7.0 Public Consultation:

Table: 7.1 – Response of PP for Public hearing points raised

S.No.	Points Raised	Response/Commitment of Project Proponents
1	Smt. Varalakshamma, Sarpanch, Kalichedu village, Sydapuram Mandal, SPSR Nellore district-while expressing her opinion on the mining project she informed that she has no objection for the establishment of mining project and the she requested the project management to renovate the hospitals and school and to lay the roads in the village and to construct Kalyana Mandapam in the village.	Management assured that they will renovate hospital and school and also lay the roads.
2	Sri M. Veeraswamy, Sydapuram Mandal, SPSR Nellore District-while expressing his opinion on the mining project, he informed that there is no cultivation due to no rainfall and they are solely depending on this mining project and hence, her expressed his whole heart support to this mining project.	Management also assured that there would be development due to the mining project.
3	Sri Suresh Babu, Kalichedu Village, SPSR Nellore District- While expressing his opinion on the mining project, he informed that there is no agriculture activity due to no rainfall and they are solely depending on this mining project and hence, he expressed his whole heart support to this mining project.	Management also assured that there would be development due to the mining project.
4	Sri Penugonda Bhaskara Rao, Kalichedu Village, SPSR Nellore District-while expressing his opinion on the project he informed that he has no objection	Management also assured that there would be development due to the mining project.

	for the mining project and supported for the project.	
5	Smt. Gajula Chandramma, Kalichedu Village, SPSR Nellore District-while expressing her opinion on the project she informed that the mining management has provided water tankers in the village and she expressed no objection for the mining project and supported for the project.	Management also assured that there would be development due to the mining project.
6	Sri Subramanyam, Kalichedu village, SPSR Nellore District-while expressing his opinion on the project has informed that he has no objection for the mining project and he requested the project management to rectify the water scarcity in the village & and to develop village roads for school going children and supported for the project.	Management assured to provide the Road facility for school going children.
7	Sri K. Sekhar, Kalichedu, Sydapuram Mandal, SPSR District-while expressing his opinion on the mining project he informed that he has no objection for the establishment of the mining project and he requested the project management to renovate the hospitals & schools in the village and he expressed his support.	Management assured that they will renovate hospital and school.
8	Sri Sunanda Reddy, Environmental NGO, Nalgonda District-while expressing his opinion on the mining project, he appraised the draft EIA report prepared by the project consultant is perfect and he expressed his support for the mining project stating that there should be a sustainable development in developing the country without damaging the environment and would also eradicate unemployment. He has given following	Management assured that they will follow all the environmental conditions. Management will follow all the suggestions made by the NGO.

	suggestions:- • M/s Sri Kalyana Rama Company has been carrying mining activity in an extent of 116.428 Ha since 50 years without any apprehensions. • To convert mined out pits into Rain Water Harvesting structures to preserve ground water levels. • To take up plantation in the surrounding villages with variety of tree species viz., herbal, medicinal & fruit bearing types and to develop avenue plantation all along the haulage roads. • He also stated that all the developmental activities should be monitored by a coordination committee, which would be an effectual system for effective utilization of CSR funds. • He batted for establishment of skill developmental programmes should be conducted to the village youth with the help of Government to prepare them for self help sustenance for their livelihoods. • To conduct health camps in the villages & provide medicines at free of cost. • The mineral development fund announced by the Central Government is a boon to the villagers, which will be helpful for village development.	
9	Sri Syamala Nagasena Reddy, Environmental	Management assured that they

	NGO – while speaking on the occasion, he informed that EE&JC has already informed the procedure of Environmental Public Hearing laid down in EIA Notification and whatever the written minutes to the concerned authorities for appraisal. Further, he voted his support for the establishment of the mining project underscoring for sustainable development without damaging environment & contributing for socio economic development of the surrounding villages. Further, he informed that the project management is having 50 years experience in this mining field and he appraised the draft EIA report prepared by the Project consultant is perfect. The project proponent had contributed to the village development such as providing drinking water to the villages and he requested the project management to construct Kalyana Mandapam in the Village and to expand their cooperation for development of surrounding villages in all aspects in the coming years.	will follow all the environmental conditions. Management will follow all the suggestions made by the NGO.
10	Sri Manda Venkapati, Kalichedu Village, Sydapuram Mandal, SPSR Nellore District-while expressing his opinion on the mining project he informed that he has no objection for the establishment of mining project and he expressed his support.	Management also assured that there would be development due to the mining project.
11	Smt. Rapur Sujathamma, Kalichedu Village, Sydapuram Mandal, SPSR Nellore District-while expressing her opinion on the mining project she informed that there is no problems due to this	Management also assured that there would be development due to the mining project.

	mining project and they are depending on this mining project for their livelihood and hence she expressed her support foe establishment of the mining project.	
12	Smt. Vakati Ramanamma – while expressing her opinion on the mining project she informed that there are no problems due to this mining project and she expressed her support for establishment of the mining project.	Management also assured that there would be development due to the mining project.
13	Smt. K. Kameswaramma, Kalichedu Village, SPSR Nellore District-while expressing her opinion on the mining project she informed that there is no problems due to this mining project and she expressed her support for establishment of the mining project.	Management also assured that there would be development due to the mining project.
14	Sri SK Babu, Kalichedu Village, Sydapuram Mandal, SPSR Nellore District-while expressing his opinion on the mining project he has no objection and he wished that they will get employment opportunities in the mining project and he expressed his support.	Management also assured that there would be development due to the mining project.
15	Sri P. Munirathanam, Kalichedu Village, Sydapuram Mandal, SPSR Nellore District- while expressing his opinion on the mining project he has no objection and he wished that they will get employment opportunities in the mining project and he expressed his support.	Management also assured that there would be development due to the mining project. Management assured to give reference to local people through direct and indirect employment.
16	Sri Vijaya Reddy, NGO-READS, Hyderabad-while speaking on the occasion, he expressed that the mining project authorities would have a good will	Management assured that they will follow all the environmental conditions.

	among the surrounding villagers. He informed that this area lands are dry lands and not suitable for agriculture purpose and in order to develop socio-economic conditions of the villagers, it is needed to welcome the industrial projects in this area. He suggested the followings:- 1. To convert mined out pits into Rain Water Harvesting structures to preserve ground water levels. 2. He suggested the project proponent to take up green belt development in such a way to arrest noise pollution and shall be for the benefit of the villagers. 3. The Govt. Has introduced compensation Act in the year 2013, as result of that Corporate Social Responsibility comes into effect for the benefit of the villagers to improve their socio-economic conditions. The fund allocated towards CSR by the proponent would be utilized for the development of the villagers & for welfare of the villagers. 4. Mining projects will be welcomed in the state so that as per the Mining Act, 2015, the Government would give part of the royalty amount for the development of villager. He requested the management to explore the possibility to get that royalty as early as possible & same would be utilized 60% of fund in the affected areas & remaining for the development of villages by forming a	Management will follow all the suggestions made by the NGO.

	co-ordination committee. Finally, he requested the management to carry out mining activity duly following the guidelines and he supported this mining project.	
17	Sri Ravi Kumar, Environmental Activist, NGO, SPSR Nellore District – He has underscored the need of Industrial Development for economic strengthening of the State which has necessitated after bifurcation of State of Andhra Pradesh. He welcomed the project and informed by the Government. Further, he expressed that the project proponent had contributed to the village development and his charity towards for the welfare of the villagers are the hall marks of his benevolent attitude towards wholesome village development & he requested to continue same in the coming years also. He requested the management the CSR fund allocated would be given preference for primary education of children by providing teachers & furniture in the village schools. & the mineral development of the surrounding villages. He expressed his full support to the mining project.	Management assured that they will follow all the environmental conditions. Management will follow all the suggestions made by the NGO. CSR fund will be allocated for the local villagers only.
18	Sri Y. Chennakesava Reddy, NGO, Kadapa- while speaking on the occasion, he informed that everyone should welcome the projects to get employment opportunities and to contribute socio-economic development of the public. While recommending this project to MoEF, he suggested the following:-	Management assured that they will follow all the environmental conditions. Management will follow all the suggestions made by the NGO.

	1. To conduct medical camps frequently in the villages and medicines will be given at free of cost. 2. Rain Water harvesting structures shall be constructed in each house to preserve ground water levels. 3. Check calms shall be constructed to preserve ground water levels. 4. Top priority should be given to the locals in providing of employment opportunities. 5. He requested the project management to extend their cooperative for the development of village & for the benefit of the villagers. 6. The fund allotted towards CSR will be spent for the development of village. 7. Mines royalty will be spent in the affected areas only.	
19	Sri A. Murali, Grameena Paryavarana Abhivridhi Samsta, SPSR Nellore Dstrict-while welcoming the project he informed that the mining project authorities have a good will among the surrounding villagers. He further noted that there is less rain fall in SPSR Nellore and it is needed to develop greenbelt to safe guard the Environment. Further, he requested the project management to utilize the CSR funds towards the village development by providing basic amenities to public such as hospitals, drinking water, education etc.	Management assured that they will follow all the environmental conditions. CSR fund will be allocated for the local villagers only regarding development of basic amenities.
20	Sri H. Madhubabu, NGO, Environmental Activist,	Management assured that they

	Nellore- while speaking on the occasion he informed that this mining project was started by the Germany and alter it was handed over to M/s Sree Kalyana Rama Company. Further, he expressed that there is possibility for dust pollution, which would be mitigated by developing greenbelt and by adopting sprinkling of water arrangement. Finally, supported the establishment of the mining project.	will develop greenbelt and water sprinkling for dust suppression.
21	Sri N. Ramesh Naidu, Environmentalist-while speaking on the occasion, he informed that he had attended 150 Environment Public Hearings so far but he never see in any EPH that this type of positive support by all the villagers. Further, he expressed that everyone should welcome for the establishment of industries and it is responsibility of the project proponent to explore the possibility to address the needs of the public. He requested the project management to provide employment opportunities to the locals & to conduct skill developmental programmes to the village youth to prepare them for self help sustenance for their livelihoods. He supported the establishment of the mining project.	Management also assured that there would be development due to the mining project.
22	Sri D. Anjaiah, Environmental Activist, NGO, Nalgonda – while speaking on the occasion, he expressed that is agreeing with the opinion of the earlier speakers. Further, he expressed that everyone should welcome for the establishment of industries and it is responsibility of the project proponents to explore the possibility to address the	Management assured that they will develop greenbelt and construct RWH pits to preserve ground water. Management assured to provide water to local villagers.

	needs of the public. Further, he requested the project proponent to develop greenbelt and to construct Rain Harvesting Water pits to preserve underground water table. Further, he noted that there is less rainfall in the SPSR Nellore District when compared to other Districts and he requested the management to employ a dedicated personnel for the development of greenbelt and to provide water arrangement to the villagers and water tankers on the schools in the village. He welcomed the mining project.	
23	Sri S. Venkateswarlu, Kalichedu Village, Sydapuram Mandal, SPSR District – while expressing his opinion on the project he has no objection and he expressed his support.	Management also assured that there would be development due to the mining project.
24	Sri Bhaskar, Kalichedu Village, Sydapuram Mandal, SPSR District – while expressing his opinion on the mining project he expressed that the project management is extending their cooperation for the village development & contributing their support for the welfare of the villagers. Further, he stated that the project management has provided two cans drinking water to each house daily & he hoped that the management shall support further also by providing medical facility at free of cost to the senior citiziens. He expressed his whole hearted support to the mining project.	Management also assured that there would be development due to the mining project.
25	Smt. Jayamma, Kalichedu Village, Sydapuram Mandal, SPSR District – while expressing her opinion on the mining project she informed that	Management also assured that there would be development due to the mining project.

	there is no problems due to this mining project and she informed that the project management has provide employment to them and expressed her support for the establishment of mining project.	

7.1 Risk Assessment

Risk analysis provides a numerical measure of the risk that a particular facility poses to the public. It begins with the identification of probable hazardous events at an operational area and categorization as per the predetermined criteria.

Risk assessment should be done on the basis of past accident analysis at similar projects, previous judgments and expertise in the field of risk analysis especially in accident analysis.

The objectives of Environmental Risk Assessment are governed by the following, which excludes natural calamities.

a. To identify the potential hazardous areas so that necessary design safety measures can be adopted to minimize the probability of accidents.
b. To identify the potential areas of Environmental disaster, this can be prevented by proper design of the installations and their control operations.
c. To manage emergency situations or a disastrous event, if any, from the mining operations.

7.2 Air Environment:

It proposed to carryout mining by open cast semi mechanized method. During mining operations will generate dust due to operation of mine, transportation, screening and dumping storage of mined mineral and over burden. It is proposed to produce 1500 TPA of Quartz, 6000 TPA of Feldspar and 1500 TPA of Mica for next five years. As per mine scheme 35625 cum of mine reject would be generated and will be disposed at dump yard situated within mine lease area.

To assess the impact of mining operation on air quality both mineral and rejects volumes were considered for quantification of emissions. ISC-AERMOD model as employed for prediction of incremental ground level concentrations (GLC) due to proposed activity.

Predictions were carried out to estimate the concentration over radial distance of 10 km around the project area. Uniform polar receptor network has been considered.

Table: 7.2 Predicted GLC due to proposed mining project:

S.No.	Location	Measured Baseline Value (µg/m3)	Predicted Concentration (µg/m3)	Total Predicted Value (µg/m3)
1	Project site	76.8	0.02	76.82
2	Malichedu	67.2	0.002	67.202
3	Utukur	64.2	0.05	64.25
4	Kalichedu	61.5	0.02	61.52
5	Talupur	78.4	0.002	78.402

Maximum incremental load due to proposed project will be 0.02 µg/m3. However the following mitigative measures should be taken during mining operations.

- Water sprinkling on haul roads
- Grading of haul roads and cleaning of accumulated dusty material
- Regular maintenance of transport vehicles
- Providing PPE to mine workers
- Plantation along haul roads and mine perimeter.
- Avoiding overloading of trucks.

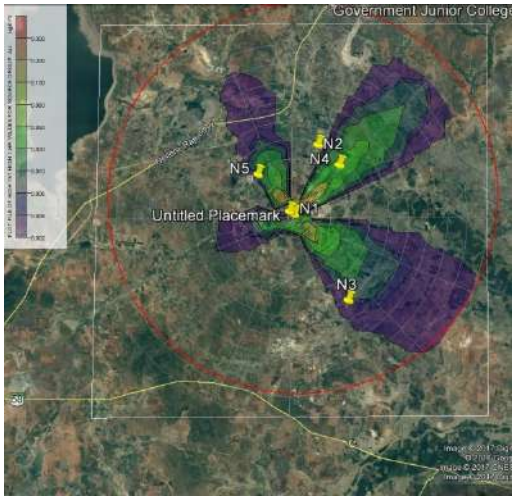


Fig: 7.1 Predicted GLC by AERMOD

7.3 DISASTER MANAGEMENT PLAN

It is presumed that the proposed mining process would be designed and engineered with all possible safety measures and standard code of practices. There is no chance of slope failure in open cast mining. Hang wall slope will be maintained at 30° and the total wall slope of 30° over the entire strike length of 600 m. So, there is no risk of collapse of any wall. In spite of this, there may be some design deficiency or due to operations and maintenance faults which may lead to accidental events causing damage of life and property. This chapter presents an over view of Environmental risk associated with various mining operations, suggested remedial measures and on outline of the Emergency Preparedness Plan.

7.4 Identification of Hazards

During the proposed operations of the open-cast mine, the following risks have been expected.

1. Filling up the mine pit due to excessive rains.
2. Failure of slope in the pit.
3. Failure of slope of dump.
4. Accidents of heavy machinery.
5. Seismic activity.
6. Surface fire (Electrical and Oil).

Hazards in Underground Working:

1. Fall of roof and sides
2. Collapse of pillars in mines
3. Air blast
4. Rock burst and bumps
5. Rope haulage
6. Electrical hazards
7. Fire hazard
8. Ventilation
9. Illumination

7.5 Subsidence Study:

1. Limited number of Gallery
2. Systematic Support Rules (SSR)
3. Stoping method

Support in the area under actual extraction:

Cogs shall be set up in all entrances of the area under actual extraction.

i. Support of stope having width of 2m or less:

Props shall be set at the maximum interval of 1.2m between props in the same row and 1.5m between rows of pops and the front row being not more than 1.8m from the face.

ii. Support of stope having width more than 03m:

a) Props would be set at the interval of 1.2m between the props in the same row and between rows of props and the front row being not more than 1.8m from the face.

b) Cogs shall be set the interval of 04m from edge to edge.

iii. Support of stope having width more than 03m:

a) Props shall be set at the maximum interval of 1.2m between props in the same row and between the rows and the front prop shall not be more than 1.8m from the face.

b) Cogs shall be set at a distance of 2.4m from edge to edge.

iv. Cogs – cross bars shall be set as and when required.

Support in drives and cross cuts:

i. All drives and cross cuts with in a distance of 30m or within two blocks from the block under extraction, which ever is greater shall be support by props at the maximum interval of 1.2m between the props in the same row and at an interval of 1.5m between the rows of props.

ii. Cogs shall be set all junctions of drives and cross cuts with in a distance of 30m or with in two blocks from the block under extraction, which ever is greater. Where it is difficult to erect cogs, for more movement of tubs, cross bars shall be set at an interval of 1.2m on props in either side.

General Requirement:

i. Diameter of the props shall not be less than 15cm. Lids and wedges used with props shall have a width not less than the diameter of the prop, a thickness not less than 8cm and length not less than 0.5m.

ii. The timber used in the construction of crib sets (cogs) shall not be less than 1.2m in length and shall have at least two opposite sides joggled that to provide suitable bearing surface.

iii. Props shall be set o solid floor and not on loose material they shall have kept tighten against the roof, where props are to be on filled waste or debris a flat base plate not less than 5cm thick, 25cm with and 0.75m long shall be used for setting of propos.

iv. Crib sets (cogs) shall be kept tight against the roof to ensure maximum contact between timber and the roof.

Stoping:

In underground metal mines, stoping is the final extraction of an ore body of minerals from ore body that has already been developed.

Stoping depends on many factors the main ones being:

- The shape, size and regularity of the deposit
- Mineralogical character and value of ore and distribution of values
- The dip, width and strength of the ore
- The character of the walls
- Ease with which ore separates from the walls
- Continuity of the ore within the boundaries of the deposit
- The cost and availability of support material
- Depth below surface and nature of overburden
- Output desired and extent of mechanization planned for stoping within the financial resources available.
- Possibility of dilution of ore with waste
- Surface structures/features and their support
- Proximity of surface water bodies, HFL of river
- Proximity of underground water bodies

7.5.1 Filling up the mine pit due to excessive rains

Filling up the mine pit due to excessive rains in the worked out area is a remote possibility. Normally there will be sufficient warning time before such an incident takes place, harming equipment and human life. However, as a precautionary measure, interceptor ditches along the outer boundary of the pit area constructed to control inflow of runoff into the mine pits. Water that collects in the mine pit from rainfall will be coursed out from the pits, through garland drains.

7.5.2 Failure of slope in the pit

During the planning period, the individual benches will be kept nearly vertical. Rock being stable ultimate final pit slope will be kept at 30° with the horizontal by maintaining height and width of benches of 6m.

7.5.3 Failure of slope of dump

The slope of dumps has been initially planned at the angle of repose of dump material. However, as to attain final position, the slopes will be terraced and proper vegetation will be laid which will cause lowering of the slope as well as binding of the soil, preventing any slope failure.

7.5.4 Accidents of heavy machinery

Most of the accidents during transfer of dumpers, trucks and other vehicles are often attributed to mechanical failures, in which the factor of human errors cannot be ruled out. Regular maintenance and testing of all mine equipment as per manufacturers guide lines can largely eliminate accidents of heavy machinery.

7.5.5 Seismic activity

The mine lease area falls in Seismic Zone II. There has been no history of earthquake in the area.

7.5.6 Surface fire

Sources of mine fire are likely to be from oil depot, power line, machinery etc. Adequate maintenance of machinery and electrical apparatus prevent any such danger of fire. Fire extinguishers shall be provided in all places those are prone to fire.

Fire and Explosions

- Identify the sources of fire and fire hazards at regular intervals
- Undertake regular training and awareness on dos/don't on in-case of fires; use of fire distinguishers; handling flammables
- Inflammable material; shall not be stored in underground
- Underground mining infrastructures such as shaft, ventilation systems, Ramp, incline etc will be made of non-combustible materials.
- Proposed workshop, compressor house shall be provided with adequate firefighting equipments and the functioning status of the same shall be verified at periodic intervals as per the supplier requirement.
- A proper communication system shall be installed to warn underground workers about outbreak of fire

7.6 Safety Preparedness Plan

In order to take care of above hazards/disasters the following measures have been envisaged.

- Checking and regular maintenance of garland drains will be taken to avoid any in flow of surface water into the mine pit.
- Provision of high capacity pumps for pumping out water from mining pit.
- Regulation 1961 DGMS will be strictly followed during allactivities of mine operations.
- Entry to unauthorized persons will be prohibited.
- Provision of all safety PPE like safety boots, helmets, Goggles etc. to the employees and regular check for their use.
- Training and refresher courses for all employees working in hazardous places.

- Working of mine, as per approved plans and regularly updated.
- Clearing of mine faces will be regularly done.
- Regular maintenance and testing of all mining equipment as per manufacturer's guidelines.
- Suppression of dust on haulage roads.
- Increasing the awareness of safety and disaster through competitions, posters and other similar drives.

As a part of disaster management, a rescue team is formed by imparting specialized training to select mining staff.

List of safety equipment provided to persons, working in the mines:

1. Safety helmet
2. Safety shoes
3. Miners cap lamp
4. Ear muffs
5. Dust guard(for mouth and nose)
6. Goggles
7. Hand gloves

Additionally provided First aid out fits for statutory persons

Standby provisions:

1. Safety belts
2. First aid stations containing all necessary requirements
3. Flame safety lamps
4. Intercom communication system (belowground)

Instruments provided to measure air current and humidity in belowground:

1. Anemometer
2. Whirling hygrometer

Electrical:

1. Earth leakage protection Relay (ELP)

7.7 Training

The training of mine personnel is conducted regularly with respect to Environmental protection. Training facilities are also extended to equipment maintenance and operations also to the operators. Training will cover the following fields.

- Awareness regarding pollution control and Environmental protection
- Operations and maintenance of pollution control equipment.
- Afforestation / plantation and post care of plants.
- Field monitoring, maintenance and calibration of pollution monitoring instruments.
- Chemical analysis of various Environmental parameters at laboratory.
- Repair of pollution monitoring instruments.
- Knowledge of norms, regulations and procedures.
- Occupational health and safety.
- Risk Assessment and Disaster Management Plan.

7.8 IMPLEMENTATION OF EMP AND MONITORING SYSTEM

7.8.1 General

Various measures have been proposed to implement for mitigating the adverse impacts due to mining on the environment in the area. A separate wing "Environmental Management Cell (EMC)" will be formed to look after the inspection / monitoring requirements. The mine management will undertake the control measures in coordination with the State Forest Department, Regional APPCB and Environmental consultant. The management of EMC shall be made an integral part of the major activities of mining.

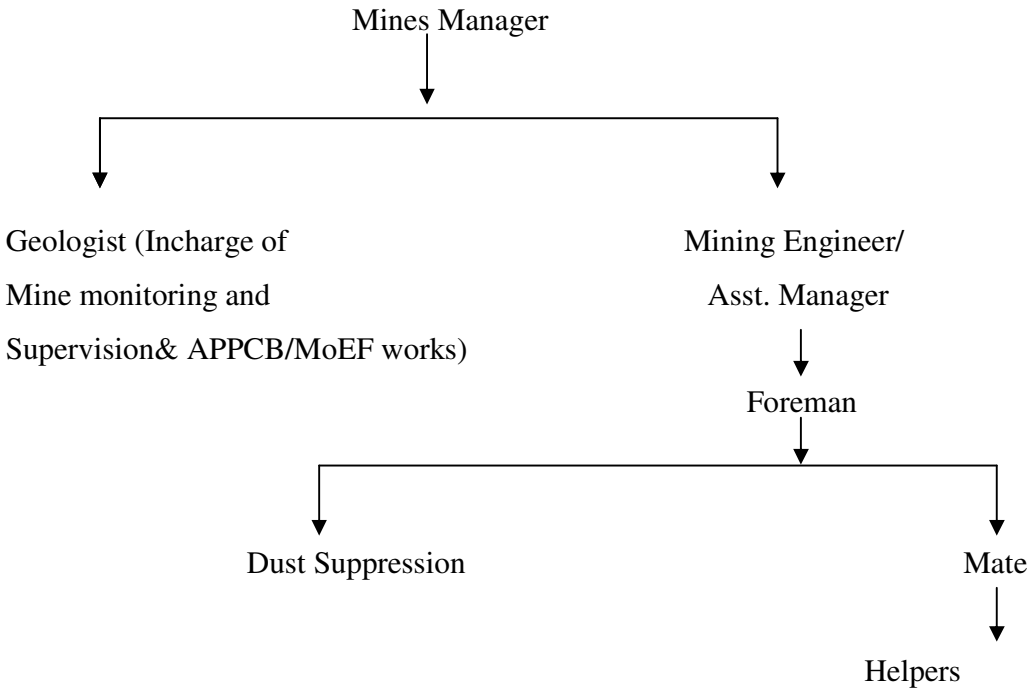


Fig.7.2 Organizational setup of EMC

Important records to be maintained by EMC are:

- Field monitoring results for air, water, meteorology
- Inspection records of slope failure, land erosion, drainage, Socio-economic development.
- Format to record / monitor plantation measures.
- Nursery records
- Environmental and related standards / norms
- Records pertaining to statutory consents, approvals
- Periodic medical examination (PME) records.
- Records pertaining to laboratory equipment maintenance and calibration.
- Complaint register (Environmental pollution).
- Records on water and electricity consumption.
- Periodic progress records
- Environmental audit records
- Records of annual budgetary requirement and allocation for pollution control.

7.9 IMPLEMENTATION

The following system shall be followed to see that the Environmental scheme is implemented as per schedule.

a) A separate wing will be created to see that the engineering measures such as construction of garland drains and retention walls are taken up, wherever necessary.

b) A crew attends for afforestation measures on a regular basis for culturing, manuring and watering.

c) On an annual/quarterly basis, the quality of air, water, noise and soil will be monitored to understand the status vis-à-vis the baseline data. This will enable the management for taking up any corrective measures, if required. The frequency of sampling will be as prescribed by the MOEF&CC guidelines issued in this regard.

7.10 ACTIVITIES TO BE MONITORED / INSPECTED BY EMC

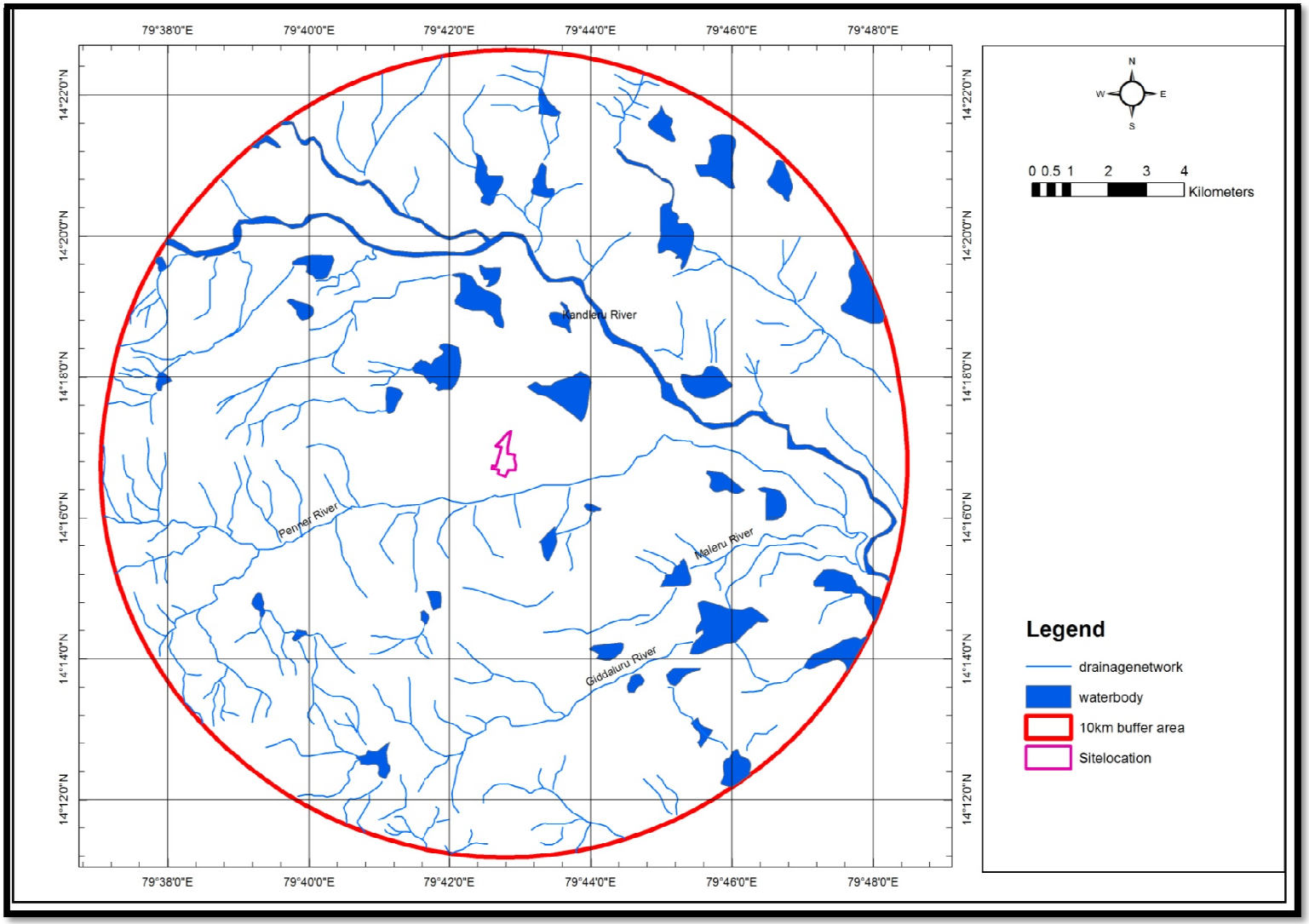
7.10.1 Land erosion

Regular observations during the rainy season for checking land erosion will be made in back filled areas / slopes. And proper measures also taken to control land erosion.

7.10.2 Drainage

The effectiveness of drainage system depends on control of run off and recharging stretches like stone pitching, brick mounds etc on drains shall also be monitored.

Fig: 7.3 Drainage Map



7.10.3 Re-vegetation and green belt development

Planned schedule for green belt development will be checked after every year and improvement required will be implemented. Post plantation status will be regularly checked in every season. Phase wise development in the areas of plantation including rate of growth, survival rate etc. will be recorded systematically

7.10.4 Occupational health

Since it is opencast mining, health problems due to dust may be expected at various location during excavation of pegmatite. Particles of quartz, mica can affect the human body if is inhaled and swallowed.

Monitoring:

Measurements to determine employee ceiling exposure can be taken during period of maximum expected air borne concentrations of quartz. Sampling and analysis may be performed by collection of manganese in a filter, followed by atomic absorption, spectrophotometric analysis.

Control Measures:

Location of dust generation:

1. Mining area
2. Loading & Transportation
3. Stacking & Screening

It is advisable to use sprinkling of water to suppress the dust generated in the above locations so that the work men will not get expose to the dust.

Precautions:

- By using various PPEs, the chances of occupational health disease will be lowered.
- Periodical medical checkups for lungs functioningand breathing.
- First aid will be given for in case of emergency.
- Each group of mine worker will undergo regular medical checkup at regular intervals by specialist doctors.
- Persons not wearing protective equipment and clothing should be restricted from areas of spills until clean up has been completed.

- The workmen especially who are literate should be sent for first aid training conducted by the group vocational training centre to maintain by the DGMS (Director General of Mine Safety).
- All working places will have safe means of access, safe working platform and exit. Persons working in hazardous dust prone area will be provided with dust mask.
- Education & training will be provided to the workforce about facilities, protective equipment, risk associated, potential health effects etc.

Impact study on Occupational health due to Quartz mining:

Quartz is a frequently occurring solid component of most natural mineral dusts. Human exposures to quartz occur most often during occupational activities that involve movement of earth, disturbance of silica-containing products or use or manufacture of silica-containing products.

Quartz is a colourless, odourless, non-combustible solid and a component of many mineral dusts. It is soluble in water. Trace metal impurities such as iron and aluminum, can modify the surface reactivity.

Quartz is abundant in most rocks, sands, and soils. The extensive natural occurrence of quartz and the wide uses of the materials that contain quartz are directly related to potential occupational exposures to quartz workers in many industries and occupations.

- Quartz dust induces cellular inflammation.
- Silicosis, lung cancer and pulmonary tuberculosis are associated with occupational exposure to quartz dust.
- Occupational exposure to quartz dust is complex because workers are frequently exposed to dust mixtures that contain quartz and other mineral varieties.
- Properties of the dust ie., particle size, surface properties ,crystal-line form may differ according to geological source and can also change during industrial processing. Such variations can affect the biological activity of the inhaled dust.
- Ambient quartz is emitted to the environment as a component of particulate emissions.

- Respirable quartz levels exceeding 0.1mg/m3 have been reported in many industries worldwide and are most frequently found in metal, non-metal and coal mines and mills, in granite quarrying and processing, crushed stone and related industries.
- The mean respirable quartz level in mining operations ie., underground and surface mining was usually less that 0.10mg/m3 but a significant percentage of samples exceeded the permissible exposure limit.

Effects Evaluation:

- Quartz deposited in the lungs causes epithelial and macrophage injury and activation, and it translocates to the interstitium and the regional lymph nodes.
- Cellular damage by quartz particles

Medical Surveillance:

Following are the proposed Medical Surveillance will be conducted for all employees:

- Pre-employment medical check-up
  - Pulmonary function test
  - Complete physical examination
  - Blood test
  - Urine test
  - Chest x ray
- Once in six months medical check-up of each employee
- Individual medical record will be maintained

Operation and Maintenance:

The problem of occupational health in the operation and maintenance phase is primarily due to dust and noise which could affect the workers from respiratory and hearing problems. The necessary personal protective equipments will be given to all the workers. The working personal will be given to all the workers. The working personnel will be given the following appropriate personnel protective equipments.

- Safety helmets
- Face shield
- Plain googles with cut type filters on both ends.

- Googles with cut type filters on both sides and blue color glasses
- Cylindrical type earplug
- Ear muffs
- Dust mask
- Self contained breathing apparatus
- Leather apron
- Safety belt/ line mans safety belt
- Leather hand gloves
- Safety shoes with steel toe

Full-fledged hospital facilities will be available round the clock for attending emergency arising out of accidents, if any. All working personnel will be medically examined at least once in every year.