

Executive Summary of Draft Environmental Impact Assessment Report

Proposed Ilmenite Mining at Reel, Undi & Warvade, Tal. Ratnagiri, Dist.: Ratnagiri

Baseline Monitoring:
Summer - 2016

by

Indian Garnet Sand Company Ltd.



September - 2016

Environmental Consultant: Aditya Environmental Services Pvt. Ltd., Mumbai

QCI- NABET Accredited EIA Consultant

www.aespl.co.in

1 Introduction

Demand of titanium and its compounds is ever increasing. Nearly 95% of the Ilmenite is used for production of titanium dioxide, a white pigment and rest to produce titanium metal, titanium based chemicals, welding rod coatings, fluxes and other miscellaneous products.

Ilmenite is a rare mineral found principally in coastal regions of Tamil Nadu, Andhra Pradesh, Orissa, Kerala and Maharashtra.

Considering the usefulness, export market and the consequent potential for foreign exchange earnings, the Government felt the additional need of any properly conceived project for exploitation of Ilmenite by Private Entrepreneurs, as an asset in the industrial sector of India.

As a result, Indian Garnet Sand Co. (P) Ltd., Ratnagiri have applied for 6 leases in Ratnagiri district and Department of Industries, Energy and Labor, Government of Maharashtra had issued precise lease area letters for 6 leases viz, Undi, Reel, Warvade, Kalbadevi, Pethpurngad and Gaonkhadi. Out of 6, first three (from north to south) viz, Undi, Reel and Warvade leases are situated along the coastline of respective villages, one after other thus, these can be called as 'Contiguous leases'. Fourth one called Kalbadevi is single lease whereas, Pethpurngad and Gaonkhadi are situated on respective banks of Purngad creek (Pethpurngad on north bank and Gonkhadi is on south).

Indian Garnet Sand Co. (P) Ltd., (IGSC) has been incorporated on 10th November 1989, as a Private Limited Company, for the 'exclusive' purpose of "Mining and Processing" of highly demanded minerals like Garnet. IGSC is the "FIRST" located the viable River Garnet deposit and obtained Mining Leases in the country and also developed indigenous manufacturing technology for processing River Garnet.

The Registered Office of the Company is presently located at 1/580, 7th Street, Veerabhadra Nagar, Mambakkam Main Road, Medavakkam, Chennai - 600 100, Registered with all the Statutory Authorities.

1.1 Promoter's Details:

Dr. D. Dhaya Devadas is Chairman cum Managing Director of Indian Garnet Sand Co. (P) Ltd. He has a total of 43 years of experience in business, mainly with 30 years of experience in the Garnet Mineral Industry. He has successfully developed the River Garnet Process Technology. He is the Founder President of Federation of Indian Placer Mineral Industries – a Section 25 company, where leading experts, scientists, State and Central Government of India officials, connected to Placer Mineral Industries are the Members. The main objective of the Federation is to protect the interests of the Indian Placer Mineral Industries and their Wealth. Because of the repeated representations, the Government of India has brought the amendment in the Atomic Energy Act, 2015 in respect of Monazite and also got the Atomic Mineral Concession Rule, 2016.

1.2 Location of the Project

The project (mining of Ilmenite and pre-concentration) is located along the coastline of villages Undi, Reel & Warvade, Taluka Ratnagiri, Dist. Ratnagiri. Nearest railway station,

Bhoke (on Konkan Railway) is about 21 Km, towards SSE w.r.t. site. The site is adjacent to MSH 4 (Coastal Highway). Figure below shows Ratnagiri taluka map with location of village Undi, Reel & Warvade.

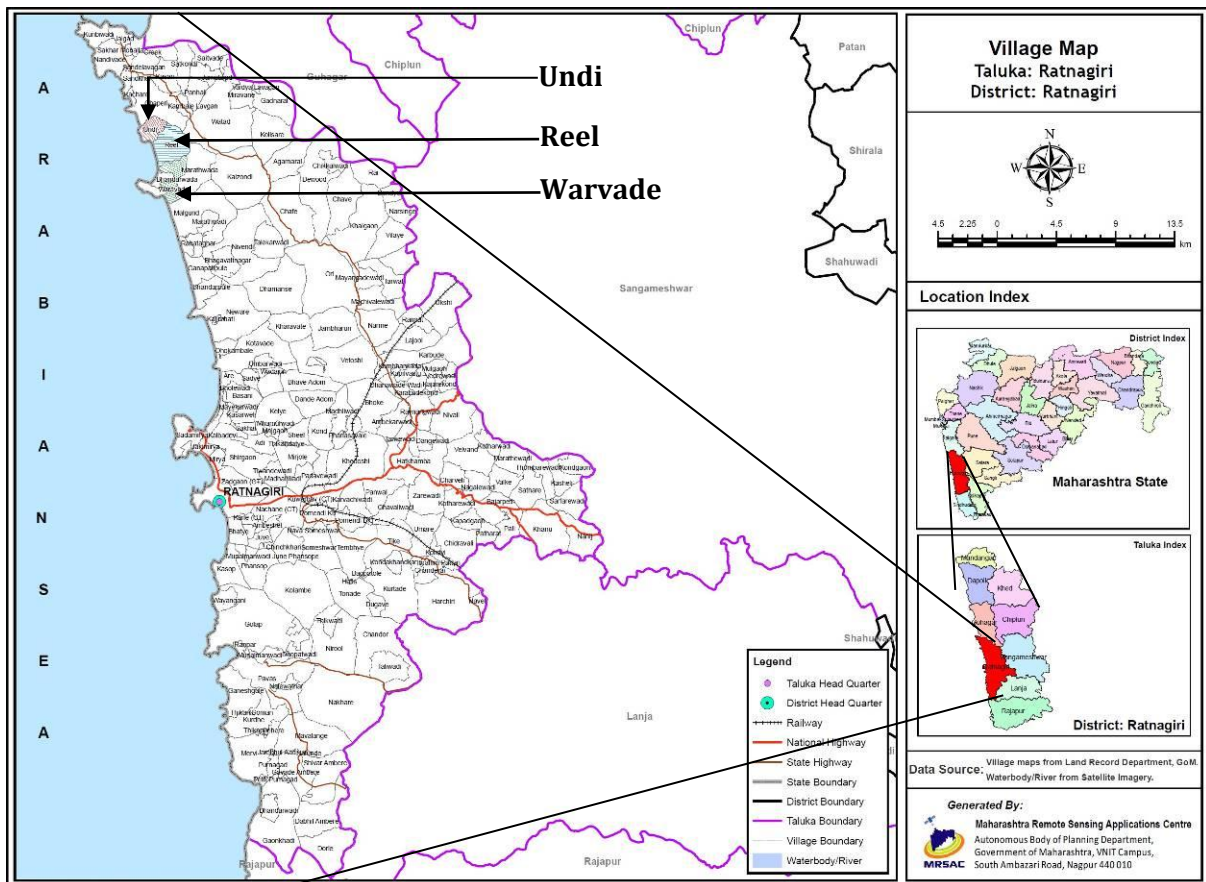


Fig. no. 1 – Location of Site

As per the requirements of CRZ Notification, CRZ map is prepared by National Center for Earth Science, Thiruvananthapuram. Lease areas are overlaid on it. According to the above referred maps and reports, location of each lease in CRZ is as follows:

Undi:- Part of lease areas is located in CRZ IVA, part in CRZ IB and part in CRZ III

Reel:- Part of lease area is located in CRZ IB and part in CRZ III

Warvade:- Part of lease areas is located in I A, I B, CRZ III and part in CRZ IV B

Approaches for each lease are under CRZ III. Owing to presence of Mangroves (more than 1000m²) in Warvade lease, 50m buffer zone is applicable. Part of Warvade Lease is passing through Mangroves and respective buffer zone, but there will be no Mangrove cutting nor mining activity will be carried out within buffer zone.

2 Project Description

The proposal pertains to manual open cast mining, pre-concentration of Ilmenite within applied lease area in CRZ of village Undi, Reel & Warvade and transportation of sand to Mineral Processing Factory to be located at MIDC, Ratnagiri. The site (the lease areas)

are intertidal areas in respective villages which are owned by Government of Maharashtra and does not involves any forest land. The precise lease area letters are given to Indian Garnet Sand Co. Ltd. vide letter no. MMN-1820/C.R.8117/IND-9, letter No.MMN-1820/C.R.8044/IND-9, letter No. MMN-1820/C.R.8051/IND-9 (respectively for Undi, Reel & Warvade) dated 04th October 2007 by Department of Industries, Energy and Labor, Government of Maharashtra. The project involves scraping of sand from the lease, physical separation (pre-concentration) of black component from scrapped sand and backfilling of remaining sand in to the void generated in lease area.

2.1 Size & Magnitude of Project

Sr. No.	Head	Undi	Reel	Warvade	Total (Group I)
General					
1.	Lease Area	21 Ha	15.6 Ha	90 Ha	126.6 Ha
2.	Production	20,654 TPA	8,641 TPA	41,471 TPA	70,766 TPA
3.	Depth of Mineral Deposits	2.5 m	2.5 m	2.5 m	--
4.	Depth of Proposed Mining	1.0 m	1.0 m	1.0 m	--
5.	Bulk Density of the Sand	2.99	3.04	2.95	2.99 (Avg.)
Minable Reserves @ 1 m Depth (after leaving reserves blocked in safe zone of 7.5 m along periphery)					
6.	Total Reserve (Raw Sand)	586785 T	4,38,976 T	25,73,450 T	35,99,211 T
7.	Ilmenite	192465 T (@ 32.8 %)	1,49,252 T (@ 34 %)	7,30,860 T (@ 28.4 %)	10,72,577 T
8.	Other Heavy Minerals	97406 T (@ 16.6 %)	53994 T (@ 12.3 %)	5,40,425 T (@ 21 %)	6,91,825 T
9.	Waste Quartz	296913 T (@ 50.6 %)	235730 T (@ 53.7 %)	13,02,165 T (@ 50.6 %)	18,34,808 T

The total capital expenditure of project is estimated to be Rs. 12 Crores.

2.2 Material Required for the Project

This mainly requires implements like pick-axe, shovel, spade, buckets and mesh screen. These are common and easily obtained from nearby market or Ratnagiri city. Manual shaking table will be fabricated locally or brought from Tamil Nadu.

Water required at lease is for domestic (9m³ per day). Domestic water requirement will be meet from existing water supply scheme or nearby well. Total water requirement is 2968 m³ per day.

Manual mining operations are labour intensive. It is proposed to carryout mining in two shifts of six hours each. There will be 25 number of staff deployed in each work shift at Undi and Reel whereas, in Waravde it is 50 per work shift. Typically, duty hours will be 06:00hrs. to 18:00hrs. Mining Engineer, Mines Manager and Geologist will be common for all 6 leases. For the purpose of counting they are mentioned in this (Group I). Total manpower deployed will be 200.

Mining operations at lease practically does not generate hazardous waste. There will be generation of solid waste in the form of packaging materials used for equipment, machinery, electrical panels, lamps, cables, batteries etc. In operation phase of project, hazardous waste generated will be in the form of paint/ antirust solution containers (category 33.1, schedule I as per HW rules 04th April 2016) etc.: 2 nos. (Will be given to MPCB authorised recycler).

2.3 Radioactivity

Based on the composition of sand and constituents of Ilmenite, there are negligible radioactive elements/ minerals present. Mining methodology and pre-concentration does not disturb/ extract any of the component of sand. They will be remained as it is in the state as they are now existed within lease. Atomic Energy Regulatory Board (AERB) guidelines will be strictly followed during operation of mine.

Steps involved in project are, Taking away sand by digging trench within the help of pick-axe, shovel and spade, Make heap of excavated sand for separation, Screening of sand and transportation of heavy sand to Mineral Processing Factory (to be located in MIDC, Ratnagiri).

2.4 Environmental aspects in Project

Project involves activities like sand excavation, screening, pre-concentration and transportation are envisaged as below

- Excavation, pre-concentration and ore handing within lease (making heap, screening and forming dump) are proposed in intertidal & subtidal region. This will result in disturbance in water column and substratum
- There will be additional traffic on regional roads
- Resource utilisation like electricity for pre-concentration
- There is no R & R involved
- There is no Forest land involve
- Simultaneous backfilling will help restore original substratum
- There will not any cutting of Mangroves & Sand Dunes

3 Description of Environment

3.1 Study Area

Study area indicates group I leases, roads, major settlements, rivers/streams/reservoirs (Kalzondi), Mangroves, industrial areas (JSW Power plant at Jaigad, Chowgule Dockyard at Lavgan), historical monument locations, religious/tourist places (Ganpatipule) and tehsil boundaries. Coastal Highway MSH 4 connecting various coastal villages is traverses the study area from North to South. Similarly, other district roads, major district roads and State highway are passing through study area. The lease areas are located alongside the Coastal Highway to its West and even at some places, leases are crossing the Coastal Highway. Project site and entire 10 km study area is covered in

open series map (OSM published by Survey of India) No E 43 N 3, E 43 N 7 and E 43 N8 & N4.

3.2 Land Environment

3.2.1 Land Use Land Cover

Thirteen different land use/land cover classes have been identified from satellite imagery. Dominant amongst them is water body. The proposed project site is located at the sea front hence more than half i.e. 52.19% of the total land cover is dominated by waterbody which is Arabian Sea. Some small scale shrimp farms and prawn farms are visible in the study area along with reservoirs they contribute to 0.04% of land use. Waterbody class is followed by moderate dense vegetation that is spread all over the study area contributing to 19.68% of land cover. Open land (15.96%) and scrub land (6.01%). The plantation covered 2.79% of total land use. As site is located in the vicinity of fresh and saline water mixing zone (estuary), mangroves are seen to cover 0.39% of land cover. Mixed vegetation (0.04%) is also seen in the area within 10km radius. Habitation covers rural (0.13%) and urban (0.01%) of land use.

3.2.2 Geology of Study Area

Study area is composed of Laterite in major part with intermittent presence of Deccan Trap towards northeast portion. There are deposits of Ilmeite seen.

3.2.3 Geology of Lease Area

General geology of the group I lease area is found to be occupied by the black sands throughout the beach, but for shrubby vegetation at the backshore. These sands are seen to have been piled up to an average thickness of 3 m.

3.2.4 Topography

Study area possesses elevation ranging from 0m to 100m with exception of NW-SE aligned hilly area (pale green band in above map) where it ranges from 100m to 200m. Slope ranges 0 to 50m/Km throughout the study area.

The outstanding feature in the relief of the district is its highly uneven nature and the very narrow riverine plains that fringe the coast-line.

Though there are not many hilly structures seen within the 10km distance from project site, the overall terrain shows undulations. General slope of the study area is from East to West. Highest point within the 10 km radius area around the project is 235 m above mean sea level whereas lowest point is at 0 m above mean sea level.

Gentle slopes are visible at the Reel and Warvade project sites whereas Undi site shows sudden drop in altitude. Overall slope is from East to West. Highest point of this map is located in the south east side of the project site at 108 m above mean sea level and the lowest point is at 00 m above mean sea level.

3.2.5 Soil

Based on the physical characteristics of the soils, they can be classified into five major groups as Coarse Shallow Soil, Medium Deep Soil, Deep Soil, Coastal Alluvial Soil and

Coastal Saline Soil. In study area, narrow coastal strip of land, has Coastal Saline soil and Coastal Alluvium towards eastwards.

As a part of environmental baseline sampling, soil samples were collected from 7 different locations.

Soil texture is uniform at all locations, though water holding capacity slightly differs depending upon presence of percentage composition of components of soil. Heavy metals like Copper, Nickel, Zink are present almost at half locations sampled whereas, Chromium is found at all locations

3.3 Meteorology

The meteorology of the region is influenced mainly by the coastal winds, as there is no obstruction to wind. The meteorology of the site and nearby areas is affected primarily by the presence of adjacent sea shore on west and hills on east in immediate vicinity. The prominent wind direction at project site during the study period (Summer 2016) was from west with 17.35 % calm conditions during summer season.

Being a coastal region, weather in study area remains warm & humid throughout the year. Daily temperature in summer 2016 ranges from 18 °C to 38 °C. and humidity more than 50% all the time. Humidity profile in summer 2016 at Ratnagiri ranges from 15% to 94%. Out of total rainfall 90% is experienced during monsoon season (June to September). There are only three instances of rain (drizzling) during study period viz. one in April and last two days of May.

3.4 Air Environment

Ambient air quality was monitored as per CPCB guidelines at 6 locations and it was found within standard. PM₁₀ values at sampling locations ranges from 48.3 to 69.2 (µg/m³), SO₂ ranges from 9.7 to 14.0 (µg/m³), NO_x ranges from 10.9 to 15.0 (µg/m³) and concentration of CO ranges from BDL to 0.38 (mg/m³).

3.5 Noise Environment

Ambient noise monitoring was carried out at 6 locations same as AAQM and found within limit. It ranges from 52.6 to 43.2 dB(A) in day whereas it is 35.4 to 44.8 dB(A).

3.6 Water Environment

study area displays distinct and sub-dendritic drainage pattern. Ground water sample were collected from dug wells from 7 villages, analysis results observed that ground water has contamination of Coliform. At some places contamination of lead is beyond limit puts the quality of drinking water in question.

3.7 Biological Environment

The Study area is majorly occupied by Coastal areas, creeks, subsistence agricultural pastures, horticultural plantations with scattered dependant settlements. The hilly terrains were majorly occupied by Mango & Cashew plantations followed by kokum, jackfruit & supari; with few deciduous forests and flat hill tops "katal land" with Open scrub. Creek mouths & banks were observed with mangrove and associated flora. Water bodies including, Creek lets, rivers, small reservoirs, dams, seasonal rivers also

visited during survey in study area. During survey, No mass nesting within site was observed. Faunal members like Kites, Herons, Egrets, Kingfisher, Red-vented Bulbul, Wild lizard, Magpie Robin Sparrows, House crows etc. were observed to near site.

3.8 Marine Environment

The general alignment of the coastline is oriented along Northwest-Southeast direction and there are several headlands along the coast. At Undi, there is a wide headland on the north. Between Undi and reel village on the south, the sea bed slope is relatively steep (1: 100 or less), from low water line to 5 m depth of water in the sea. There is a creek between the headland and Varavade shore. The flow through the creek is relatively insignificant in nature. The beach is gentle slopping from East to West. The intertidal zone is obviously quite wide (300 m -500 m). The site is directly fronting Arabian sea and obviously the shoreline is exposed to the waves from Northerly quadrant while it is protected from waves approaching from South-West quadrant by the headland during monsoon months.

Marine ecology was studied at 8 subtidal locations and 9 intertidal transect locations with 2 benthic study spots.

The overall physico-chemical water & sediment quality results indicate marine environment isn't under much stress or degraded in study area.

The samples were noted to be rich in phytoplankton density as well in diversity; zooplankton population, diversity and biomass as well were on healthier side; Benthic population show high biomass and low diversity but no specific trend. At major instances observations show stress-free marine environment with few exceptions due to cosmopolitan hindrances as influx.

Mangroves study showed dominance of *Sonneratia alba*, followed by *Avicennia officinalis*, *Acanthus ilicifolius*, *Ageciras corniculatum*, *Lumnitzera racemes*, *Ceriops tagal* & *Rhizophora mucronata*.

Fishing is carried out by traditional rods and hooks are used for crabs; traditional cast nets near shore waters by individual native fishers; collection of bivalves, and Oysters. In Varavade fishcatch is of 140 T/yr with 30 mechanised & 5 non-mechanised boats currently being operated.

3.8 Socio Economic Environment

Study Area Highlights as Per 2011 & 2001 Census

Description	Study Area	
No. of State	1 (Maharashtra)	
No. of District	1 (Ratnagiri)	
No. of Tehsil	2 (Ratnagiri & Guhagar)	
No. of Villages	47	
Demographic Structure	2011	2001
Population: Male	20800	19994
Female	23028	23877
Total	43828	43871

No. of Household	10567	9959
Child Population 0 - 6 years (%)	4140 (9.45)	5960 (13.59)
Sex Ratio (No. of females per 1000 males)	1107	1194
Family Size (person per household)	4.15	4.41
Scheduled Castes (%)	2733 (6.24)	516 (1.18)
Scheduled Tribes (%)	84 (0.19)	137 (0.31)
Literate Population (%)	33098 (76)	27899 (64)

Source: Primary Census Abstract CD 2011 & 2001 Ratnagiri district, Maharashtra State

4 Anticipated Impacts & Mitigation Measures

Sr. No.	Step/Activity	Environmental Aspect	Impact	Mitigation Measures
1.0	Installation of Spirals within lease	Fuel burning (cranes etc.), Emission to air Noise generation due to cutting/welding/ metal work	Air & Noise Pollution	<ul style="list-style-type: none"> Screening of construction area with tin sheets Construction machineries will be well maintained, lubricated and cleaned periodically having valid PUC certificate
		Use of water, energy and materials	Natural resource consumption	Sea water will be used for spirals which reduce fresh water consumption
		Use of manpower	Employment	Temporary employment generation
		Waste Discharge on land	Land pollution	<ul style="list-style-type: none"> Separate area will be earmarked for storage of solid and hazardous wastes. After completion of construction phase, hazardous waste will be given to given to MPCB authorized recyclers Metal scrap will be sold to scrap dealers for recycle No camp site for work force will be provided
2.0	Erection and Commissioning of Spirals within lease	substratum will be permanently lost and may cause flooding during high tide	Marine/ Land Pollution	Waste sand will be backfilled within lease help restoring original level
		Use of manpower	Employment	Temporary
3.0	Operations at leases i.e.	Partial Loss of	Benthic (25.04	Backfilling of waste

Sr. No.	Step/Activity	Environmental Aspect	Impact	Mitigation Measures
	manual scraping of sand, pre-concentration at designated places and Transportation of heavier fraction of sand to mineral processing factory to be located at Ratnagiri, MIDC	substratum, suspension of sediment in marine water	gm/m ²) Biodiversity loss and marine water pollution	sand simultaneously will help restore original position.
		Air Emission and fuel burning (during transportation)	Air pollution	Vehicles will be well maintained, lubricated and cleaned periodically having valid PUC certificate
		Noise generation and vibration due to vehicular movement	Noise pollution and road damage due to vibration	
		Use of water for domestic as well as for preparation of slurry	Natural resource consumption	Sea water will be used for slurry preparation to reduce fresh water consumption
		Waste disposal and backfilling	Land Pollution and marine water pollution	Temporary increase in turbidity in water column, will restore shortly
		Socio-economic	200 locals will get employment	
4.0	Closure and Decommissioning	Stoppage of use of facility	Revenue & employment loss	

5 Environmental Monitoring plan

Environmental parameters will be monitored at each stage of project at locations covered during baseline monitoring before commencement of project activities once in six months.

There will be separate budgetary provision made for environmental monitoring. It is proposed to budget Rs. 15 lakhs as capital investment and Rs.38 lakhs per annum for implementation of EMP. Besides above financial commitment as a part of EMP, the company will help society in up-bringing of living status of nearby populace by following:

1. Providing them with job as per need and skillset of individual
2. Providing various contracts to competent local persons
3. Operation phase of project will also open secondary business opportunities (like mining material supply vendor, garage, mechanics/workshop, restaurant etc.)

6 Additional Studies

This draft report is prepared to put-up before members of public. As per the requirement of one of the condition in ToR, Public Hearing will be conducted. After public hearing, this report will be updated to the extent to include opinion of public and any additional study (if asked).

During entire duration of project, there will not be generation/handing/storage of hazardous chemicals, so this kind of project activity does not require to carry out Risk Assessment, HAZOP, and Heat radiation modelling studies.

Therefore, except studies mentioned in this document; there are no additional studies carried out.

7 Project Benefits

7.1 Improvement in Infrastructures

The proposed project is to be located at Undi, Reel & Warvade. It does not require additional transportation facilities like road connectivity.

7.2 Employment Potential

The proposed peak manpower requirement during construction and commissioning will be 30 Persons. Once commissioned, the project will require 200 work force. Thus the project has direct employment potential of 200 people.

All recruitments will be done from local area which will be the considerable benefit to the local area considering the demography of the region. Further, the indirect employment, local economic activities will also add in the employment potential of the proposed project. Thus the potential of employment will be greatly beneficial to the local people.

7.3 Other Tangible & Intangible Benefits

Demand of TiO₂ is increasing in India as well as foreign country day by day. Thus the proposed project will help in reduction in demand-supply gap. This will benefit the country in earning appropriate revenue against their efforts.

All the required Environmental protection measures will be implemented appropriately to ensure compliance with the norms.

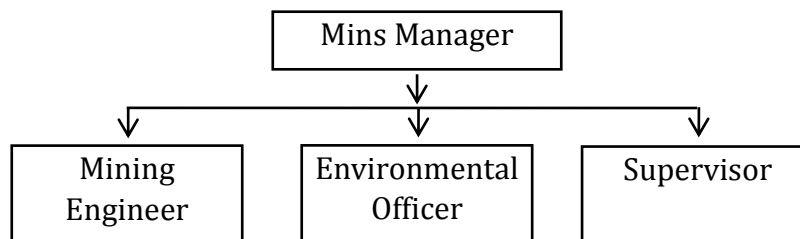
The overall project cost is estimated at Rs 12 crore.

The company has made a budgetary allocation for environmental protection measures at a capital cost of Rs. 15 lakhs and an annual budget of Rs. 38 Lakhs.

Implementation of project in turn will give better livelihood and will increase ease in lifestyle.

8 Environmental Management plan

The company will form an environment management cell (EMC) with vision to implement the EMP as suggested in the EIA. The illustrative presentation of the EMC is presented below.



As indicated in Organogram, Mins Manager will lead as head of the EMC and will be assisted by, Mining Engineer, Environmental Officer and Supervisor.

The responsibilities of the above personnel is as below:

Mines Manager will lead the team and will direct the EMC in timely manner and make budget available.

Mining Engineer will take lead and supervise all functions of EMC

Environmental Officer will be responsible for environment management works and all legal and statutory compliances, including CRZ clearance.

Supervisor will look after maintenance of environmental infrastructure created such as proper disposal of waste sand from spirals etc.

Standard operating procedures will be prepared by Environmental Officer well before the inception of operation phase of the project. SOPs will be reviewed and approved by Mining Engineer.

8.1 Environmental Activities

- Major environment protection features are disposal of waste sand from manual shaking tables
- Maintenance will be done throughout the extent of operation phase

9 Conclusion

The proposed project of Indian Garnet Sand Company Ltd. will have low adverse impact with due implementation of control measures as suggested. Continued vigilance with budgetary support is required from the industry in order to implement the EMP.