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CHAPTER 1 INTRODUCTION

1.1 PRELUDE

M/s. Karnataka Mining Industries is a partnership firm involved in mining, beneficiation & marketing of minerals. The applicant is having other mining leases in H.D.Kote taluka, for Kyanite and Graphite mineral mining. The partners of the firm Mr Naresh Bajaj & Mr Arun Kumar Bajaj are well experienced in the mining of Kyanite & Graphite.

M/s Karnataka mining industries is in possession of a Mining Lease No-2341 over a total extent of 150 acres (60.70 Hectares) in Hunaganahalli village.

The earlier lease was granted and executed for an area over 62 acres; further vide notification number DGM/MLS/86/AML94/2004-05-9846/ML No 2341 Dtd: 20-10-2004 another area of 88 acres and inclusion of kyanite was granted coterminous to the existing lease No.2341 to M/s Karnataka Mining Industries.

Since the lessee has proposed to significantly increase the production of Kyanite to 10,000 tonnes/annum from 1000 tonnes, he has been advised to obtain Environmental clearance from MoEF, Government of India as per the above notification under EIA Notification dated 14th September 2006. The proposed increase in production has necessitated changing of the earlier Mining Plan. Hence, the modified Mining Plan is being submitted for approval and onward submission to MoEF and the Directorate of Mines and Geology. The Mining Plan is being prepared under Rule 22 of MCR 1960 for Kyanite and Graphite

1.2 OBJECTIVE & SCOPE OF STUDY

To obtain environmental clearance for proposed project of Kyanite and Graphite Ore of Karnataka Mining Industries (Lease area 60.7 ha (150 Acre), proposed rate of production 10000 tonnes/ year).

Since the area within the lease is less fertile agriculture land because of deposition of the float ore Kyanite bearing graphite schist, maximum up to the depth of 1.2 m. Moreover, the process shall be development of the agriculture land by segregating all the float ore just converting the same to higher fertile land, therefore, this is not exactly

a mining project as it does not involve deployment of heavy mining machinery, drilling or blasting. This method of ore collection is surfacial, since collection would be from the surface and maximum up to the depth of 1.2 meters. Presently the land has low fertility due to the presence of the ore but it becomes 100% fertile just after collection of the ore. The area after the collection of mineral is immediately given back to the farmers for farming.

So, this mine is 100% environment friendly and it also increases the fertility of the land, so this project can also be treated as the land development.

1.2.1 SCOPE OF STUDY

The sole purpose of Environmental Impact Assessment report is to assess the beneficial and adverse impacts of the proposed activity on the existing environmental systems and to propose appropriate pollution control measures. Thus the report is a summarized presentation of environmental consequences of the project activity so that all the factors are considered in totality and decision is taken accordingly. As per the ToR received from MoEF, Delhi on 4th October 2010, following points were covered in the EIA Report:

1. A copy of the document in support of the fact that the proponent is the rightful lessee of the mine should be given.
2. A copy of the document in support of the fact that the proponent is the rightful lessee of the mine should be given.
3. All documents including approved mine plan, EIA and public hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management and mining technology and should be in the name of the lessee.
4. The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc should be for the life of the mine / lease period.

5. Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary and national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated.
6. Land use plan of the mine lease area should be prepared to encompass pre-operational, operational and post operational phases and submitted.
7. Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Tiger/Elephant Reserves (existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, if any, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above should be obtained from the State Wildlife Department/ Chief Wildlife Warden under the Wildlife (Protection) Act, 1972 and copy furnished.
8. A detailed biological study for the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, duly authenticated, separately for core and buffer zone should be furnished based on field survey clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.
9. Impact of change of land use should be given.
10. R&R plan / compensation details for the project affected people. While preparing the R&R plan, the National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs / STs and other weaker sections, need based sample survey, family-wise, should be undertaken to assess their requirement and action programmes integrating the sectoral programme of line departments of the State Government.
11. One season (non-monsoon) primary baseline data on ambient air quality (PM10, SO2 and NOx), water quality, noise level, soil and flora and fauna shall be collected and the AAQ data so collected presented date-wise in the EIA and EMP report. Site-

specific meteorological data should also be collected. The location of the monitoring stations should be justified. Date wise collected baseline AAQ data should form part of EIA and EMP report. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction.

12. Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.
13. The water requirement for the project, its availability and source to be furnished. A detailed water balance should also be provided. Fresh water requirement for the project should also be indicated.
14. Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the project should be provided.
15. Details of water conservation measures proposed to be adopted in the project should be given.
16. Impact of the project on the water quality both surface and groundwater should be assessed and necessary safeguard measures, if any required should be provided.
17. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed hydro geological study should be undertaken and report furnished. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.
18. Details of first order stream, if any passing through lease area and modification/diversion proposed, if any and the impact of the same on the hydrology should be brought out.
19. Details of rainwater harvesting proposed, if any, in the project to be provided.

20. Information on site elevation, working depth, groundwater table should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.
21. Quantity of solid waste generation to be estimated and details for its disposal and management be provided. The quality, volumes and methodology planned for removal and utilisation (preferably concurrently) of top soil should be indicated. Details of backfilling proposed, if any, should also be given. It may be clearly indicated that out of the total waste generated during the mine life, the quantity to be backfilled and the quantity to be disposed off in the form of external dump (number of dumps, their height, terraces etc.).
22. The reclamation plan, post mine land use and progressive greenbelt development plan shall be prepared in tabular form (prescribed format) and submitted.
23. Impact on local transport infrastructure due to the project should be indicated. Projected increase in truck traffic as a result of the project in the present road network (including those outside the project area) should be worked out, indicating whether it is capable of handling the increased load. Arrangement for improving the infrastructure, if contemplated including action to be taken by other agencies such as State Government, if any, should be covered.
24. Details of the infrastructure facilities to be provided for the mine workers should be included in the EIA report.
25. Conceptual post mine land use and Reclamation and Rehabilitation of mined out area (with plans and with adequate number of sections) should be given in the EIA report.
26. Phase-wise plan of greenbelt development, plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted.
27. Occupational health impact of project should be anticipated and prevention measures initiated. Details in this regard should be provided.
28. Occupational health impact of the project. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP.

29. Measures of socio economic significance influence to the local community proposed to be provided by project proponent. As far as possible, quantitative dimension may be given with time frame for implementation.
30. Detailed environmental management plan to mitigate the environmental impacts which, should inter-alia also include the impact due to change of land use, due to loss of agricultural land and grazing land, if any, occupational health impacts besides other impacts of the projects.
31. Public hearing points raised and commitment of the project proponent on the same along with time bound action plan to implement the same should be provided.
32. Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the project should be given.
33. The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should clearly be spelt out.

In addition to the above we are also addressing the following issues:

- ❖ All documents have been properly referenced with index, page numbers and continuous page numbering.
- ❖ Where data are presented in the report especially in tables, the period in which the data were collected and the sources have been indicated.
- ❖ Where the documents provided are in a language other than English, an English translation have been provided.
- ❖ The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry has also be filled and attached.
- ❖ Approved mine plan along with copy of the approval letter for the proposed capacity is also attached.
- ❖ While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry has also be followed.
- ❖ The EIA report would also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and

sections and (iii) sections of the mine pit and external dumps, clearly showing the land features of the adjoining area.

1.3 METHODOLOGY FOR EIA

- Any developmental project is expected to cause impacts on surrounding environment at and around the project site during its construction and operational phases. The nature and magnitude of impacts on different components of the environment depend on the type of project activities and geographical conditions of the study area. The impacts of the project activities on environmental components can be quantified through Environment Impact Studies within the impact zone of the project activities. The results of the EIA studies form a basis for preparing a viable Environmental Management Plan (EMP) for mitigating the potential adverse impacts.
- This Rapid Environmental Impact Assessment (REIA) for proposed Graphite & Kyanite Mine (86 AML 94) at near village Hunaganahalli, Tehsil Heggadadevanakote, Distt - Mysore, Karnataka deal with detailed studies for various environmental components viz. air, noise, water, land, biological and socio-economic environment for study period. For Rapid Environmental Impact Assessment studies, an area covering 10 km radial distance from centre of project site was identified as the study area (impact zone).

1.3.1 LAND ENVIRONMENT

Soil samples were collected from the project site, its immediate vicinity and the surrounding areas. Physico-chemical properties of the soils were determined and information of landuse pattern in the study area was also collected. Environmental management plan was formulated for solid waste management during construction and operational phase of proposed project.

1.3.2 WATER ENVIRONMENT

Information on water resources in the study area was collected. The water resources in the study area are mainly groundwater . The parameters of prime importance for water quality studies were selected under physical, chemical, inorganic, organic,

nutrient heavy metal and bacteriological groups. Samples for groundwater and surface water at different locations were collected and analyzed.

1.3.3 AIR ENVIRONMENT

The topographical information of project site as well as of the study area and details about different activities related to the project site was collected. Different air pollution parameters like PM₁₀, SO₂, and NO_x etc. were identified as related to the project activities for representing baseline status of ambient air quality within the study area. Meteorological parameters viz. wind speed, wind direction; temperature, relative humidity and rainfall were collected during the study period (October - December 2010). The estimation of air pollution loads was predicted for with and without project scenario for stationary sources.

1.3.4 NOISE ENVIRONMENT

Noise is often defined as unwanted sound, interferes with speech communication, causes annoyance, distracts from work and disturbs sleep, thus, deteriorating quality of human environment. Noise pollution monitoring has, therefore, been carried out in and around proposed project site to assess the impact of the construction and operational phase activities on the ambient noise environment.

Noise levels were measured during day and night time at several locations in the human settlements around the proposed project site.

1.3.5 Ecological Environment

Commonly found species for flora and fauna within the project influenced area were collected from secondary sources. The landscape of the project site has been planned. Based on the attenuation factors for dust aerosols and air pollutants, green belt species were identified and the same are incorporated in the report.

1.3.6 Socio- Economic Environment

The information has been collected from the secondary sources as per census records and demographic structure of the study area has been selected as a parameter under

socio-economic component. Significant impacts have been predicted on the nearby human settlements during construction and operational phase of environment.

1.3.7 Statutory Requirements

- The objective of the study is to carry out Environmental Impact Assessment (EIA) for the proposed project to meet the environmental compliances laid down by the Ministry of Environment and Forests (MoEF), Government of India.
- EIA is a planning tool that is now generally accepted as an integral component of sound decision-making. The objective of EIA is to foresee and address potential environmental problems/concerns at an early stage of project planning and design. EIA/EMP (Environmental Management Plan) should assist planners and government authorities in the decision making process by identifying the key impacts/issues and formulating mitigation measures.
- The study would include the description of project setting, appraisal of project activities and assessment of adverse impacts related to the location, design, construction and operation of the project. Environmental Management Plan (EMP) will be prepared that includes mitigation measures, including evaluation of alternatives to reduce or mitigate/eliminate the impacts that likely to cause most significant environmental burdens. The cost would be worked out for the management and monitoring programmes.
- Filling up of application form and questionnaire for the Ministry of Environmental and Forest (MoEF) and presentation before the Environmental Appraisal Committee for Environmental Clearance.

LEGAL, POLICY & Institutional Frameworks

The principal environmental regulatory, agency in India is the Ministry of Environment & Forests (MoEF), New Delhi that formulates environmental policies and accords environmental clearances for different projects. This section describes all relevant existing legal and institutional framework related to environmental management of infrastructure development projects in India including clearance requirements as per

Government of India. Table 1.1 highlights the relevant environmental legislations applicable to the project.

Table 1- 1 Environmental Legal Framework Applicable to Project

S. No	Legal Framework	Coordinating Agency	Objectives/Highlights of Framework.	Applicability
Environment Legal Framework				
1	Water (Prevention and Control of pollution) Act 1974	CPCB, KSPCB	Prohibits the discharge of pollutants into water bodies beyond a given standard, and lays down penalties for non-compliance	Applicable
2	Water (Prevention and Control of Pollution) Cess Act, 1977	KSPCB	Provides for a levy and collection of a cess on water consumed by industries and local authorities	Applicable
3	Air (Prevention and Control of Pollution) Act, 1981	CPCB, KSPCB	Provides means for the control and abatement of air pollution.	Applicable
4	The Air (Prevention and Control of Pollution) Rules, 1982	CPCB, KSPCB	Defined the procedures for conducting meetings of the boards, the powers of the presiding officers, decision-making etc	Applicable
5	The Noise Pollution (Regulation and Control) Rules, 2000	CPCB, KSPCB	Provides means for the control and abatement of noise pollution.	Applicable
6	Environment (Protection) Act, 1986 (EPA) followed by amendment in May	Ministry of Environment and Forests (MoEF)	Ensure that appropriate measures are taken to conserve and protect the environment before commencement of operations.	Applicable

S. No	Legal Framework	Coordinating Agency	Objectives/Highlights of Framework.	Applicability
	1994 (Schedule-I)			
7	Environmental Impact Assessment Notification 2006, and its subsequent addenda/ deletion/ alteration and updation till date	MoEF	It makes EIA Report preparation mandatory for 32 types of projects as mentioned in Schedule-I of EIA notification no. 60 (E) dt. 07-01-1994 and its subsequent amendments	Applicable
8	The Environment (Protection) Rules, 1986	KSPCB, MoEF	Lay down the procedures for setting standards of emission or discharge of environmental pollutants.	Applicable
OTHER RELEVANT LEGAL FRAMEWORK				
9	The Hazardous Wastes Management (Management and Handling) Rules, 1989	KSPCB, MoEF	Providing for making effective procedure for inventory, control, handling and disposal of hazardous waste provide for setting up of disposal sites/landfill sites design, operation and closure.	Not Applicable
10	The Manufacture, Storage and Import of Hazardous Chemical (MSIHC) Rules, 1989/2000	KSPCB, MoEF	Under these rules, any kind of hazardous industry has to identify likely hazard and their danger potential. They also have to take adequate steps to prevent and limit the consequences of any accident at site. MSIHC Rules	Not Applicable

S. No	Legal Framework	Coordinating Agency	Objectives/Highlights of Framework.	Applicability
			Isolated storage and industrial activity at a site handling (including transport through carrier or pipeline) of hazardous chemicals equal to or, in excess of the threshold quantities.	
11	Factories Act, 1948 amended 1987	KSPCB, MoEF	The act tell about the regulation of labour employed in factories	Applicable
12	Central Motor Vehicles Act 1988/	Ministry of Road Transport and Highways	To control vehicular air and noise pollution. To regulate development of the transport sector, check and control vehicular air and noise pollution.	Applicable

Source: Government of India Publications

1.4 ENVIRONMENTAL STANDARDS

1.4.1 AMBIENT AIR QUALITY STANDARDS

The proposal for revision in NAAQS was deliberated upon extensively and has been notified under the Environment (Protection) Act, 1986 on 16.11.2009 by the Ministry of Environment and Forests. The CPCB has initiated the process of harmonizing it's notification under the Air Act, 1981 with the revised notification so as to ensure the efficient implementation of the new standards. Table 1.2 details out the National Ambient Air Quality Standards.

Table 1- 2 National Ambient Air Quality Standards

Pollutant	Time Weighted average	Concentration in Ambient Air		Methods of Measurement[
		Industrial, Residential, Rural and other area	Ecologically sensitive area (Notified by	

			Central Government)	
Sulphur Dioxide SO ₂ μ g/m ³	Annual *	50	20	○ Improved West & Gaeke ○ Ultraviolet
	24 hours **	80	80	
Nitrogen Dioxide as NO ₂ μ g/m ³	Annual*	40	30	○ Modified Jacob & Hochheiser (Na-Arsenite) ○ Chemiluminescence
	24 hours **	80	80	
Particulate matter (size less than 10 μm) (PM ₁₀) μ g/m ³	Annual *	60	60	○ Gravimetric ○ TOEM ○ Beta attenuation
	24 hours **	100	100	
Particulate matter (size less than 2.5 μ m) (PM _{2.5})	Annual *	40	40	○ Gravimetric ○ TOEM ○ Beta attenuation
	24 hours **	60	60	
Ozone (O ₃) μg/m ³	8 hours **	100	100	○ UV photometric ○ Chemiluminescence ○ Chemical method
	1 hour **	180	180	
Lead (Pb) μg/m ³	Annual*	0.50	0.50	○ AAS/ICP method after sampling on EPM 2000 or equivalent filter paper ○ ED – XRF using Teflon filter
	24 hours **	1.0	1.0	
Carbon Monoxide mg /m ³	8 hours **	02	02	○ Non Dispersive Infra Red (NDIR) spectroscopy
	1 hour **	04	04	
Ammonia	Annual *	100	100	○ Chemiluminescence ○ Indophenol blue method
	24 hours **	400	400	
Benzene (C ₆ H ₆) μ g/m ³	Annual*	05	05	○ Gas chromatography 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 ng/m ³	(Ni)	Annual *	20	20 ○ AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

Source: Central Pollution Control Board

1.4.2 AMBIENT NOISE STANDARDS

Ambient Noise level standards have been notified by the MoEF in the Noise Pollution (Regulation and control) Rules, 2000 under Environmental (Protection) Act, 1986 in the schedule (rule 3(1) and 4(1)). It is based on the 'A' weighted equivalent noise level (Leq) and presented in Table 1.3.

Table 1- 3: National Ambient Noise Standards

Category of Zones	Leq in dB(A)	
	Day *	Night+
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone **	50	40

* Day Time is from 6.00 AM and 10.00 PM.
+ Note –2 :Night Time is reckoned between 10.00 PM and 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

1.4.3 Effluent Discharge Standards

For the purpose of protecting and improving the quality of the environment and preventing and abating environmental pollution, the standards for discharge of environmental pollutants from the industries, operations or processes are stipulated under "Environmental (Protection) Rules, 1986. The standards for discharge effluent in municipal sewer are present in Table 1.4.

Table 1- 4 Effluent Discharge Standards (Public Sewer)

S. No.	Parameter	Public Sewers
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S. No.	Parameter	Public Sewers
1	Color and Odor	--
2	Suspended Solids mg/l, Max.	600
3	pH Value	5.5 to 9.0
4	Temperature	--
5	Oil and Grease mg/l, Max.	20
6	Total residual chlorine mg/l, Max.	--
7	Ammonical Nitrogen (as N), mg/l, Max.	50
8	Total Kjeldahl Nitrogen (as NH ₃) mg/l, Max.	--
9	Free Ammonia (as NH ₃) mg/l, Max.	--
10	Biochemical oxygen demand (5 days at 20°C), mg/l Max.	350
11	Chemical Oxygen demand, mg/l Max.	-
12	Arsenic (as As), mg/l Max.	0.2
13	Mercury (as Hg), mg/l Max.	0.01
14	Lead (as Pb), mg/l Max.	1.0
15	Cadmium (as Cd), mg/l Max.	1.0
16	Hexavalent Chromium (as Cr+6), mg/l Max	2.0
17	Total Chromium (as Cr), mg/l Max	2.0
18	Copper (as Cu), mg/l Max.	3.0
19	Zinc (as Zn), mg/l Max.	15
20	Selenium (as Sc.), mg/l Max.	0.05
21	Nickel (as Ni), mg/l Max.	3.0
22	Cyanide (as CN), mg/l Max.	2.0
23	Fluoride (as F) mg/l Max.	15
24	Dissolved Phosphates (as P), mg/l Max.	-
25	Sulphide (as S), mg/l Max	-
26	Phenolic Compounds (as C ₆ H ₅ OH) mg/l Max.	5.0
27	Radioactive Materials a Alpha emitter micro curie/ml b. Beta emitter micro curie/ml	10 ⁻⁷ 10 ⁻⁷
28	Bio-assay test	90% survival of fish after 96 hours in 100% effluent
29	Manganese (as Mn), mg/l Max	2
30	Iron (as Fe), mg/l Max.	3
31	Vanadium (as V), mg/l Max	0.2

S. No.	Parameter	Public Sewers
32	Nitrate Nitrogen, mg/l Max.	-

Source: CPCB, 1998, Pollution Control Acts, Rules, and Notifications issued there under.

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To ascertain and categorize the existing drinking water quality, water quality need to be compared with the drinking water quality standards given in Table 1.5.

Table 1- 5: Drinking Water Quality Standards (IS 10500:1991)

S. No.	Substance or Characteristic	Requirement (Desirable Limit)	Undesirable Effect outside the Desirable Limit	Permissible Limit in the Absence of Alternate Source	Methods of Test (Ref to IS)	Remarks
1	2	3	4	5	6	7
Essential Characteristics						
i	Colour, Hazen units, Max	5	Above 5, consumer acceptance decreases	25	3025 (Part 4) : 1983	Extended to 25 only if toxic substances are not suspected, in absence of alternate sources
ii	Odour	Unobjectionable	-	-	3025 (Part 5) : 1983	a. Test cold and when heated b. Test at several dilutions
iii	Taste	Agreeable	-	-	3025 (Parts 7 & 8) : 1984	Test to be conducted only after safety has been established
iv	Turbidity, NTU, Max	5	Above 5, consumer acceptance decreases	10	3025 (Part 10) : 1984	-
v	pH value	6.5 to 8.5	Beyond this range the water will affect the mucous membrane and / or water supply system	No relaxation	3025 (Part 11) : 1984	-

S. No.	Substance or Characteristic	Requirement (Desirable Limit)	Undesirable Effect outside the Desirable Limit	Permissible Limit in the Absence of Alternate Source	Methods of Test (Ref to IS)	Remarks
vi	Total hardness (as CaCO ₃) mg/l, Max	300	Encrustation in water supply structure and adverse effects on domestic use	600	3025 (Part 21) : 1983	-
vii	Iron (as Fe) mg/l, Max #	0.3	Beyond this limit taste/ appearance are affected, has adverse effect on domestic uses and water supply structures, and promotes iron bacteria	1.0	32 of 3025 : 1964	-
viii	Chlorides (as Cl) mg/l Max	250	Beyond this limit, taste, corrosion and palatability are affected	1000	3025 (Part 32) : 1988	-
ix	Residual, free chlorine, mg/l Min	0.2	-	-	3025 (Part 26) : 1986	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be Min 0.5 mg/l.
x	Fluoride (as F), mg/l Max	1.0	Fluoride may be kept as low as possible. High fluoride may cause fluorosis	1.5	23 of 3025 : 1964	-
Desirable Characteristics						
xi	Dissolved solids mg/l Max	500	Beyond this palatability decreases and may cause gastro intestinal irritation	2000	3025 (Part 16) : 1984	-

S. No.	Substance or Characteristic	Requirement (Desirable Limit)	Undesirable Effect outside the Desirable Limit	Permissible Limit in the Absence of Alternate Source	Methods of Test (Ref to IS)	Remarks
xii	Calcium (as Ca), mg/l Max	75	Encrustation in water supply structure and adverse effects on domestic use	200	3025 (Part 40) : 1991	-
xiii	Magnesium (as Mg), mg/l Max	30	Encrustation to water supply structure and adverse effects on domestic use	100	16, 33, 34 of IS 3025 : 1964	-
xiv	Copper (as Cu), mg/l Max #	0.05	Astringent taste, discoloration and corrosion of pipes, fitting and utensils will be caused beyond this.	1.5	36 of 3025 : 1964	-
xv	Manganese (as Mn) mg/l Max #	0.1	Beyond this limit taste/ appearance are affected, has adverse effect on domestic uses and water supply structures	0.3	35 of 3025 : 1964	-
xvi	Sulphate (as SO ₄) mg/l Max	200	Beyond this causes gastro intestinal irritation when magnesium or sodium is present.	400 (see col 7)	3025 (Part 24) : 1986	May be extended up to 400 provided (as Mg) does not exceed 30
xvii	Nitrate (as NO ₂), mg/l Max	45	Beyond this methaemoglobinemia takes place	100	3025 (Part 34) : 1988	-
xviii	Phenolic compounds (as C ₆ H ₅ OH) mg/l Max	0.001	Beyond this, it may cause objectionable taste and odor	0.002	54 of 3025 : 1964	-
xix	Mercury (as Hg) mg/l Max #	0.001	Beyond this, the water becomes toxic	No relaxation	(see Note) Mercury ion analyzer	To be tested when pollution is suspected
xx	Cadmium (as	0.01	Beyond this, the	No	(See Note)	To be

S. No.	Substance or Characteristic	Requirement (Desirable Limit)	Undesirable Effect outside the Desirable Limit	Permissible Limit in the Absence of Alternate Source	Methods of Test (Ref to IS)	Remarks
	Cd), mg/l Max #		water becomes toxic	relaxation		tested when pollution is suspected
xxi	Selenium (as Se), mg/l Max #	0.01	Beyond this, the water becomes toxic	No relaxation	28 of 3025 : 1964	To be tested when pollution is suspected
xxii	Arsenic (as As), mg/l Max #	0.05	Beyond this, the water becomes toxic	No relaxation	3025 (Part 37) : 1988	To be tested when pollution is suspected
xxiii	Cyanide (as CN), mg/l Max	0.05	Beyond this limit, the water becomes toxic	No relaxation	3025 (Part 27) : 1986	To be tested when pollution is suspected
xxiv	Lead (as Pb), mg/l Max #	0.05	Beyond this limit, the water becomes toxic	No relaxation	(see Note)	To be tested when pollution is suspected
xxv	Zinc (as Zn) mg/l Max #	5	Beyond this limit it can cause astringent taste and opalescence in water.	15	39 of 3025 : 1964	To be tested when pollution is suspected
xxvi	Anionic detergents (as MBAS) mg/l Max	0.2	Beyond this limit it can cause a light froth in water	1.0	Methyleneblue extraction method	To be tested when pollution is suspected
xxvii	Chromium (as Cr ⁶⁺) mg/l Max #	0.05	May be carcinogenic above this limit	No relaxation	38 of 3025 : 1964	To be tested when pollution is suspected
xxviii	Polynuclear aromatic	-	May be carcinogenic	-	-	-

S. No.	Substance or Characteristic	Requirement (Desirable Limit)	Undesirable Effect outside the Desirable Limit	Permissible Limit in the Absence of Alternate Source	Methods of Test (Ref to IS)	Remarks
	hydrocarbons (as PAH)mg/l					
xxix	Mineral oil mg/l Max	0.01	Beyond this limit undesirable taste and odor after chlorination take place	0.03	Gas chromatographic method	To be tested when pollution is suspected
xxx	Pesticides mg/l Max	Absent	Toxic	0.001	-	-
xxxix	Radioactive materials				58 of 3025 : 1964	
	a. Alpha emitters Bq/l, Max	-	-	0.1	-	-
	b. Beta emitters pci/l, Max	-	-	1	-	-
xxxii	Alkalinity mg/l Max	200	Beyond this limit taste becomes unpleasant	600	13 of 3025 : 1964	-
xxxiii	Aluminum (as Al) mg/l Max #	0.03	Cumulative effect is reported to cause dementia	0.2	31 of 3025 : 1964	-
xxxiv	Boron (as Bo) mg/l Max	1	-	5	29 of 3025 : 1964	-

Source: IS: 10500:1991 (Bureau of Indian Standards)

1.5 Report Layout

The objective of the study is to identify the possible environmental impacts, which can be anticipated as a result of the construction and the operational phase of the proposed project, and to suggest suitable measures to mitigate the expected, adverse impacts on the environment. The work has been carried out in accordance with MoEF guidelines and covers the requirements of environmental appraisal committee of MoEF. Baseline information such as data on flora, fauna and demography has been collected from available literature field surveys. A sampling network was designed for field studies to collect air, water, soil and noise quality data apart from collection of data pertaining to hydrology, meteorology, and land use, which were collected from

secondary sources and the Project Report (PR). The main chapters of the report are following:

Chapter-1: Introduction of the proposed project;

Chapter-2: Description on the proposed project activities and facilities;

Chapter-3: Environmental Baseline;

Chapter-4: Potential positive and adverse environmental impacts of the project;

Chapter-5: Environmental monitoring plan;

Chapter-6: Additional Studies

Chapter-7: Project Benefits

Chapter-8: Environmental Management Plan including environmental strategy to combat the probable adverse impacts

Chapter 9: Executive Summary

