Nilaimas Services

ENVIRONMETAL IMPACT ASSESSMENT FOR "PROPOSED MANGANESE ORE MINING AT ML15/2021, ML16/2021, ML17/2021, ML18/2021, ML19/2021 AND PL21/2020 WITH TOTAL AREA OF 629.8 HECTARES, HUTAN SIMPAN KEKAL RELAI, MUKIM RELAI, DAERAH CHIKU, JAJAHAN GUA MUSANG, KELANTAN DARUL NAIM"

EXECUTIVE SUMMARY

MINING LEASEHOLDER

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PROJECT OVERVIEW

PROJECT LOCATION

ML15/2021, ML16/2021, ML18/2021, ML19/2021 & PL21/2020 located at Hutan Simpan Kekal Relai, Mukim Relai, Jajahan Gua Musang, Kelantan

LEGAL REQUIREMNET

Schedule 2: Activity 8 (b); Mining of Minerals within or adjacent or near to environmentally sensitive area.

Mining Lease Duration
Mine area: 5 ML & 1 PL
Total area: 629.8 Ha
5 years start 13th October 2021

Mine Life
Operational Life: 14.2 years

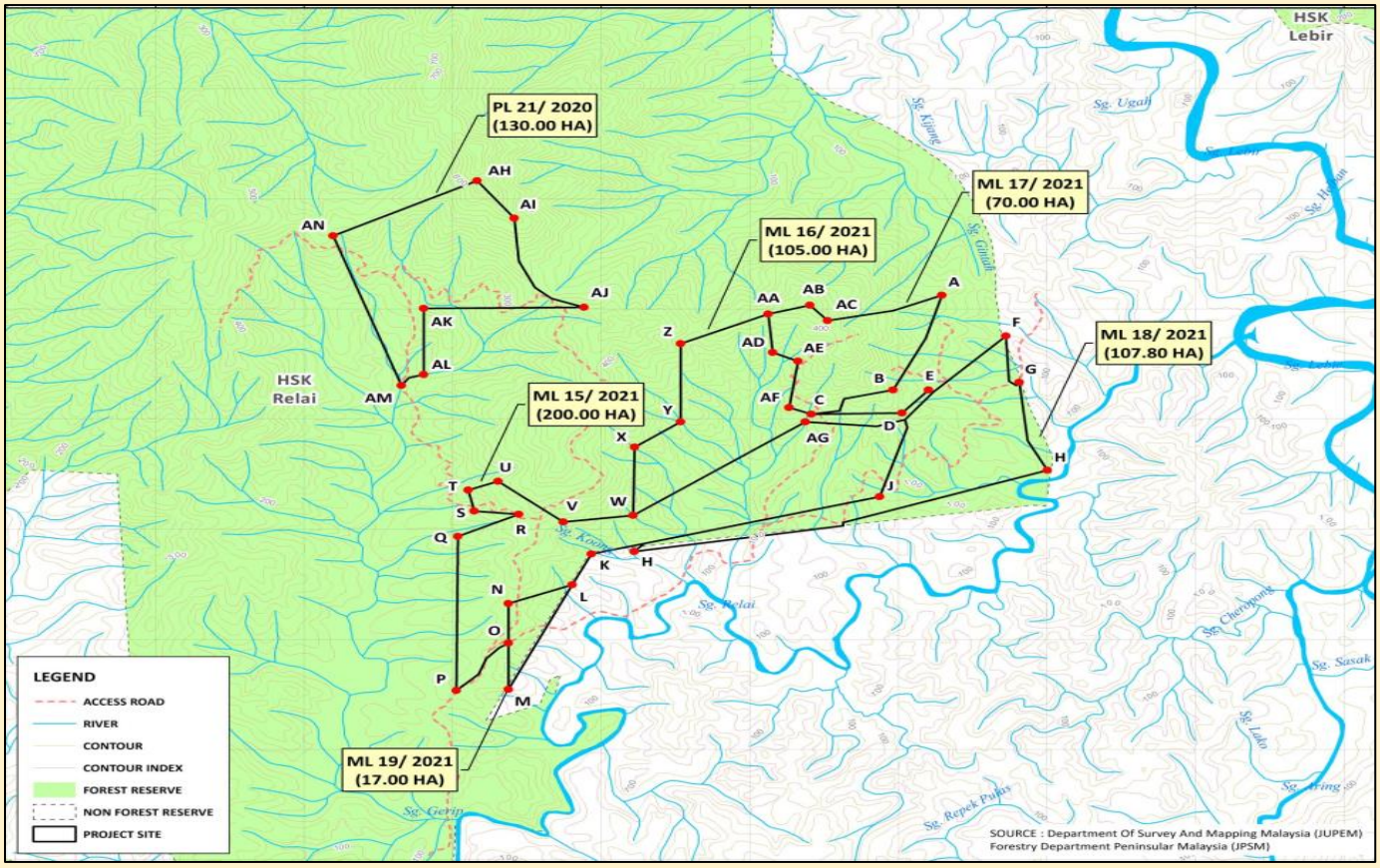
Zoning
Based on RTJ Tanah Merah 2020 site is located within Land use zone Hutan and Mining activities are permitted subject to permission obtained from the State Government and relevant authorities

PHASING	Proposed Working Area:	Phase A (47.52 Ha)	Phase B (28.41 Ha)	Phase C (18.41 Ha)	Phase D (38.35 Ha)	Phase E (10.06 Ha)	Phase F (42.32 Ha)

STATEMENT OF NEED

- DEMAND AND SUPPLY
- FULFILLS THE LOCAL COMMUNITY NEEDS
- COMPATIBILITY WITH LOCAL PLANNING STRATEGIES

KEY, LOCATION AND SITE PLAN



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EXECUTIVE SUMMARY

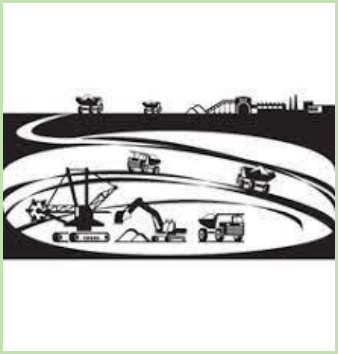
PROJECT CONCEPT

Open-cast Mining (Dry) → **Internal Ore Haulage** → **Ore Processing (Wet)**

Purpose	Estimated Utilization Area (Ha)
Mine Excavation Area	185.5
Mineral Processing Plant	4.5
Tailing Storage Facility	10.5
Product Stockpiles	3.0
Overburden Stockpiles	30.0
Mine Office	2.0
Access/Haul Road	4.5
ESCP BMPs	4.5
Workshop	1.5
Buffer Zone	30.0
Future Development	353.8
Total	629.8

Manganese Ore Reserves and Mine Operational Life

Estimated Workable Deposit Area	Manganese Reserve	Operational Mine Life
185.5 Ha	2,941,447tonnes	14.2 years



- ✓ The mining operation has been designed to operate at a maximum of ROM ore throughput about 75,000 m^3 per month
- ✓ The designed ROM or throughput comprises of about 75% dry process and 25% wet process.
- ✓ Transporting excavated overburden to dry-dump area for temporary stockpiling and re-use in reclaimation
- ✓ Tailing pond maintenance and monitoring
- ✓ Reclaimation of completed mine sites will run concurrently to ore excavation
- ✓ Drying and stockpiling of product

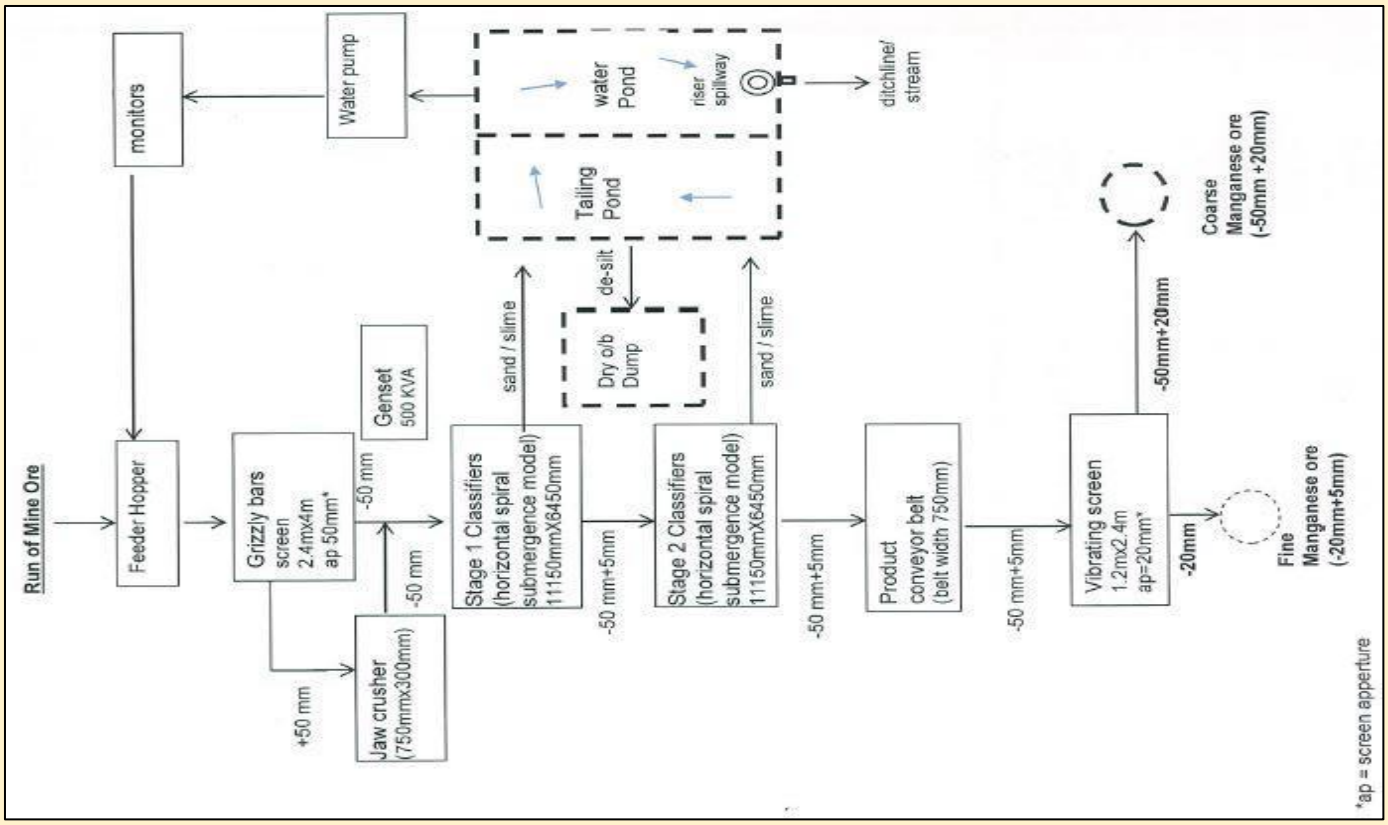
Tailing Pond Water Recycling

- ❖ Closed circuit water recirculation
- ❖ There will be no effluent discharge
- ❖ Desilting of the ponds will be carried out periodically to restore the tailing pond retention capacity

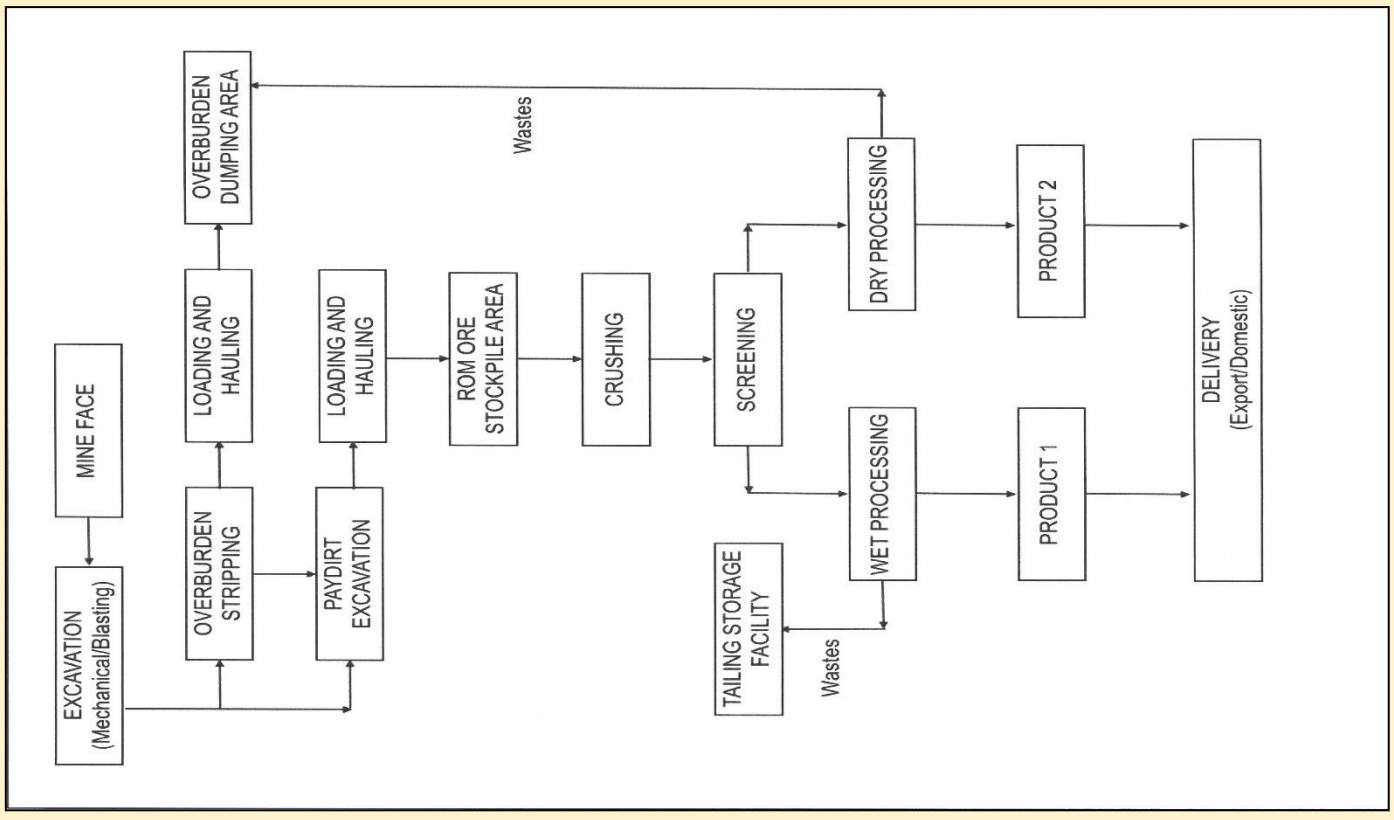
Production Capacity

- ➢ The mine production is estimated at an average annual production of about 96,710 tonnes to 225,658 of manganese ore for the first 3 years of its operation.
- ➢ The production is expected to increase to about 241,776 tonnes per year when the mine is fully operational schedule in its 4th year of operation

FLOWCHART



Proposed Mining Operation



Manganese Ore Processing using dry and wet processing

PROJECT ACTIVITIES

Investigation Stage

- Exploration of mineral deposit
- Environmental Impact Assessment

Initial Site Preparation and Construction Stage

i. Boundary demarcation and positioning;
ii. Mobilization of the workforce;
iii. Transport of equipment and supplies;
iv. Land Preparation;
v. Overburden removal;
vi. Construction of Haulage Road and Working Platform;
vii. Construction of Drainage System;
viii. Installation of Manganese Ore Processing Plant and other Construction of Buildings;
ix. Construction of Tailing Ponds;
x. Constructions of Erosion Control BMPs;
xi. Managing waste at the Project site; and
xii. Creation of buffer zone.

Operational Stage

- Excavation of ores
- Stockpiling overburden at dry dump
- Haulage of ROM to the processing plant
- ROM Processing
- Tailing pond maintenance and monitoring
- Maintenance of haulage and access road
- Management of haulage and access road
- Management of BMPs
- Concurrent reclamation of mine sites
- Transportation of end products

Abandonment and Rehabilitation Stage

- Plan for mine closure
- Decommissioning
- Reclamation and backfilling
- Rehabilitation

EXISTING ENVIRONMENT

LANDUSE

- According to Rancangan Jajahan Gua Musang 2020, Project Site is Located inside Hutan Simpan Relai.
- Existing land use gazette as forestry whereby mining activities are permitted subject to permission granted from the state government and relevant authorities. (Pengubahan Draf Rancangan Tempatan Jajahan Gua Musang 2020 (Pengubahan Kali Ke-6 Bil 1/2021)
- The existing land use of the Project Site is mainly rubber plantation (TLC), secondary forest, shrub and bamboo.

TOPOGRAPHY

- The terrain in the locality is generally undulating to gentle to steep slope with contour lines from 68 m to 656 m
- Slope of class I and II: 49.72%
- Slope of class III: 33.44%
- Slope of class IV: 14.32%
- Slope of class v: 2.52%

CLIMATE AND METEOROLOGY

- Mean monthly relative humidity ranges from 82.8 % to 98.8 %
- Monthly mean temperature ranges from 28.8 % to 37.1 %
- The wind is calm with mean speed of 0.8 m/s
- The range of annual rainfall amount from 2013 to 2022 was between 2212.1 mm to 3457.4 mm
- The highest monthly rainfall was recorded in January 2017 with value 916.2 mm/month

SURFACE HYDROLOGY

- Proposed development area lies within Sg. Lebir River Basin
- Drains toward a small river within site and merge with another river before discharging toward Sg. Relai and finally toward Sg. Lebir.
- Four (4) WTP located nearest to project site which are Manek Urai WTP (37.30 km), Paloh WTP (5.84 km), Aring WTP (6.63 km) and Lebir WTP (3.35 km)
- Two (2) Air Tandak located upstream to project site which are GFS Aring (6.5 km) and GFS RKT Kampung Chalil (7.94 km)

SITE GEOLOGY

- Highly decomposed sedimentary rocks to produce thick natural residual silty soil (sandy silt) that was discovered at most of the outcrops inside the project site
- Purplish tuffaceous sandstone and shale with some quartz veins and thin bedded of volcanic rocks, which are also embedded in the sandstone.
- Fine grained, very hard and strong, greenish andesite volcanic rock can be found as large boulders inside the proposed project site

SOIL CHARACTERISTIC

- The soil materials observed were recorded as gravelly sand, sandy silt and silty sand.
- Gravelly material found in the bore log indicated the fragments of quartz veins and lenses as normally discovered on the surface outcrop.

EXISTING ENVIRONMENT

ENVIRONMENTAL QUALITY

WATER QUALITY

. Twenty-six (25) sampling points
. Water Quality Index (WQI) for most sampling points classify as Class III
. Baseline river water status for all sampling points are considered as clean and slightly polluted.

NOISE LEVEL

. Three (3) sampling point
. Noise Level were below the limit at all monitoring points under schedule 1 (Sub Urban) of 60 dB(A) for daytime and 55 dB(A) for nighttime

AIR QUALITY

. Three (3) sampling point
. The sampling was done from 13th to 14th December 2021
. SO_2, O_3, CO are not detected
. PM_{10}, $PM_{2.5}$ and NO_2 are within the permissible limit as per Malaysia Ambient Air Quality Standards (Standard value by 2020) (MAAQS)

GROUNDWATER QUALITY

. Eight (8) monitoring stations
. Two groundwater samples were not sampled due to dry well and damaged by elephant.
. GW4 is classified as Good with the GWQI index of 77.26. Others groundwater samples were categorised as Excellent with the GWQI index values of more than 90.

TERRESTRIAL FAUNA

- Methodology
  - Camera Trapping - 17 locations in Project Area based on the designated stratified random sampling design
  - Transect Line Survey - Identification of bird species visually or aurally by recognition of unique songs and calls. Record any notable behaviours of the bird such as feeding, nesting, or breeding
- Faunal Composition
  - Mammals
    - Survey conducted has recorded 13 species of mammals from 12 families
      - 7 Protected species (Schedule 1)
      - 3 Totally Protected species (Schedule 2) as listed in Wildlife Conservation Act 2010
      - 3 species were not listed under the WCA 2010 (Act 716).
  - Avifauna
    - A total of 42 species from 26 families of birds were recorded
      - 30 bird species were listed as totally protected
      - 5 species are protected under the Wildlife Conservation Act 2010 [Act 716]
      - 7 bird species were not listed under the act
  - Herpetofauna
    - A total of 7 species of herpetofauna were recorded from5 families recorded.
      - 2 Protected species (Schedule 1)
      - the remaining are not listed under Wildlife Conservation Act 2010

EXISTING ENVIRONMENT

TERESSTRIAL FLORA

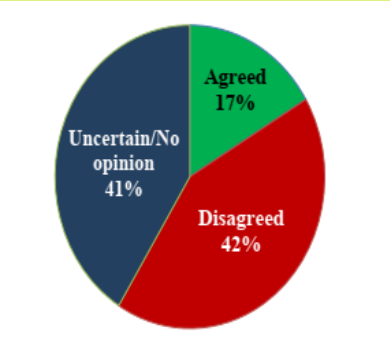
- Methodology
  - Qualitative Transects Line Survey method - to determine the flora diversity.
    - The transects line were located along the accessible forest trails and abandoned logging tracks
    - The direct observation was conducted and all existing plants encountered visually were listed
    - Observed plants were recorded, identified and photographed using observation kits (binoculars, camera with tele-photo lens).
- Floristic Composition
  - Observations show that rubber trees predominate on the project site (Hevea brasiliensis). At all compounds, there were rubber trees and open spaces to be seen.
  - there are a number of instances of additional flora that can be discovered in the vicinity of the project area.

SOSIO-ECONOMIC

Respondent's Acceptance toward Proposed Project

Total Respondent: 85

- Kampung RKT Kesedar Lebir

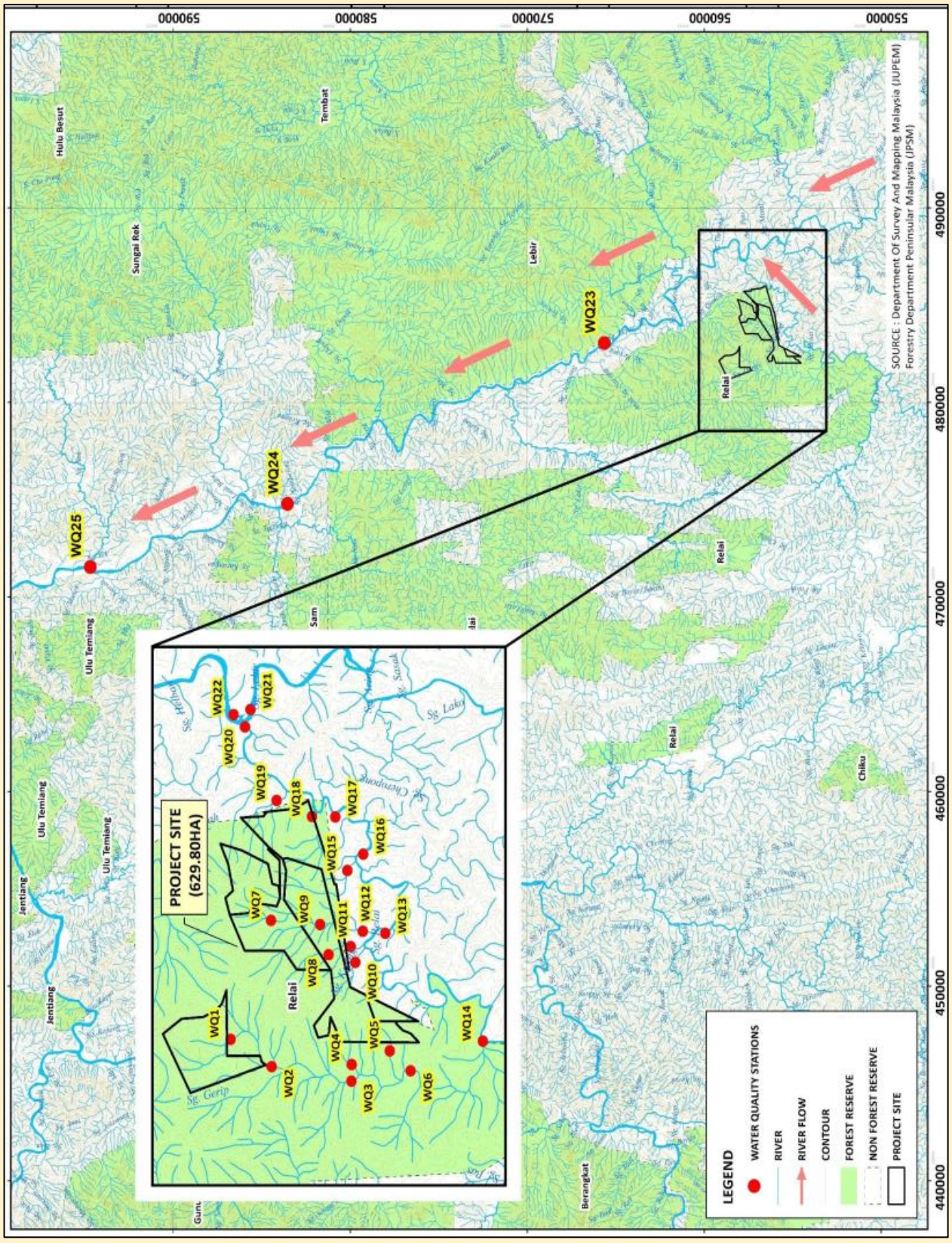


- Based on the social survey conducted, only 3 respondents were aware of the proposed Project and the remaining have not heard about it. Out of all 85 respondents, 16.5 % of them agreed with the Project as they believed that the project will bring benefit, while another 42.4 % disagreed and the rest of 41.2 % respondents were uncertain.
- High percentage of disagreement perceived among the locals within ZOI towards the proposed project are primarily influenced by the current condition (poor) of their river namely Sg. Aring & Sg. Lebir
- However, as per discussed in Public Dialogue with Community in the proposed project is agreeable if project Proponent make full of best management practices to minimize the environmental implications over the course of the project, both during construction and operational phase.

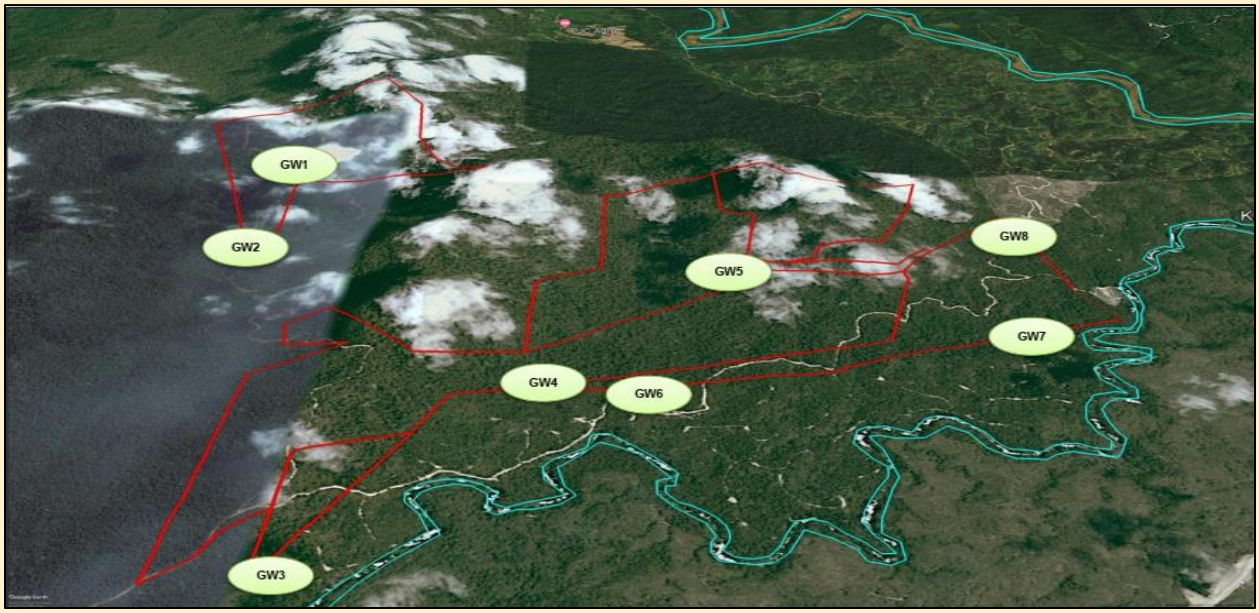
COMMUNITY HEALTH

- 16.5% (n=62) of the heads of the households and their dependents are diagnosed by a doctor as not healthy and had one or more problems in the past six months
- The commonest health issue is hypertension (6.7%) followed by diabetes mellitus (5.1%), gout (3.2%), arthritis (1.9%) and asthma (2.7%).
- These diseases are most probably related to poor diets and air quality.

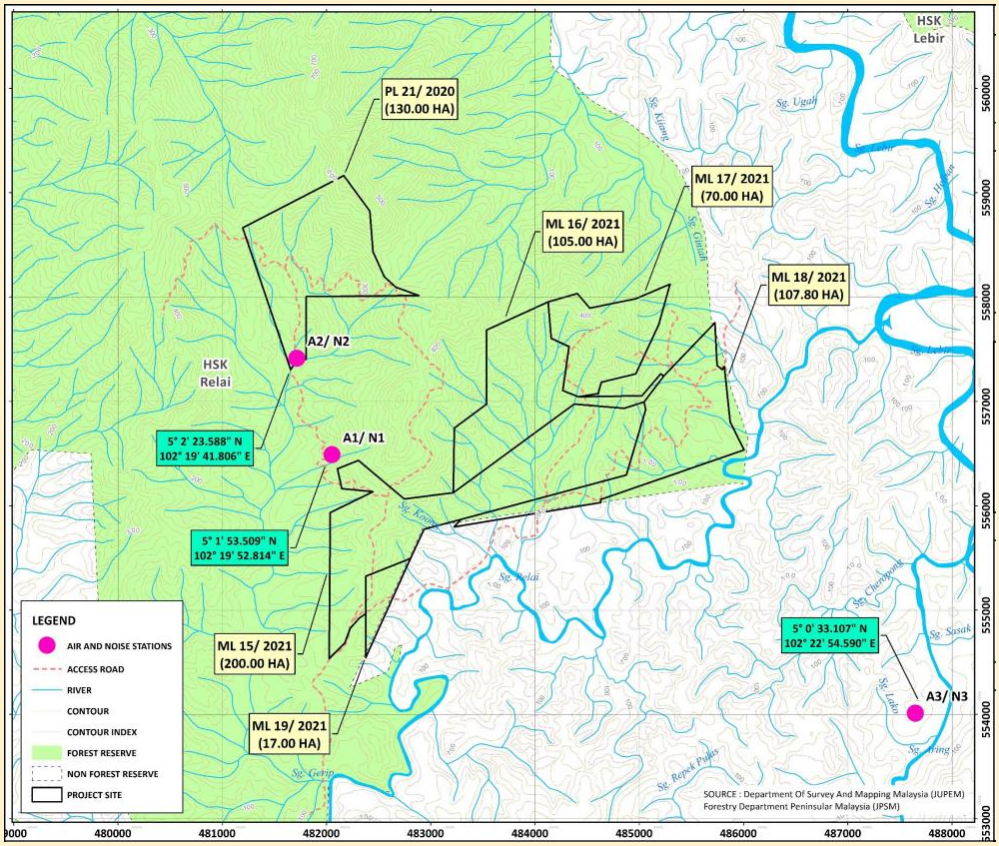
WATER QUALITY STATIONS WITH CATCHMENT & WATER INTAKE LOCATION



AIR, NOISE & GROUNDWATER SAMPLING LOCATION



Borehole No.	GPS Coordinate		Justification
	Latitude	Longitude	
GW1	5° 2'45.12"N	102°19'45.74"E	Nearby to proposed tailing retention pond
GW2	5° 2'19.48"N	102°19'38.67"E	Nearby to proposed dry dump area
GW3	5° 0'55.32"N	102°20'4.92"E	Nearby to proposed mine pit
GW4	5° 1'38.08"N	102°20'40.20"E	Nearby to proposed tailing retention pond
GW5	5° 2'8.20"N	102°21'1.02"E	Nearby to proposed dry dump area
GW6	5° 1'35.39"N	102°20'56.18"E	Nearby to proposed mine pit
GW7	5° 1'51.70"N	102°21'47.72"E	Nearby to proposed tailing retention pond
GW8	5° 2'25.64"N	102°21'50.45"E	Nearby to proposed mine pit



EVALUATION OF POTENTIAL IMPACT

SOIL EROSION AND SEDIMENTATION

- ✓ Suspended sediment abrades and coats aquatic organisms;
- ✓ Excessive sedimentation "paves" the water body floor, blankets the bottom fauna and destroys fish spawning areas;
- ✓ Turbidity due to the suspended sediment reduces light penetration and photosynthesis, thus reducing phytoplanktonic growth and food supply to other forms of aquatic life;
- ✓ Reduction in river depth, resulting channel overflow during high rainfall

HYDROLOGY

- ✓ The process of manganese ore mining has been linked to the increase of the frequency of flash flood in the downstream area.
- ✓ The changes in topography and land clearing could result in the tremendous increase in surface runoff
- ✓ The land clearing and earthwork of the proposed project for the purpose of mining manganese ore may expose the large tract of bare soil to erosion.

RIVERINE RIPARIAN ZONE

- ✓ Clearing of vegetation from riverbanks will leave the area and river unprotected from erosion and sedimentation respectively. Causing a decrease in water quality through the loss of filtration effects.
- ✓ Clearing also leads to loss of critical species habitat. A river buffer zone gazetted by JPS will be kept along the rivers streams.

EVALUATION OF POTENTIAL IMPACT

WATER QUALITY

- ✓ Based on simulations, the consequence for pH, TSS, manganese, COD and iron pollutions during tailing pond burst/overflow were so far-reaching, that the downstream WTP Manek Urai risk shutdown
- ✓ Water quality in mines is indirectly affected by soil erosions that carry sediments and these are not controlled or managed well.
- ✓ Release of sediments into rivers will impact the water quality: turbidity, total suspended solids and mineral contaminants.
- ✓ Fine silt increases the suspended solid and turbidity of the water bodies and can be detrimental to aquatic life

GROUNDWATER

- ✓ A land clearing may potentially result in change onto groundwater recharge behaviour to an area.
- ✓ significant land clearing may enhance surface runoff and subsequently may cause water impoundment or flooding on area of low in elevation, low permeability and shallow in groundwater levels
- ✓ Excavation of the ground in mining operation will be essentially result in a certain extent of modification to ground condition of the site and working areas in particular
- ✓ Potential groundwater contamination and contaminant movement

AIR QUALITY

- ✓ Sources of air pollution in mines are the ore excavation, ore haulage and ore processing.
- ✓ Elevation, wind directional and wind speed greatly influence the dispersion of air pollutants with hotspot mainly lying downwind of the dominant wind directions.

EVALUATION OF POTENTIAL IMPACT

NOISE QUALITY

- ✓ The general adverse effects of noise are interference with communication, hearing loss, disturbance of sleep, stress and annoyance
- ✓ Noise at the mining site mainly is due to the mobilization of motor vehicle and machinery.
- ✓ Operators who work on or in the vicinity of noisy machinery could be exposed to a noise level, which, over a period of time, may damage their hearing systems

TERRESTRIAL FLORA

- ✓ Vegetation Loss
- ✓ Water Pollution
- ✓ Reduction in Soil Quality

TERRESTRIAL FAUNA

- ✓ Loss of species diversity and poaching
- ✓ Wildlife - Human Conflict
- ✓ Road Kills
- ✓ Loss of Habitat
- ✓ Illegal Hunting

EVALUATION OF POTENTIAL IMPACT

SOLID AND HAZARDOUS WASTE

- ✓ Cut vegetation has the potential to be a fire risk unless properly managed. Cut vegetation shall be generated during site clearing and shall consist of tree trunks, branches, shrubs and green vegetative material.
- ✓ Excavated materials from site formation, earthworks etc. will consist of primarily of soils, sand and organic matter (e.g., material from swamp areas)
- ✓ The storage, handling, transport and disposal of the construction types waste has the potential to result in visual, water, dust and noise impacts in the event of inappropriate management method.

SEWERAGE

- ✓ The primary contaminants in sanitary effluents will be organic matter, coliform bacteria and suspended solids resulting in decreased dissolved oxygen content elevated organic and coliform levels in downstream watercourses.
- ✓ If the domestic sewage is not well designed and maintained, odor and diseases might be triggered.

SOCIO-ECONOMIC

- ✓ The social impacts may bring effect to the locals, either directly or indirectly and either positive or negative impacts.

COMMUNITY HEALTH

- ✓ Air pollution and elevated noise levels might have greater impact on workers but minimal impact on community
- ✓ Water and groundwater pollution can affect the workers and the community

MITIGATION MEASURES

HYDROLOGY

- ✓ Build detention ponds to provide temporary storage for the excess runoff during storm event
- ✓ Build sufficient diversion and earth drains and other BMPs on site to direct the surface runoff flows within the site to the silt trap.
- ✓ Continuous monitoring and maintenance of all the BMPs and take immediate action on any non-compliance
- ✓ Enough storage volume within the ponds should be provided in order to control of 50 year ARI

SOIL EROSION & SEDIMENTATION

- ✓ More erosion prone development activities like site clearing and removal of overburden should be scheduled for the drier period of the year when the rainfall erosive would be lower.
- ✓ Maintenance of drainage system shall be regularly carried out. Re-design or add on number of drainages shall be considered from time to time viewing to the current situation;
- ✓ Maintenance of drainage system shall be regularly carried out. Re-design or add on number of drainages shall be considered from time to time viewing to the current situation;
- ✓ The staging of the Project will help to reduce potential soil erosion and the resultant sediment pollution; and
- ✓ Monitoring of water quality – The project Proponent must also monitor the water quality at the point of discharge from the Project site to ensure that the water is of an acceptable quality.

MITIGATION MEASURES

WATER QUALITY

- ✓ all BMPs such as Silt Trap, Sediment Basin, On-site Detention Pond (OSD) etc. shall be first established and regularly inspected and maintained throughout the development period.
- ✓ To control the discharge from the project site to be less than 50 mg/l, implementation of LDP2M2 should be executed stringently. Where from the simulation, the on-site mitigation should be at least 90% efficiency during peak discharge during construction phase.
- ✓ To comply with the TSS discharge compliance (TSS<50mg/l), the project proponent is
- ✓ advised to adopt more than 90% BMPs efficiency as conserving water quality nearly to its
- ✓ existing pristine condition is the most responsible approach to be considered. Minimize earthwork operations during periods of high rainfall
- ✓ Provision of sufficient tailings ponding area
- ✓ Zero discharge of tailing pond must be implemented during mining operational stage.
- ✓ To include emergency responses procedure in case of tailing pond outburst/overflow.

GROUNDWATER QUALITY

- ✓ A regular and consistent groundwater monitoring exercise shall be commenced.
- ✓ Preventing surface water quality degradation – appropriate mitigating and remedial measures have to be sustainably conducted in order to sustain the good surface water quality and to improve the degraded surface water quality in the Project site.
- ✓ Groundwater monitoring wells will be properly managed (maintenance) to ensure their sustainability in performing their function.

MITIGATION MEASURES

AIR QUALITY

- ✓ Exposed soil areas, excavated materials, stockpiles and haul roads shall be dampened with water during dry ambient conditions. The minimum number of wet suppression units to be provided must be specified in operation contract clauses;
- ✓ Before work commences, the contractor will prepare a dust control strategy in agreement with regulatory requirement;
- ✓ Vehicle speed restrictions shall be imposed to reduce dust generation and dispersion; and
- ✓ All lorries utilized to transport potentially dusty materials to/from the site shall be of an appropriate design to ensure load containment; transport vehicles shall not be overloaded.

NOISE QUALITY

- ✓ Low noise equipment shall be used in the operation;
- ✓ Transportation and machinery that may be intermittent shall be throttled to minimum;
- ✓ Silencers or mufflers on equipment shall be utilized and properly maintained during the operation;
- ✓ If operation noise does become an issue, additional measures such as avoiding simultaneous noisy activities shall be done;
- ✓ Workers shall be provided with suitable safety apparels such as ear plug to prevent the impact on their ears. The wearing shall be made mandatory.

MITIGATION MEASURES

SEWERAGE

- ✓ Workers shall be provided with adequate sanitation facilities;
- ✓ Toilets facilities shall be provided whereby the cleaner shall be responsible for regular site visits to collect the accumulated waste for off-site disposal;
- ✓ At least 2 toilets shall be provided for every 15 workers; and
- ✓ The waste shall be properly stored and managed to minimize contaminated run-off and avoid from flowing to the water body.

TERRESTRIAL FLORA

- ✓ Planning of Mining Activities
- ✓ Biomass Management
- ✓ Restriction of Open Burning
- ✓ Allocation of Riparian Buffer Zone and BMPs
- ✓ Minimise Exposed Surfaces

TERRESTRIAL FAUNA

- ✓ Prohibition of Wildlife Poaching and Trapping
- ✓ Prohibition of Rearing Animals at Site
- ✓ Phasing/Directional Clearing
- ✓ Wildlife-Human Conflict
- ✓ Placement of Solar Powered Spotlight
- ✓ Signage on Prohibition of Wildlife Hunting
- ✓ Preparation and Enforcement of Wildlife Management Plan (WMP)

MITIGATION MEASURES

SOLID & HAZARDOUS WASTE

- ✓ Large stumps, small branches and other organic materials shall be disposed of via mulching/composting in a suitable area within the Project site
- ✓ Surplus excavated materials and inert wastes shall be reused on site as structural fill, landscaping, erosion control and restoration features wherever applicable.
- ✓ Proponent must aware that oily residues such as spent lubricating oil (SW305) and spent hydraulic oil (SW306) are classified as scheduled wastes under the Environmental Quality (Scheduled Waste) Regulations 2005;

SOCIO-ECONOMIC

- ✓ The local communities shall also be encouraged and given the opportunity to acquire the necessary technical know-how through training scheme related to the operation.
- ✓ constantly water sprinkle the manganese ore mining plant during mining period so as to reduce the amount of dust emitted into the air Wildlife-Human Conflict

SAFETY AND HEALTH

- ✓ Only well-maintained equipment shall be operated on-site and equipment should be serviced regularly during the operation;
- ✓ Ensure that the site is kept orderly and tidy with good working conditions;
- ✓ Workers shall be provided with adequate sanitation facilities. At least one latrine shall be provided for every 15 workers;
- ✓ Establish effective on-site safety procedures and emergency response plan;

ENVIRONMENTAL MANAGEMENT PLAN (EMP

Environmental monitoring comprises 3 types of monitoring:

i. Performance Monitoring (PM)

ii. Compliance (CM)

iii. Impact monitoring (IM).

PM

Monitoring to ensure that the pollution control systems and other mitigation measures are perform in a good condition to reduce the adverse impacts from the proposed Project at a minimum level

CM

monitoring activities to be carried out to ensure that the EIA condition of approval (COAs) is complied with

IM

Monitoring activities which will be conducted once the proposed project is approved for implementation to verify that the findings of the EIA study of the potential impacts identified during EIA preparation stage are correct

CONCLUSION

The main activities that produce the effect:
Site cleaning;

- ✓ Ore excavation;
- ✓ Ore transport; and
- ✓ Ore processing.

Among the activities that have the potential to have an impact:

- ✓ Dust/dust dispersion (Air quality)
- ✓ Noise production (Noise quality)
- ✓ Soil erosion and river sedimentation (Water Quality)

Main effects:

- ✓ Air pollution (PM_{10})
- ✓ Noise pollution (dBA)
- ✓ Water Quality (Turbidity, number of suspended solids, solution of solids and metal contaminants)

Impact Mitigation Measures:

- ✓ Maintenance and monitoring of BMPs
- ✓ Environmental Management Plan
- ✓ Environmental Auditing
- ✓ Self -regulation
- ✓ Commitment and financial allocation for BMP and other mitigation measures

The proponent's effort to commission an EIA study, thereby taking into consideration all environmentally friendly approaches and also incorporating pollution control measures in their future operations should be given strong considerations from all relevant authorities. If there is any environmental impact to the surrounding, the Project Proponent shall stop work and rectify the impact immediately at own cost.