to avoid dust escape due to wind,
- Feed point to the belt conveyor will be provided with mist spray arrangement,
- Feed belt conveyor will be covered throughout the length so as to avoid wind coming in contact with the dry raw material,
- Wind barricades with sufficient height shall be erected around feed hopper area,
- Feed hopper will be provided with **"Dust Hood"** to avoid dust dispersion from the feed point. Tipper bodies will be checked for any leakages through the body and corrective action will be taken.

- Entire beneficiation process will be closed circuit (in-house) and wet in nature, hence no air pollution from the plant,
- As the processed ore will have moisture content, transportation of the same through public roads will not generate dust,
- Ore carrying trucks will be effectively covered with tarpaulin,
- Overloading of tippers will be avoided so that there is no spillages on the public road and wastage of non-renewable resources,
- Transport vehicles will be regularly checked for their environmental fitness like pollution under control and fitness etc,
- Green barriers with tall growing thick foliage plants species will be developed around the plant premises to arrest noise transmission and dust dispersion,
- For safety of workers at site, engaged at strategic locations/dust generation points Personnel Protective Equipment (PPE) would be provided and ensured for using the same,
- Environmental monitoring of air quality to take mid-course correction, if required to keep the pollution constituent with-in the permissible limits always.

11.9.2 Noise Environment

The main sources of noise in the plant are classified into following types:

- Operation of Plant
- Operation of Heavy Earth Moving Machinery (HEMMs)
- Noise due to transportation

11.9.2.1 Mitigation Measures for Noise Control

- Necessary steps will be taken to reduce noise generation from noise generating sources.
- A green belt will be made by selecting thick foliage and tall growing plants around the plant premises which will act as acoustic barriers in arresting noise transmission,
- Providing PPE (Personal Protective Equipment) to the personnel who are exposed continuously to the high noise zone/ operation area.
- Display of sign boards at high noise generation zones.
- Corrective & preventive maintenance of plant & machinery including transport vehicles.
- Providing rubber lining at screening decks to reduce noise generation,

- Transport vehicles engaged are ensured for not over speeding, their fitness certificate, pollution under control (PUC) certificate etc.

11.9.3 Water Environment

The impact on water environment has been considered under the following heads:

- Water consumption
- Impact on ground water
- Impact on surface water bodies
- Storm water management

The water requirement for the proposed expansion is 3150 m^3/day. However, consumptive consumption will be only 900KLD since the process water will be re-cycled back in the process. There will not be any impact to the ground water through seepage as there are no toxic elements in the raw material.

11.9.3.1 Mitigation Measures of Water Pollution

The chemical analysis of the ore does not show any toxic substance, which can dissolve and pollute water quality.

- Construction of parapet wall of appropriate dimension all along the toe of ore stock,
- Contour trench of appropriate width and depth all along the ore stock,
- Systematic drainage system for diverting the surface run-off during monsoon.
- Plantation of local varieties of species, so that there will be fast and healthy growth of vegetation in addition to the existing plantation carried out.
- Regular monitoring and analyzing the quality of water
- The process water will be recycled and reused by adopting 3Rs (Reduce, Recycle & Reuse).

11.9.4 Land Environment

Proposed expansion of the plant and its allied activities will be restricted in an area of 17.50 acres which is private and converted for industrial purpose. There will not be any impact due to expansion of the project to buffer zone land use.

11.9.4.1 Disposal of Industrial solid waste

The dry tailings generated from the filter press shall be stored in the area designated and will be dispose to nearby cement and brick manufacturing units.

11.9.5 Green belt development

Plantation is already carried along the periphery of the plant premises with tall growing having thick foliage plant species to arrest the dust generated in the plant premises.

However, two more rows of plantation all around the plant remises will be carried out with the species in consultation with the local forest department.

All effort will be made to improve the survival rate of the saplings and their healthy growth will be taken care of by simple methods like proper watering, fencing and after care.

11.9.5 Resettlement and Rehabilitation

The proposed increase in annual throughput of ore will be restricted to already acquired and converted land of 17.5 acres. Hence R & R is not applicable.

11.9.6 Biological Environment

There is no adverse impact on Flora and Fauna in the area due to proposed expansion of beneficiation capacity.

11.9.7 Demography & Socio Economic Environment

The objective is to demonstrate the range of potential impacts on communities and families by the project. The actual impacts experienced at a given project site will depend on a variety of factors.

The impact from the proposed expansion of beneficiation plant capacity on the surrounding community will be positive in nature in improving the Quality of Life (QoL), economic status of the local people and infrastructure in buffer zone.

11.9.7.1 Social Corporate Responsibility

The management proposes to increase literacy levels within buffer zone, by way of support to school going children through free distribution of books and by way of supporting through transportation to school going children.

Management will actively participate in the efforts by the local self help groups/bodies to improve the health and social status of the population living in the buffer zone villages. Management proposes to extend the medical assistance to the local needy people by engaging a part time Medical Officer on a regular basis.

However, management allocates necessary funds towards community developmental activities in the buffer zone villages to improve the facilities such as school, health, road, infrastructure, etc., once the plant start its operation.

11.10 Other Tangible Benefits

The proposed project is likely to have other tangible benefits as given below.

- About additional 55 direct employments will be generated in addition to the existing 50 employment.
- About 500-600 persons are depending upon the project.
- Indirect employment opportunities to local people in contractual works like housing construction, transportations, supply of goods and services to the project and other community services. Local villagers will be preferred for the above works.
- 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.
- The State Government will also benefit directly from the proposed project, through increased revenue from royalties, excise duty.

11.11 Occupational Health and Safety

- Preliminary screening of all the employees for their baseline health condition.
- Medical evaluation of workers condition before joining to the duty.
- Educating the workers w.r.t the safety conditions & occupational health diseases.
- Regular health checkups for all the employees will be conducted.

- Database will be created for individual worker and will be updated regularly to compare health status.
- Doctor specialized in Occupational health will be appointed for special needs.

11.12 Post Project Monitoring

The company is already undertaking post project monitoring as per MoEF & CC and CPCB guidelines for all the environmental attributes and reports are being regularly submitted.

11.13 Conclusion

It can be concluded that there would be negligible impact in the buffer zone due to the proposed increase in annual throughput to the beneficiation plant as the most of the process is wet in nature. The project will contribute to the socio-economic development, strengthening of infrastructural facilities like medical, educational etc. The plant will be operated keeping **"Sustainable Development"** of the region in mind.

- The plant proposed to adopt "**ZERO DISCHARGE**" principle through reuse and recycle of non-renewable resources and also to minimize the impact on environment.
- The management will be contributing specific budgetary cost allocation towards environmental protective measures.
- Management will also be responsible for creating a database that would include medical evaluation of the workers from time to time for which Doctors specialized in Occupational Health will be appointed.
- Necessary Education and Training with respect to safety conditions and occupational hazards will be imparted from time to time.
- About 2.5% of the project cost will be earmarked towards Enterprise Social Commitment under CSR base on the public hearing issues.
- Environmental monitoring is a successful tool for the management for implementation of adequate & effective environmental measures. It also helps the management to take mid course correction, if required based on the environmental monitoring results.

Considering the above aspects, request Hon'ble EAC to recommend Environmental Clearance for the proposed *"**Ore Beneficiation Plant**" in this under developed district of Karnataka.*

CHAPTER- 12.0

DETAILS OF CONSULTANTS

FINAL EIA REPORT

CHAPTER – 12

12.0 DETAILS OF CONSULTANTS

EIA Consultant: **METAMORPHOSIS[SM] Project Consultants Pvt. Ltd., BENGALURU.**
NABET Accreditation: NABET/EIA/1518/RA 014 valid upto 30th November 2018.

The details of the EIA Co-ordinator and Functional Area Experts involved in the project, given in **Table 12.1** and signature of the all the experts is enclosed as **Annexure XVII.**

Table 12.1: Details of the EIA Co-ordinator and Functional Area Experts

Sr. No.	Name of the Expert/s	Functional Area/s
Name of the EIA Co-ordinator		
1.	Dr. Shanth A. Thimmaiah	
In-House Functional Area Experts		
1.	Dr. Shanth A. Thimmaiah	Air Pollution Control (AP), Air Quality Modeling (AQ), Water Pollution Control (WP) and Socio-Economics (SE).
2.	Mr. Kantharaj K.	Hydrology, ground water & conservation (HG) and Geology (GEO).
3.	Mrs. Sreelekha K.S	Land Use (LU)
4.	Mr. Sreekantan Nair. P	Ecology & Bio-diversity (EB), Risk Assessment (RH) and Solid & Hazardous waste (SHW).
5.	Ms. Rekha M J	Air Quality Modeling
Empanelled Functional Area Experts		
1.	Dr. Harsha Vardhan	Noise & Vibration (NV), Risk Hazardous (RH) & Solid Waste Management(ISW).
2.	Dr. Nagaraj B.C	Soil Conservation(SC), Ecology & Bio-diversity(EB).
3.	Dr. Venkat Reddy	Hydrology, ground water & conservation (HG) and Geology (GEO).