



IREL (India) Limited
(A Govt. of India Undertaking – Department of Atomic Energy)
Manavalakurichi, Kanniyakumari District, Tamil Nadu

Mining of Atomic Minerals (Monazite, Zircon, Ilmenite, Rutile, Sillimanite and Garnet) over an Extent of 1144.0618 Ha @ 1.50 MTPA ROM in Keezhmidalam-A, Midalam-B, Enayamputhenthurai, Ezhudesam-A, B & C and Kollencode-A & B Villages of Killiyoor Taluk, Kanniyakumari District, Tamil Nadu

Environmental Clearance under EIA Notification, 2006 & CRZ Notification, 2011

SI. No. 1(a) - Category 'A' of EIA Notification, 2006 (NDS Project) Permitted activity under Para 3 Clause (x)(a) & Para 4 Clause (ii)(g) of CRZ Notification, 2011

Summary of Environmental Impact Assessment

ToR awarded by MoEF&CC vide F. No. IA-Z-11013/10/2023-IA-I dated 22.02.2023

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EIA Consultant



ABC Tower, # 400, 13th Street, SIDCO Industrial Estate, North Phase,
Ambattur, Chennai 600 050., Tamil Nadu, India.
Toll free: +91-94442 60000/+91-95661 57777
Branch offices @ Delhi | Mumbai | Kolkata | Coimbatore | Hyderabad | Bangalore | Jaipur | Guwahati.



abc@abctechlab.com

044-26257788/99

www.abctechlab.com

QCI/NABET Accreditation (Category 'A') vide NABET/EIA/2225/RA0290 dated 11.06.2023 with validity till 16.11.2025 - SI. No. 4 of List dated 15.07.2024



Summary of Environmental Impact Assessment Report

1.1 Introduction

1.2 Project Proponent

M/s. IREL (India) Limited is a Multi-Unit-Multi-Product Central Public Sector Enterprise (CPSE) incorporated under the Companies Act, 1913 and wholly owned by the Government of India under the Administrative Control of the Department of Atomic Energy. IREL was established in August 1950 and its operation spans across mining, mineral beneficiation, refining of heavy minerals (atomic minerals), extraction of rare earths and its refining to produce High Pure Rare Earths.

Atomic Minerals (BSM Ore) are suite of 7 minerals viz., Monazite, Zircon, Ilmenite, Sillimanite, Rutile, Leucoxene and Garnet. These seven minerals occur together in nature by virtue of their formation along with coastal stretches and inland areas near to the shore and in Teri deposits in varying grades in India. IREL is the only CPSE in the country being authorized to mine and handle the **Prescribed Substance, Monazite under the Atomic Energy Act, 1962** and its value-added products.

IREL, Manavalakurichi Unit in Kanniyakumari District of Tamil Nadu has been in operation since 1970 before the Environmental Impact Assessment (EIA) & Coastal Regulation Zone (CRZ) Notifications came into force in the Country. The Unit is harnessing Monazite & Zircon along with other associated minerals and supplying the same to the Department of Atomic Energy and other downstream industries in the value chain. The Unit is being operated for an annual consented production capacity of 1,14,600 Tons of Atomic Minerals (HM).

IREL has been presently operating in 2 mining leases for mining of atomic minerals from the coastal and inland deposits. The BSM Ore mined out from these Leases are transported and separated for individual atomic minerals at the existing Mineral Separation Plant (MSP) at Manavalakurichi.

Address for correspondence of Project Proponent:

Name : Shri N.Selvarajan,
Designation: Chief General Manager & Head,
Address: IREL (India) Limited,
Manavalakurichi,
Kanniyakumari District - 629 252
Phone: 04651-237325
9443347325
Email: head.mk@irel.co.in
Website: www.irel.co.in

1.3 Project Profile

IREL is mandated to provide requisite strategic materials i.e., Zircon and Monazite for Atomic Energy programme of the Country through mining and processing operation of BSM. Monazite is a prescribed substance under the Atomic Energy Act, 1962 and a radioactive mineral contains Uranium and Thorium. BSM Deposits are associated with radioactivity due to the presence of Monazite. To meet the objectives of obtaining the requisite strategic materials, the Department of Atomic Energy (DAE) vide Letter No.3/10(21)/2015-PSU/11010 dated 13.08.2015 sought the concurrence of the Government of Tamil Nadu for reservation of Monazite rich area of 1144.0618 Ha in Kanniyakumari District for the purpose of mining of Atomic Minerals by IREL. Upon concurrence given by the Government of Tamil Nadu vide letter No.12503/MMD.2/2015-12 dated 15.04.2021, the Ministry of Mines, Government of India issued a Notification vide G.S.R.399(E) dated 11.06.2021 reserving the area of 1144.0618 Ha for mining by IREL under section 17A (1A) of the Mines and Minerals (Development and Regulation) Act, 1957. The Government of Tamil Nadu, after obtaining prior approval from the Ministry of Mines, Government of India, issued a Letter of Intent (LOI) No.12503/MMD.2/2015-19 dated 28.06.2022 for mining of Atomic Minerals over an extent of 1144.0618 Ha. The Mining Lease area of 1144.0618 Ha comprises two Blocks A&B and located in the following villages of Killiyoor Taluk in Kanniyakumari District, Tamil Nadu (Fig. 1-1).

- (i) Resurvey Nos. 16-19, 45-54, 55p, 56p, 57p, 58-61, 69-81, 82p, 83p, 84-88, 89p, 90p, 91p, 92-95, 96p, 97-110, 123-124, 126-129, 136-140, 141p in Keezhmidalam-A village (204.0652 Ha).
- (ii) Resurvey Nos. 80,82-101,105-112, 113p, 114, 115p, 116-162, 163p, 166p, 167-169, 170p, 173-175, 176p, 177p, 178p, 179p, 180p, 182p, 183-194, 196, 203 in Midalam-B village (202.9686 Ha).
- (iii) Resurvey Nos. 494p, 495, 496, 529-537, 541-567, 578, 581-582, 585, 587, 588-634 in Enayamputhenthurai village (137.0350 Ha).
- (iv) (Resurvey Nos. 374p, 402-404, 407-413, 448-453, 455-458, 488, 490 in Ezhudesam-A village (41.1000 Ha).
- (v) Resurvey Nos. 139, 146, 149-154, 157, 169-174, 175p, 186-187, 192-207 Ezhudesam-B village (82.9000 Ha).
- (vi) Resurvey Nos. 208-221, 225-226, 228-229, 246-256, 258-259, 261-283, 294-296, 319-320, 322, 327-348, 351-355, 359p in Ezhudesam-C village (275.8280 Ha).
- (vii) Resurvey Nos. 347-348, 354p, 355-358, 362-365 in Kollencode-A village (28.3950 Ha).
- (viii) Resurvey Nos. 585-591, 595-596, 601-621, 623p, 651-652, 655-689 in Kollencode-B village (171.7700 Ha).

Mining Lease Plan is given as Fig. 1-2 and part of the Lease areas are shown in Fig. 1-3.

Fig. 1-1 Index Map (ML in Killiyoor Taluk in Kanniyakumari District, Tamil Nadu)

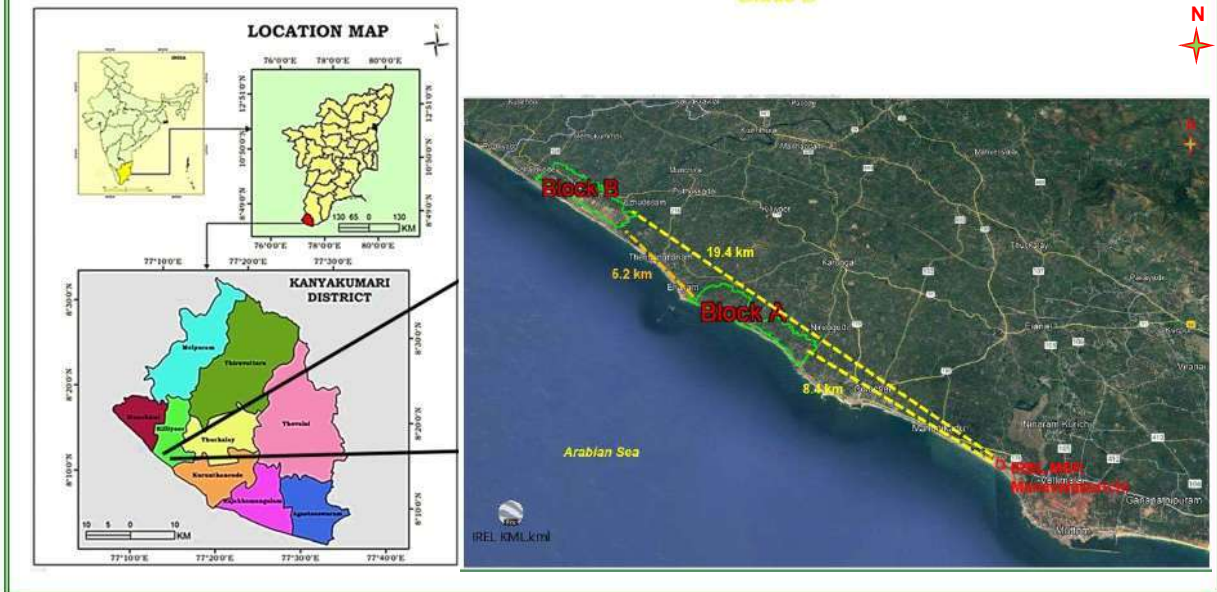


Fig. 1-2 Mining Lease Plan





Existing Mineral Separation Plant at Manavalakurichi is aerially located at 8.4 km from Block A and 19.4 km from Block-B in the south east. The distance by road distance is 12 km and 30 km from Block A and Block B respectively. Out of the total area of 1144.0618 Ha, 353.4876 Ha area falls under CRZ-I(B), II and III categories. The estimated mineable reserves is 59.88 Million Tonnes. The Heavy Mineral (HM) content in the deposit varies between 10.0% and 22.6% with an average HM content of 14.5%. Thus, the New Mining Lease will feed the Manavalakurichi Plant sustainably for a period of 40 years @ 1.5 million tonnes per annum (MTPA) ROM.

For the Project, no acquisition of land will be carried out. IREL has formulated a Land Leasing Policy i.e., Concession Option Scheme for taking possession of the private patta land on lease for mining. The land leasing period will be 11 months. Mining and backfilling will be simultaneously carried out within the lease period of 11 months and thereafter the land will be returned to the land owners with lease compensation. Neither land acquisition nor purchase of land would be done for the Project. The permanent structures will not be disturbed and mining shall not lead to involuntary displacement of people. Thus, **no Rehabilitation & Resettlement (R&R) is involved in the Proposal.**

The method of mining will be **Non-Conventional Opencast Mechanized Mining** by Excavator-Tipper combination with no Drilling and Blasting. Also, there will be no Developmental activities like Top Soil & Over Burden removal. Thus, there will be **no Dump** in the Mining Lease. It is proposed to mine Atomic Minerals (BSM Ore) @ 5000 Tonnes per day (TPD) ROM and 1.50 Million Tonnes ROM per Annum.

The mining operation will consist of two-layer operation. The mineralisation occurs right from the surface. First, the surface layer up to 2.5-3.0 m from surface is excavated by Tipper & Excavator combination and followed by the excavation in bottom layer. While excavating the bottom layer, backfilling of the mined-out voids by the Tailings (quartz-free from minerals) from the MSP will be carried out simultaneously. Thus, there will be **no bench** formation and **no Mine Pit** in the Mining Lease area. Ore : Waste Ratio will be 1:0.

Mining operation will be carried out at an average depth of 6 m and a maximum depth of 9 m depending upon the location and mineralization. **No ground water-table intersection** is envisaged as ground water-table level in the Mining Lease Area ranges between 10-15 m BGL.

ROM from the mining lease will be transported and separated for individual atomic minerals at the existing Mineral Separation Plant at Manavalakurichi. In the MSP, the ROM is fed to Heavies Upgradation Section (HUS) and subsequently separated using its physical properties viz., Size, Specific Gravity, Conductivity and Magnetic Susceptibility.

From the ROM production of 15.00 Lakhs TPA and with about 70% recovery, the Mineral Separation Plant can have a concentrated feed quantity of 1,52,250 TPA (Table 1-1). The generation of tailings (after removal of Minerals - Quartz) will be about 13,47,750 Tons per annum which will be transported to the mined-out voids and backfilled. Mining and backfilling will be carried out simultaneously.

Table 1-1 Mine Profile

Description	Area/Capacity
Total Mining Lease area	1144.0618 ha.
Total Mineable Quantity	59.88 Million Tonnes
Annual Production	1.5 Million Tonnes @ 5000 TPD (Max)
No. of working days	300 days (3 Shifts)
Life of the Mine	40 Years
Method of Mining	Open cast (without drilling & blasting) – No topsoil & No Overburden – using Excavator and Tipper combination upto a maximum depth of 9 m (average 6 m).
	No ground water intersection involved.
	No R&R issue due to the proposal.

During the Plan Period, 7.50 Million Tonnes of ROM @ 1.50 MTPA will be mined out and the tailings - Quartz (after removal of Minerals) will be generated from the MSP to the tune of 6.738 Million Tonnes @ 1.347 MTPA, which will be transported back to the Mining Lease Area to backfill the mined-out voids. This process would continue till the Conceptual Stage (Tables 1-2 & 1-3).

ROM Production per annum	:	15,00,000 Tonnes @ 5,000 TPD
Ore : Waste Ratio	:	1: 0
No. of days per annum	:	300
No of shifts in a day	:	3
Expected life of the mine	:	40 years

Mining activity is limited to vacant area in the Mining Lease. Hence, the ultimate pit limit lies in the mining lease area. The Project Cost is Rs.31.25 Crores.

Table 1-2 Development & Production - Plan Period & Subsequent Periods

Year	Top Soil (Tons)	Over Burden (Tons)	Mineral Rejects (Tons)	ROM Production		Anticipated Atomic Minerals Concentrate in Tons	Tailings from MSP for Backfilling Mined out Voids (Tons)
				cu. m	Tons		
First Plan / Block Period:							
I	0	0	0	9,37,500	15,00,000	1,52,250	13,47,750
II	0	0	0	9,37,500	15,00,000	1,52,250	13,47,750
III	0	0	0	9,37,500	15,00,000	1,52,250	13,47,750
IV	0	0	0	9,37,500	15,00,000	1,52,250	13,47,750
V	0	0	0	9,37,500	15,00,000	1,52,250	13,47,750
Total	0	0	0	46,87,500	75,00,000	7,61,250	67,38,750
Subsequent Plan / Block Periods :							
2 nd Block Period	0	0	0	46,87,500	75,00,000	7,61,250	6,738,750
3 rd Block Period	0	0	0	46,87,500	75,00,000	7,61,250	6,738,750
4 th Block Period	0	0	0	46,87,500	75,00,000	7,61,250	6,738,750
5 th Block Period	0	0	0	46,87,500	75,00,000	7,61,250	6,738,750
6 th Block Period	0	0	0	46,87,500	75,00,000	7,61,250	6,738,750
7 th Block Period	0	0	0	46,87,500	75,00,000	7,61,250	6,738,750
8 th Block Period (4 Years only)	0	0	0	46,12,500	73,80,000	7,49,070	66,30,930
Grand Total	0	0	0	3,74,25,000	5,98,80,000	60,77,820	5,38,02,180

Table 1-3 Plan Period Production & Expected Mineral Production from ROM

Year	ROM (Tons)	Anticipated Atomic Minerals Production in Tons	Expected Individual Mineral Production (Tons)					
			Monazite	Zircon	Ilmenite	Rutile	Sillimanite	Garnet
I	15,00,000	1,26,349	7182	5563	92352	2772	11718	6762
II	15,00,000	1,26,349	7182	5563	92352	2772	11718	6762
III	15,00,000	1,26,349	7182	5563	92352	2772	11718	6762
IV	15,00,000	1,26,349	7182	5563	92352	2772	11718	6762
V	15,00,000	1,26,349	7182	5563	92352	2772	11718	6762
Total	75,00,000	6,31,745	35,910	27,815	4,61,760	13,860	58,590	33,810

The Proposal requires prior EC as per the EIA Notification, 2006 under Sl.No.1(a)-Category 'A' as well as under the CRZ Notification, 2011, as amended. Accordingly, IREL has submitted application to MoEF&CC on 28.12.2022 to obtain the Terms of Reference (ToR) for carrying out the EIA Study. The Proposal was deliberated in 53rd Expert Appraisal Committee (EAC) – Nuclear & Defense (ND) meeting held on 27th January 2023. ToR has been awarded vide F. No. IA-Z-11013/10/2023-IA-I dated 22.02.2023.

Baseline Data (BLD) collected during December 2022 - February 2023 representing Winter 2022-23 Season has been utilised for the EIA Study in compliance with MoEF&CC Office Memorandum No. J-11013/41/2006-IA-II(I)(Part) dated 29.08.2017. EIA Report has been prepared in compliance with awarded ToRs and is submitted as per generic structure proposed in Appendix-III of EIA Notification, 2006.

For obtaining the TNSCZMA recommendations for the proposal, IREL has submitted the CRZ Application to the DCZMA, Kanniyakumari on 08.03.2024 and the same is under their perusal. Being a parallel activity, the TNSCZMA recommendation will be obtained and submitted to the Ministry for grant of EC.

The EIA Consultant, M/s. ABC Techno Labs India Private Limited, Chennai has been accredited for various Sectors including Sector-1 (Mining Projects) for Category 'A' by the National Accreditation Board for Education & Training (NABET), Quality Council of India vide Certificate NABET/EIA/2225/RA0290 dated 11.06.2023 with Validity till 16.11.2025 (Sl. No. 4 of QCI/NABET List dated 15.07.2024). The ABC Techno Labs India Private Limited Laboratory is accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) vide Certificate No. TC-5770 dated 03.04.2022. The Lab is also recognised by the Ministry of Environment, Forest and Climate Change (MoEF&CC) vide Letter F. No. Q-15018/04/2019-CPW dated 14.10.2019 with validity of 5 years.

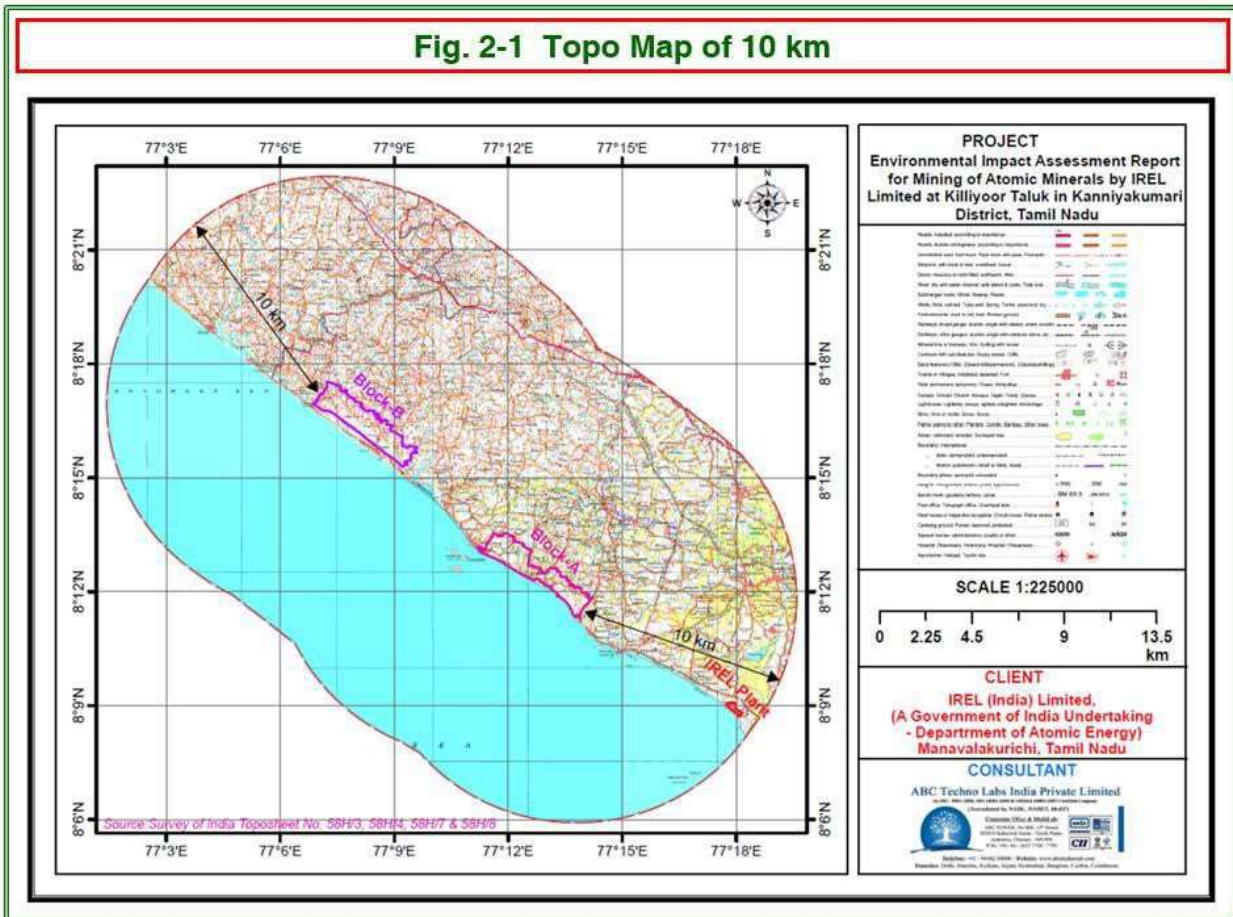
The Proposal was deliberated in the 61st EAC (N&D) Meeting held on 23.04.2024 as Agenda Sl. No. 3.1. The additional details sought by the committee in the meeting are addressed in this Report and submitted for Public Consultation & Public Hearing with Summary of EIA reports in English and Tamil languages.

2.1 Description of the Environment

2.2 Environmental Setting

The study area falls in the Survey of India Topo Sheet No. 58H/3, 58H/4, 58H/7 and 58H/8. Topo map of 10 km radius is shown in Fig 2.1. The mining area is accessible by SH-179 (West Coast Road-WCR). Block-A is connected to SH 179 (Kanniyakumari – Pazhaya Uchakada Road) by a series of Major District Roads (MDRs) and Block-B is connected by SH- 179, which is passing through the site.

The ML Block-A is located 08°11'19.78" to 08°13'33.12" North Latitudes and 77°11'13.13" to 77°14'08.82" East Longitudes and Block-B is located between 08°15'17.31" to 08°17'32.23" North Latitudes and 77°06'50.15" to 77°09'34.63" East Longitudes. There are **no Eco Sensitive Areas** like National Parks, Wildlife Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar Sites, Tiger/Elephant Reserves, Reserved Forests, etc. (existing as well as proposed) within 10 km from the Mining Lease Area.



Kanniyakumari Wildlife Sanctuary is at 25 km (shortest) distance in northeast. River Valliar drains the eastern parts of the Study Area and River Thamirabarani drains the central parts of the Study Area which flows adjacent to the Block-B at 0.12 km in the northeast and 4.5 km from Block-A in the northwest. Arabian Sea and its coastline are in southern parts.

Tamil Nadu-Kerala State Boundary is at 1.5 km in the west from Block-B & 12.4 km from Block-A and General Condition applies to this Mining Project. There is no major industry in the Study Area. The mining area does not fall Critically Polluted Areas /Industrial Clusters identified by

CPCB. The project area (ML Area) does not fall in the Aravali Range. Part of the Mining Lease Area falls in Coastal Regulation Zone Area and thus, attracts Clearance under the CRZ Notification, 2011.

The State Highway SH-179 runs parallel and through the Mining Lease area. Nagercoil-Thiruvananthapuram Section of Southern Railway BG Line runs at a distance of 6.5-7.0 km in the north. Nagercoil Junction is at 23 km from the Mining Lease Area in the east. The nearest airport is Thiruvananthapuram at 28 km in the northwest. Thengapattinam Port is at 2 km in the southeast from Block-B and Colachel Port is at 2.0 km in the southeast from Block-A.

Moderately populated villages such as Kurumpanai, Alanchi, Midalam, Melmidalam, Pallapallam, Enayamputhenthurai, Karungal, Puthukadai, Manavalakurichi, Monday Market, Neyyoor, Kalingarajapuram, Nithiraivilai, Poothurai along with Hospitals, Schools, Churches, Temples, Community Halls, recreation clubs etc., are located within the study area. Municipal Corporations of Colachel and Kollencode are located near the Mining Lease Area. Kanniyakumari District Head Quarters Nagercoil is at 23 km in the east from Block-A.

There is no litigation, directions or any order passed by any Court of Law or pending against the project.

2.3 Baseline Environmental Status

The environmental components studied and the methodologies followed for the preparation of EIA report are given in Table 2-1 (Fig. 2-2).

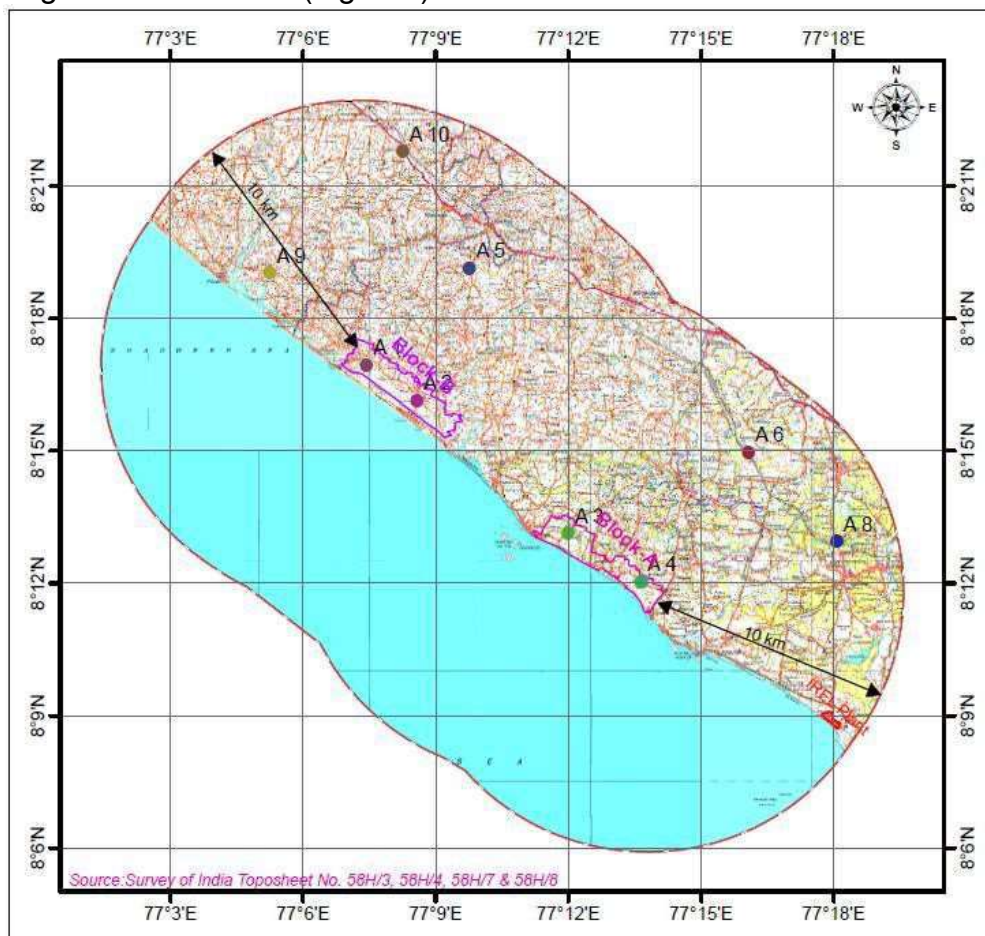


Fig. 2.2: Monitoring locations

Table 2-1 Environmental components and methodologies

Sl.No.	Environmental Components	Area	Parameters	Methodology	Frequency
1	Air	10 locations in Core zone & Buffer zone	Meteorology	Field monitoring/secondary data	Continuous for 3 months
			Ambient Air Quality (all 12 parameters of NAAQ Norms)		24 hourly-Twice a week for 4 weeks in the season
2	Water	10	Water Quality Surface & Ground (parameters as per IS:10500) Ground water regime (hydrogeology)	Field Monitoring	Once in season
3	Soil	10	Soil Quality – Physical, Nutrients & Trace Metals	Field monitoring	Once in season
4	Noise	10	Noise levels	Field monitoring	Once in season
5	Ecological Features	Core zone & Buffer zone	Flora & fauna	Field study/Secondary data	Once in season
6	Socio-economic Features	Core zone & Buffer zone	Parameters related to socio-economic aspects	Field Study (Public Consultation by questionnaire survey)/Secondary Data	Once in season
7	Traffic Survey	3	Traffic volume in project site	Field Monitoring	Once in season
8	Land Use	Core & Buffer zones	Land cover categories based on satellite image	Satellite image processing	Once in season

The summary of baseline status is given in **Table 1.5**.

Table 1-5 Environmental Baseline Status

Envl. Component	Main Parameters	Minimum	Maximum	Mean	Desirable Norms
Ambient Air Quality, ug/m ³	PM2.5	17	27	22	60
	PM10	36	56	42	100
	SO ₂	5	8.8	6.9	80
	NO _x	12.5	17.7	15.1	80
Ambient Noise, dB(A)	Leq-Day	48.3	54.1	51.8	55
	Leq-Night	39.8	44.6	42.8	45
Surface Waters	TDS, mg/l	244	1003	623.5	500/2100
Ground Waters	TDS, mg/l	218	844	531	500/2000
Soil Status	EC, mmhos/cm	0.078	0.502	0.29	0.2-0.5

Legend: PM2.5-Particulate Matter size less than 2.5 um; PM10- Particulate Matter size less than 10 um; SO₂-Sulphur dioxide; NO_x-Oxides of Nitrogen; Leq-Day & Leq-Night - Equivalent Noise Levels during Day & Night Times; TDS-Total Dissolved Solids; EC- Electrical Conductivity & SAR-Sodium Absorption Ratio.

The findings of baseline environmental status of the study area are summarized below:

- The collected meteorological data during this season represented the local weather phenomena.
- The monitored ambient air quality in the study area was found to be in compliance with the National Ambient Air Quality (NAAQ) 24-hourly Norms for Industrial, Residential, Rural and other areas.
- Monitored Ambient Noise Levels (Leq) during day and night times were found to be well within the MoEF&CC Norms.
- The water quality of surface water was found to be in compliance with CPCB/BIS Norms.
- The ground water quality was found to be in compliance with the BIS:10500-2012 Norms.
- The soil in the study area would very well support for vegetation.
- The area is moderately populated and basic amenities are available in all villages.

Thus, there is **adequate buffer** for the proposed Proposal in the physical, biological and edaphic environments of the study area.



3.0 Anticipated Environmental Impacts

Any Project would create impact on the environment in two distinct phases viz., Construction Phase which may be regarded as temporary & short term and Operation Phase which would have long term effects. Identification of all potential environmental impacts due to the Proposal are critically examined and major impacts (both Beneficial & Adverse) are studied.

Due to lack of raw material source, the existing MSP at Manavalakurichi is being operated at <40% of its installed capacity for the last 10 years. To support the Plant (with all required infrastructures) at Manavalakurichi, the New Lease has been proposed. Thus, having a dedicated MSP near the new Mining Lease Area will not be feasible on techno-economical & environmental angle. Increasing the continued supply of Raw Material to the existing MSP will ensure uninterrupted supply of strategic minerals to DAE for its operations

The proposed project does not involve any major establishment or construction. Thus, Construction Phase Impacts are not there for Impact Assessment and Environmental Management Plan (EMP). The identified impacts due to mining activities throughout the operational and post closure phases have been studied in detail.

Land Environment: Non-Conventional Mining activities, with no Drilling and Blasting, will be carried out in available/consented pocket lands in the Mining Lease Area of 1144.0618 Ha. Thus, no vibration impact due to mining. Also, there is no Solid Waste generation and thus, no Waste Dump in the Mining Lease area. After mining, the backfilling would be carried out simultaneously and surface profile would be maintained at its original RL level (w.r.t. nearest Bench Mark) + 5 to 10% more for compaction. It is an ongoing activity upto life of the mine.

Since this process is an ongoing activity, if any sand deficit occurs in the conceptual stage, appropriate measures will be adopted to backfill the mined out area to the base level. Over and above, if any information is received from the land owners requiring for additional tailings, IREL will transport the tailings and backfill to the base level.

About 106.50 Ha is required for Mining during the Plan Period which will be mined out, back filled and handed over to the Land Owners. At the Conceptual Stage, 834.1296 Ha will be the mined out and back filled area. Back filled areas will be used for plantation and other purposes by the land owners. Thus, there will not be any significant change to Land Environment due to the Proposal.

Traffic Volume: Mined out mineral from Blocks A & B will be transported by 25/30 Tons Tippers to the existing Mineral Separation Plant at Manavalakurichi, which is aerielly located at 8.4 km from Block-A and 19.4 km from Block-B in the southeast (road distance 12-17 km from Block-A and 30-35 km from Block-B). Major District Road and SH-179 will be the Ore Transportation Route from the Mining Lease to MSP at Manavalakurichi which is passing through the Mining Lease area and accessible from both northern as well as southern pockets of Mining Lease Area.

As SH-179 & major district road covers >90% of the transportation route, the ROM transportation from Blocks-A&B to MSP will be through Major District Roads/ SH-179. For balance area coverage, vacant land within the Lease will be utilized as Haulage Road to reach the nearest point of District Major Roads/SH-179 to MSP. Thus, Mineral transportation will not have any impact on the village roads.

A detailed traffic assessment has been carried out in compliance with IRC 106-1990 guidelines. It is assessed that the traffic volume at Nithiravilai was found to be 5017 PCU/day and at Midalam 4441 PCU/day i.e. 209 PCU/hr at Nithiravilai and 185 PCU/hr at Midalam with average 197 PCU/hr. The traffic carrying capacity of two-way undivided arterial road is 2400 PCU/hr as per IRC 106-1990. The proposed transportation of 5000 TPD one way by 30T Tippers – 167 trucks one way, 334 trucks per day in two ways which is about 735 PCU/day i.e. 31 PCU/hr. It is worked out to be only 16% volume addition to the existing traffic volume.

The Volume/Capacity (V/C) ratio for existing and proposed traffic volume is found to be 0.08 and 0.095 respectively and the Level of Service (LOS) is found to be “A” – Excellent. Hence, the existing road is adequate to handle the proposed volume due to the proposed project.

Air Quality: Mining, Loading and Transportation activities would generate both fugitive dust emissions and smoke from HEM Machineries/Equipments & Transporting Tippers. Fugitive emissions are predicted by using standard equations given in ‘Indian Mine and Engineering Journal’ and suggested by USEPA (Emission Factors as referred in AP-42) for Mining & Allied activities.

Accordingly, the computed values of PM Emission for various activities (other Pollutants are in insignificant levels from Mining activities) are:

<u>PM Emissions, g/sec</u>	
Excavation	0.00000005
Loading	0.00000006
Ore Haulage	0.00006596

AERMOD View Software is used for Predicting the maximum Ground Level Concentrations (GLCs) including Transportation Impact (Table 3-1).

Table 3-1 Predicted GLCs

Sl. No.	Pollutant	Background Concentration (24-hly. Avg.) ($\mu\text{g}/\text{m}^3$)	Max. Predicted Ground Level Concentration ($\mu\text{g}/\text{m}^3$)	Distance from the Project site (max.) km	Total Concentration ($\mu\text{g}/\text{m}^3$)	Revised NAAQ Norms ($\mu\text{g}/\text{m}^3$)	Buffer Available in the Atmosphere in %
1.	PM 2.5	21.60	0.73	0.8	22.33	60	62.78
2.	PM 10	45.70	7.26	0.8	52.96	100	47.04

The predicted maximum GLC-PM_{2.5} & PM₁₀ for cumulative operation of Mining activities are 22.33 $\mu\text{g}/\text{m}^3$ & 52.96 $\mu\text{g}/\text{m}^3$ respectively and found to be confined locally i.e., within 0.8 km radius from the boundaries. Also, adequate Buffer Level available (47-63%) in the Air Environment for the Proposal.



2 Nos. of Mobile tower lights backed with 2 x 125 kVA DG sets will be utilized in the mining area for illumination purpose. The DG sets will have acoustic enclosures to control the noise levels. The stack height will be as per CPCB norms to comply with emission norms.

Noise Levels: The mining operations are being carried out by fully mechanized method with the help of Excavators and Tipper combination. No Drilling and Blasting. The noise level due to Mining Equipments during operation, is being maintained at <90 db(A) at a distance of 1.5 m from the sources. In general, noise generated by these sources is within the limit of 90 dB(A) prescribed by the Director General of Mines Safety (DGMS). The work force is exposed to <85 dB(A) levels during the 8-hours Shift. Ambient Noise Levels (Leqs) will be <55 dB(A) during day times and <45 dB(A) during night times at the boundaries in compliance with MoEF&CC Norms for Residential Areas. Operation of the mobile van will be complying with the MoEF&CC noise norms of <45 dB(A) during night time for residential areas.

Water Environment: The mining activities involve the mining of Atomic Minerals (BSM Ore) from the inland deposits. Block-B is does not contain any river or stream and there are 2 Nos. streams in Block-A. As described in the approved mining plan, adequate safety barriers will be maintained at both sides of the nalla course till the end of the mine life. Natural runoff water would not be disturbed due to the mining activity.

The average working depth in Block – A and Block – B is 6 m only and the maximum depth will be 9 m BGL. The groundwater level in the mining lease area and vicinity is ranging between 10 – 15m BGL as evidenced from the Tamil Nadu Water Supply and Drainage Board (TWAD) and CGWB data base. Thus, the mining activity will not intersect the groundwater table at both the blocks A and B.

With no permanent facilities proposed in the Mining Lease area and with the moving population of worker/employees during the mining, water demand will be 2.5 KLD which will be sourced from the permitted quantity of 4500 KLD from Valliyar River for the existing MSP at Manavalakurichi. Also, the requirement will be managed through local Drinking Water suppliers. Sewage generation of 2.2 KLD will be biologically treated in a mobile Bio-Toilets and the sludge will be used as manure for the Green Belt development. No Workshop is proposed and thus no trade effluent generation from the Mine. No mine pit will be there and thus no mine drain is envisaged. No impact is anticipated on the ground water sources in the Mining Lease vicinity.

Biological Environment: There are no Eco Sensitive Areas like National Parks, Wildlife Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar Sites, Tiger/Elephant Reserves, Reserved Forests, etc., (existing as well as proposed) within 10 km from the Mining Lease Area. Kanniyakumari Wildlife Sanctuary is at 25 km (shortest) distance in northeast.

The study area does not involve any forest land. The private patta lands are found with scattered coconut trees. The major crops cultivated in the study area are coconut trees, fruit crops like mango, banana, jack and aonla. Only domesticated fauna is recorded in the Study Area.



Green Belt Development: The mining will be limited to vacant land available in the mining lease area. Out of total mining lease area of 1144.0618 Ha, the vacant land available for mining of atomic minerals is 834.1296 Ha only. Also, the mining will be carried out in the consented pocket lands given on lease for 11 months by the land owners. After the mining, such pocket lands will be backfilled to its original level and handed over to the land owners. Thus, the land will be in possession of IREL for a short duration of 11 months only and after that the land will not be in possession with IREL. The same scenario would prevail for the entire lease area. IREL will not have any surface right nor land ownership in the entire mining lease area.

In view of this, Green belt development in the mining lease area by IREL may not be possible as the ownership of the land vest with land owners. However, IREL will incorporate a clause in the land lease agreement to plant and develop coconut or any other suitable tree plantation @ 70 Trees per acre in the mined out are.

Towards compensatory afforestation programme, IREL would contribute an amount of Rs. 50 Lakhs to the District Forest Officer (DFO) to develop and maintain 25,000 trees at suitable place near the mining lease area.

Occupational Health and Safety:

Radiation: The coastal areas in Kanniyakumari District including the mining lease area of 1144.0618 ha are having high natural background radiation in the range of 1 to 4 $\mu\text{Svh-1}$ due to presence of Monazite in the BSM Ore. Monazite is a radioactive mineral containing Uranium and Thorium.

On removal of the BSM ore (Run of Mines) containing Monazite and backfilling the mined-out areas with tailings (after removal of minerals), the background radiation in the mined-out area is brought down to 0.2 to 0.4 $\mu\text{Svh-1}$. In other words, there has been 8 to 10 fold reduction in the radiation level in the area where mining & backfilling is carried out by IREL and as such our mining does not affect either environment or people and makes the area free from high background radiation.

IREL will provide and continually improve the occupational health and safety performance. Personal Protective Equipments will be provided to the mine employees. All the workers will be provided with Internal Dosimetry and Medical Surveillance. Maintenance of Pre, during & Post Employment Records will be done. Duly qualified Radiological Safety Officer (RSO) will be appointed. External Radiation Monitoring will be carried out periodically by Health Physics Division, BARC. All the workers will be trained and instructed in radiation safety.

Socio Economics: Neither land acquisition nor purchase of land would be done for the Project. The permanent structures will not be disturbed and mining shall not lead to involuntary displacement of people. Thus, no Rehabilitation & Resettlement (R&R) issue due to the Proposal. Also, there is no litigation against the Proposal.

The Mine will be operated with the required Statutory Officials and Competent Persons mandatorily appointed as per the provisions of the Mines Act, 1952 and Mineral Conservation and Development Rules (MCDR), 2017. Project will employ about 155 persons directly and 250 persons indirectly.

The Project Cost is Rs.31.25 Crores. Royalty, DMF and NMET will be remitted as per the statutory requirement. Adequate CER Budget, as per OM F.No.22-65/2017-IA.III dated 20.10.2020 will be allocated for the benefits of local villages in the Mine vicinity. IREL spends about Rs. 3.00 – 5.00 Crore for CSR activities in the region (Table 3-3)

Table 3-3: CSR Activities in the Region by IREL

CSR Component	CSR Amount Spent (Rupees in lakhs)					
	2020-21	2021-22	2022-23	2023-24	2024-25 Allocated	Total
Health & Nutrition	15.77	76.76	59.39	134.45	127.50	413.87
Education	5.41	3.92	21.77	89.56	166.50	287.16
Rural Development Projects	49.84	28.77	37.64	89.54	150.00	355.79
Promoting Environment		11.79	36.78	15.68	45.00	109.25
Women Empowerment		17.96				17.96
Skill Development			4.06	6.85		2.15
Sports				4.72	11.00	15.72
Total	71.02	139.20	159.64	340.80	500.00	1210.66

CSR Activities by IREL-MK Unit

Contribution to Covid-19 Isolation Centre at Marthandam-50 Beds, 15 Nos. Oxygen Concentrators



Medical Camp conducted at Kurumpanai on 22.07.2023- Beneficiaries - 693 persons



Free Covid-19 Vaccination Camp conducted at BMHS School, Manavalakurichi on 26.08.2021



Eye Camp conducted at Lekshmiapuram on 12.08.2023 Beneficiaries - 501 persons



CSR Activities by IREL – MK Unit



Shri H.R. Koushik, Sub-Collector, Padmanabhapuram

IREL handed over 4 nos. of vehicles to Kollencode & Colachel Municipalities, Ezhuthesam Town Panchayat and Thoothoor Village Panchayat in the presence of Shri N. Selvarajan, Chief General Manager & Head and Trade Union Representatives on 13.01.2023 for handling Solid waste in the Municipalities/Panchayat.

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Shri N. Selvarajan, CGM & Head, MK handed over cheque of Rs.14 lakhs and Rs.4.50 lakhs to the Sub-Collector, Padmanabhapuram towards Fishermen Village Development Fund and Medical Assistance Fund respectively on 14.09.2022









4.0 Environmental Monitoring Programme

IREL has EMP Monitoring Cell. The quality of air, noise, water, soil, etc., will be monitored periodically at the identified locations as per the MoEF&CC, & TNPCB Norms by appointing an accredited external agency. The Status Reports will be submitted to the Authorities periodically viz., TNPCB monthly and MoEF&CC Monitoring Cell as Half-Yearly Status Reports.

5.0 Additional Studies

Detailed Risk Assessment and mitigate measures are delineated and an effective Disaster Management Plan for natural and man-made disasters is also submitted.

6.0 Project Benefits

Social Benefits: Commencement of mining operation over the mining lease area of 1144.06.18 ha will result in overall development of the region in its own way like provision of direct & indirect employment, improvement in the general living standards and knowledge sharing, improved wage level and the living standard of the local people and continual improvements in the amenities and infrastructure facilities for the local populace.

As per the IREL's policy, neither land acquisition nor purchase of land would be done for the project. The mining operations will be carried out over the private patta lands after obtaining the consent from the respective land owners on lease basis. The land leasing period will be 11 months. Mining and backfilling will be simultaneously carried out within the lease period of 11 months and thereafter the land will be returned to the land owners with lease compensation. Mining in the lease hold areas will not result in any involuntary displacement nor change in the ownership of the land. The payment of lease compensation results in significant improvement in quality of life for local populace and economic growth in the region.

Environmental Benefits: The coastal areas in Kanniyakumari District including the mining lease area of 1144.0618 ha are having high natural background radiation in the range of 1 to 4 μSvh^{-1} due to presence of Monazite in the BSM Ore. Monazite is a radioactive mineral containing Uranium and Thorium. On removal of the BSM Ore (Run of Mines) containing Monazite and backfilling the mined-out areas with tailings (after removal of minerals-quartz), the background radiation in the mined-out area is brought down to 0.2 to 0.4 μSvh^{-1} . In other words, there has been 8 to 10 fold reduction in the radiation level in the area where mining & backfilling is carried out by IREL and as such our mining makes the area free from radioactivity and improving the living condition of people.

Financial Benefits: IREL is the only CPSE in the country being authorized to mine and handle "Monazite" and its value-added products. The Zircon produced from Manavalakurichi Unit is directly sent to the Nuclear Fuel Complex (NFC), Department of Atomic Energy for strategic applications. The processed mineral products, apart from its usage for strategic purpose in Nuclear Energy, Defense, Space etc., finds application in number of commercial sectors such as aerospace industry, infrastructure development, ceramics, foundries, oil industries etc., while Rare Earths are used in niche applications such as consumer electronics, renewable energy, EVs, etc., and also has excellent contribution for sustenance of industries in the value chain of its mineral & rare earth products. The project will generate revenue in terms of royalty and taxes etc., to the state of Tamil Nadu in addition to make available of strategic material. All these minerals and Rare Earth provides input for other industries and plays a vital role in global economy.



7.0 Environmental Management Plan

Environmental Management Plan (EMP) is suggested to mitigate the possible negative impacts that may be caused to various attributes of environment due to the proposed mining operations.

EMP for Construction Phase: There will be no Construction Phase for the Project.

EMP for Operation Phase:

Land Environment:

- Mined-out areas are to be backfilled simultaneously to restore the topography.
- Plantation are to be carried out in the mined-out areas after backfilling.
- Backfilled mined out land will be used for other activities including construction and thereby ensuring Eco-friendly and Sustainable mining.
- Carbon sequestration is the long-term storage of carbon in oceans, soils, vegetation (especially forests) and geologic formations. Adequate Green Belt will be developed for carbon sequestration. As trees grow, they store carbon in woody tissues and soil organic matter.

Traffic Impact

- ROM transportation from Blocks –A & B to MSP will be through District Major Road/SH-179.
- All Tippers shall be fully covered with Tarpaulin to avoid any spillage during transportation.
- Over loading of Tippers shall not be permitted.
- Speed restrictions shall be enforced.
- Restriction of Truck parking in the Highway and Public Roads shall be enforced.
- Regular and preventive maintenance of transport vehicles shall be ensured.
- Compliance to 'Pollution under Control' Certification shall be ensured and to be checked periodically.

Air Environment

- The DG sets will have acoustic enclosures to control the noise levels. The stack height will be as per the CPCB norms to comply with emission norms.
- Water sprinkling on loading point and Haul Roads are to be carried out.
- Covering of Trucks/Tippers with tarpaulin shall be ensured during Ore transportation.
- Over loading of Tippers shall be avoided to control the spillages during transportation.
- Periodical maintenance and replacement of worn out accessories in the mining equipments shall be carried out.
- 'Pollution under Control' Certification has to be ensured and to be checked periodically.
- Periodical monitoring of Ambient Air Quality shall be carried out.

Noise Levels

- Deployment of mining equipments shall be with in-built mechanism for reducing noise.
- Operation of the mobile van will be complying the MoEF&CC noise norms of <45 dB(A) during night time for residential areas.
- Providing ear muffs/ear plugs to the workers in high noise zones.
- Periodical Noise Monitoring shall be carried out and Reports submitted to the Authorities.



Water Environment

- Natural drains shall be maintained as such.
- Adequate safety barriers will be maintained at both sides of the nalla course in the mining lease area till the end of the mine life.
- No ground water drawl in the Mining Lease Area as well as CRZ Area for the project.
- Periodical monitoring of water table levels and water quality shall be carried out.

Biological Environment

- IREL will incorporate a clause in the land lease agreement to plant and develop coconut or any other suitable tree plantation @70 Trees per acre in the mined out areas.
- Towards compensatory afforestation programme, IREL would contribute an amount of Rs.50.00 Lakhs to the District Forest Officer (DFO) to develop and maintain 25,000 trees at suitable place near the lease area.

Occupational Health Measures: Mining Lease Area of 1144.0618 ha are having high natural background radiation in the range of 1 to 4 μSvh^{-1} due to presence of Monazite in the BSM Ore. Monazite is a radioactive mineral containing Uranium and Thorium. On removal of the BSM ore (Run of Mines) containing Monazite and backfilling the mined-out areas with tailings (after removal of minerals-quartz), the background radiation in the mined-out area is brought down to 0.2 to 0.4 μSvh^{-1} . In other words, there has been 8 to 10 fold reduction in the radiation level in the area where mining & backfilling is carried out by IREL and as such mining does not affect either environment or people and makes the area free from high background radiation.

IREL will provide and continually improve the occupational health and safety performance. Personal Protective Equipments will be provided to the mine employees. All the workers will be provided with Internal Dosimetry and Medical Surveillance. Maintenance of Pre, during & Post Employment Records will be done. Duly qualified Radiological Safety Officer (RSO) will be appointed. External Radiation Monitoring will be carried out periodically by Health Physics Division, BARC. All the workers will be trained and instructed in radiation safety.

Social Measures: The Project Cost is Rs.31.25 Crores. Royalty, DMF and NMET will be remitted as per the statutory requirement. Adequate CER Budget, as per OM F.No.22-65/2017-IA.III dated 20.10.2020 will be allocated for the benefits of local villages in the Mine vicinity. IREL spends about Rs.3.00 – 5.00 Crore for CSR activities in the region which will be continued.

Plastic Waste Management: There will be ban on one-time use and throw away Plastic usage in the operational area. Use of ecofriendly alternatives such as banana leaf, areca nut palm plate, stainless steel glass, porcelain plates / cups, cloth bag, jute bag etc., will encouraged and awareness program will be conducted periodically.

EMP Budget: The Project Cost is Rs.31.25 Crores. An amount of Rs.20.00 lakhs is earmarked as Capital EMP Budget and Rs.10.50 lakhs per annum is Operating Cost towards EMP measures including Environmental Monitoring. Also, an amount of Rs.10.00 lakhs per annum has been earmarked for Occupational Health & Safety Measures. Also, budget for the Corporate Environmental Responsibility (CER) will be allocated in compliance with the guidelines of MoEF&CC.
