



**PROPOSED PROJECT ON LOGGING AND TIN MINING OPERATIONS,
COMPARTMENTS 24 AND 31 WITHIN HUTAN SIMPAN
KENDERONG MEASURING 245 HECTARES, SUB DISTRICT OF
KERUNAI, DISTRICT OF HULU PERAK, PERAK DARUL RIDZUAN**

**EXECUTIVE
SUMMARY**



PROJECT PROPONENT

EMBI Mining Sdn. Bhd.
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Contact Person: Prof. Dato' Ir. Dr. Mohd Omar Bin Ab
Kadir, CEP-C0395 (Lead Consultant)
Mr. Abdullah Mohd Omar
(Project Manager)
Contact Number: 03-79724516/012-4100708/
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PROJECT OVERVIEW

Project Location

Compartments 24 and 31 within Hutan Simpan
Kenderong, Kerunai Sub District, Hulu Perak
District, Perak Darul Ridzuan

Zoning

Blok Perancangan Kecil (BPK) 3.3: Kg.
Kerunai – Kg. Jong (Forest Zone).
Degazetted from Kenderong Forest
Reserve (18 February 2021). Mining of
potentially economic mineral is
allowed (RTD Hulu Perak).

Project Activities

Stage 1: Logging
Stage 2: Tin Mining



Working Phases

Phase 1: 104.64 Ha
Phase 2: 90.84 Ha

Mining Lease

Total Area: 245 Ha
(10 years until 12th March 2029)

ESA (Rank 1)

- ESA Permanent Forest Reserve
- ESA Highlands
- Central Forest Spine, Primary Linkage 8 (CFS1-PL8)

STATEMENT OF NEEDS

Economic Benefit

- In Perak, the premium from the forest revenue collection was recorded RM 25 mil and the royalty from the logs and other forest products were RM 13 mil and RM 6 mil respectively in year 2018.
- In 2018, Malaysia exported 24,529 tonnes (RM 1.98 billion) of refined tin and Perak is the highest tin producer in Malaysia (3,175 tonnes) with 7 tin mines. Based on this, the economic prospect of the Proposed Project is bright.

State Taxes and Royalties

- Royalty and premium for forest revenue collection
(National Forestry Act 1984)
- Royalty 5% tin mineral sales value
- Annual Mining Lease (RM100/Ha)
(Mineral (Perak) Regulation 2008)

State Planning Strategy

Trust 2: Increment of Economic Value-Added and Productivity Based on Local and Natural Resources

Socio – Economic Benefit

Employment opportunities



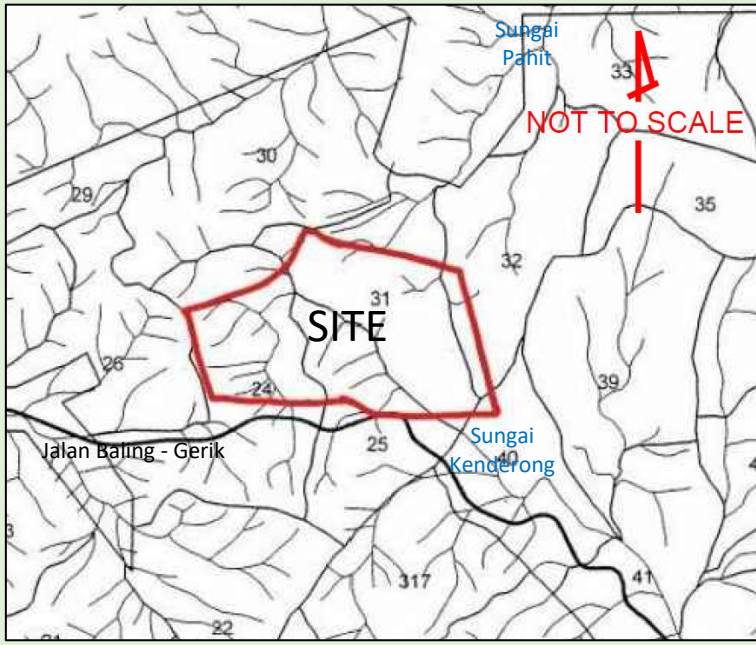
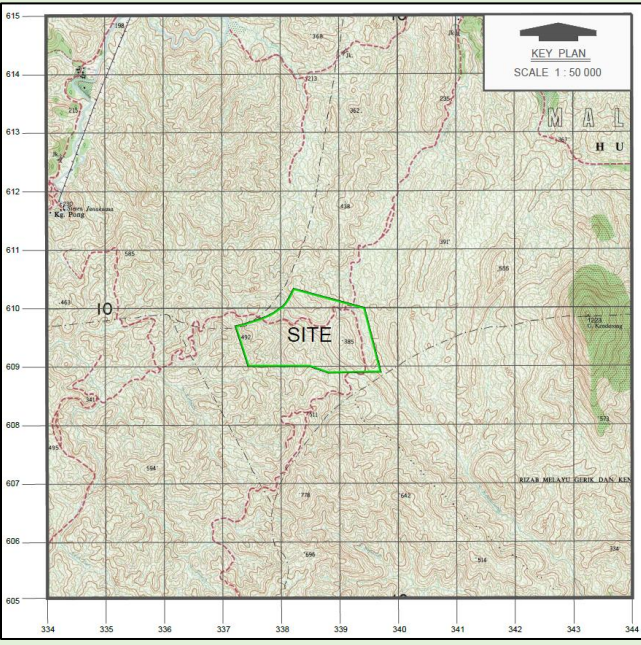
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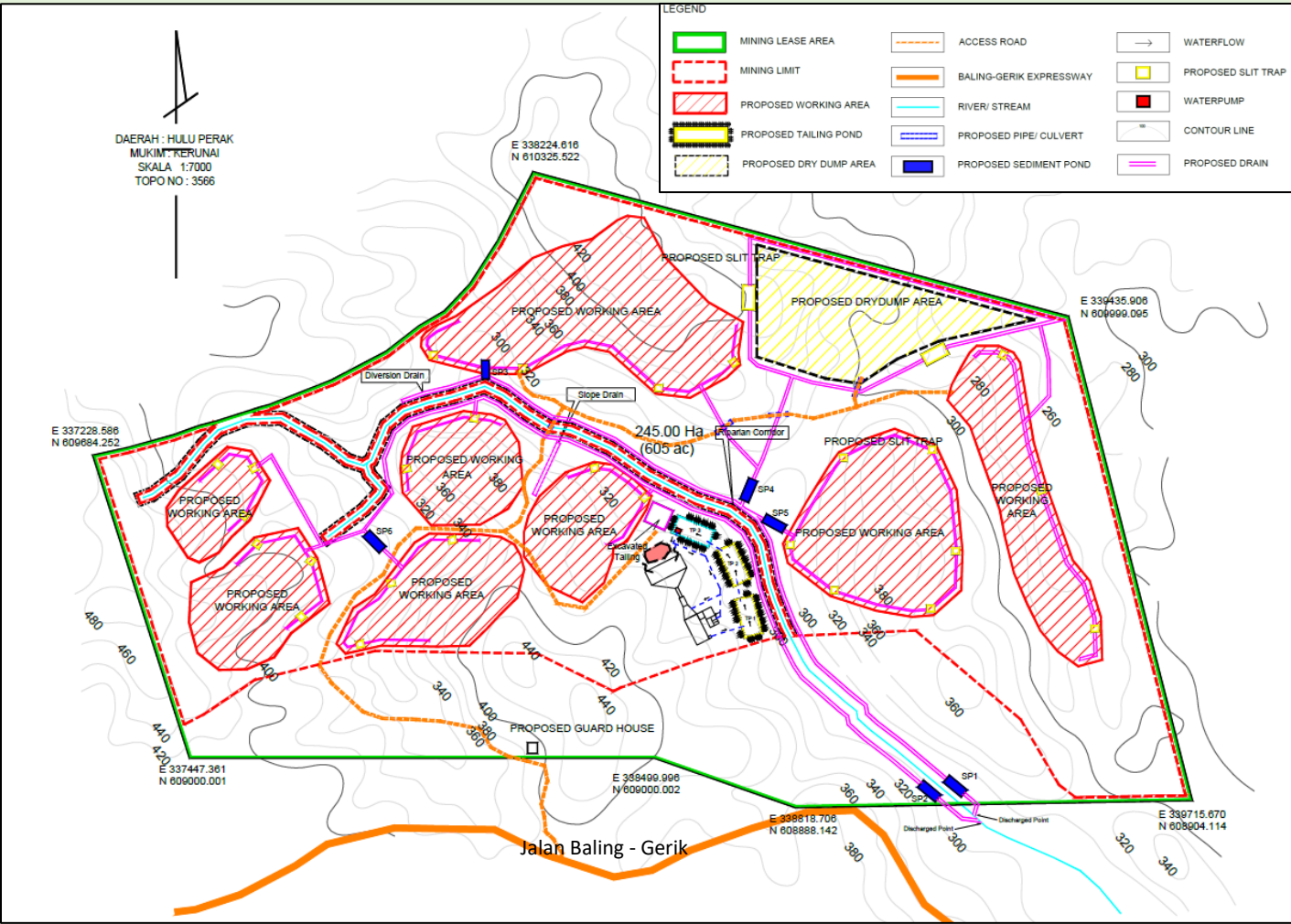
KEY, LOCATION AND SITE PLANS

Key Plan:

Location Plan:



Site Plan:



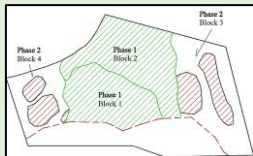
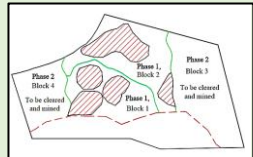
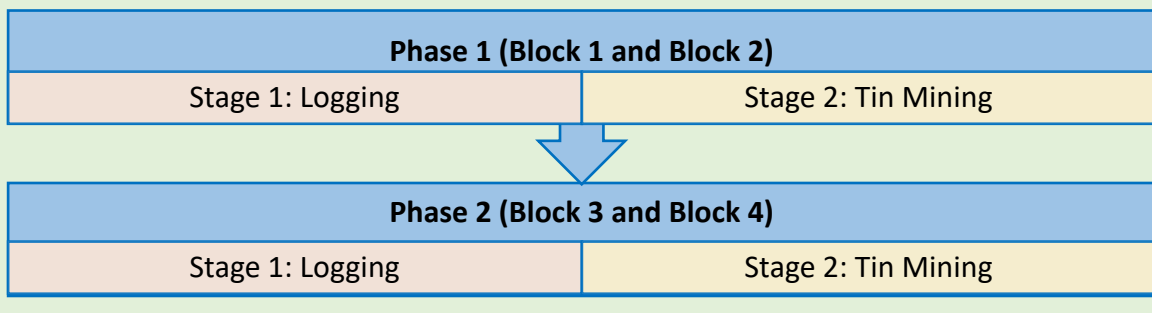
PROJECT CONCEPT



Discreet Clear felling Logging

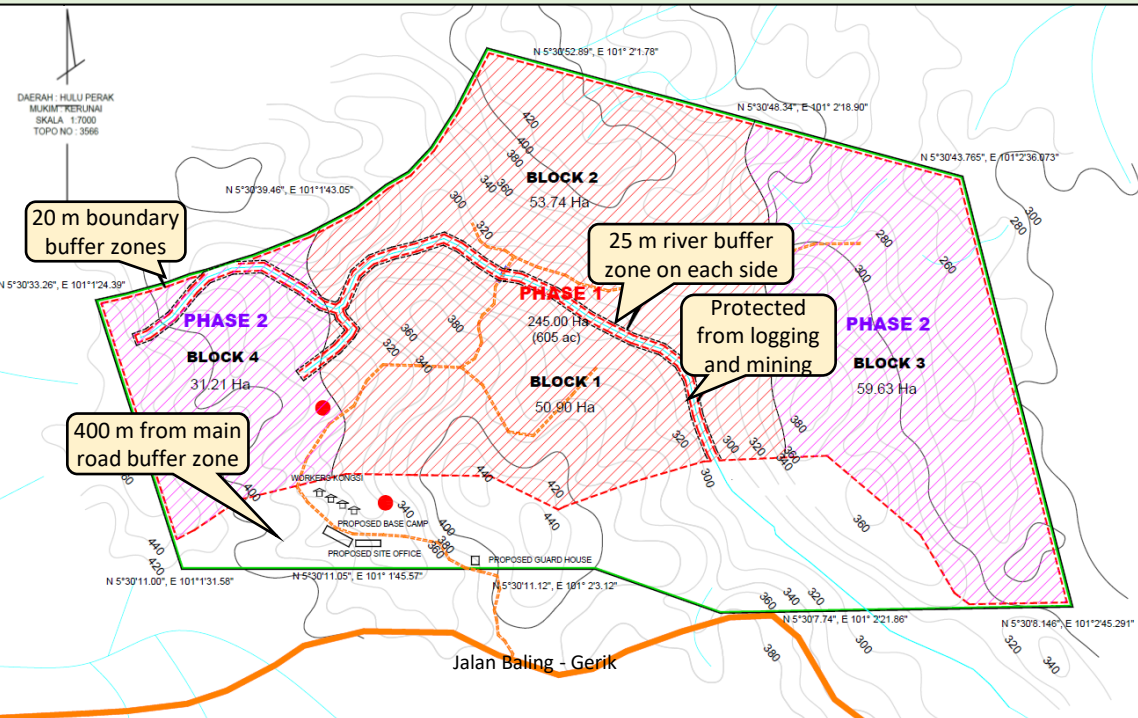
Open Cast (Dry) Mining

Tin Ore Processing (Wet)



DISCREET CLEAR FELLING LOGGING

- The logging activity for each block takes approximately 4 - 6 months to complete.
- Discreet Clear-felling method with specific areas remained undisturbed land and buffer zone
- River riparian buffer zones along the streams are prohibited from being logged or mined; likewise for zones along the site boundary
- Timber will be cut by chainsaw and collected to the log yard area (Matau) by logging truck to reduce soil erosion by skidding before transported to potential sawmill



LEGEND

	MINING LEASE AREA
	ACCESS ROAD
	RIVER
	WORKERS KONGSI
	MATAU
	PHASE 1
	PHASE 2



TIN ORE RESERVES AND MINE OPERATIONAL LIFE 

Estimated Mining Area (Phases 1 & 2)	Tin Ore Reserves	Operational Mine Life
200 Ha	1,836 T	11 years



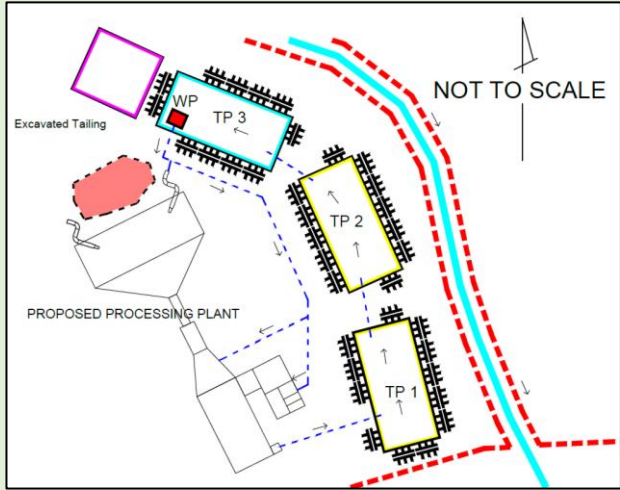
**Open-cast
Mining
Operation**

1. Excavation of tin ores up to 4 m depth (overburden and ores)
2. Overburden & waste rock generation and handling
3. Loading and internal transportation of excavated Run-of-Mine (ROM)
4. ROM processing
5. Stockpiling of processed tin ores
6. Tailing water recycled/ tailing pond maintenance
7. Reclamation of completed mine sites will run concurrently with ore excavation in new area.
8. Rehabilitation after reclamation



**Tailing Pond Water Recycling for
Ore Processing**

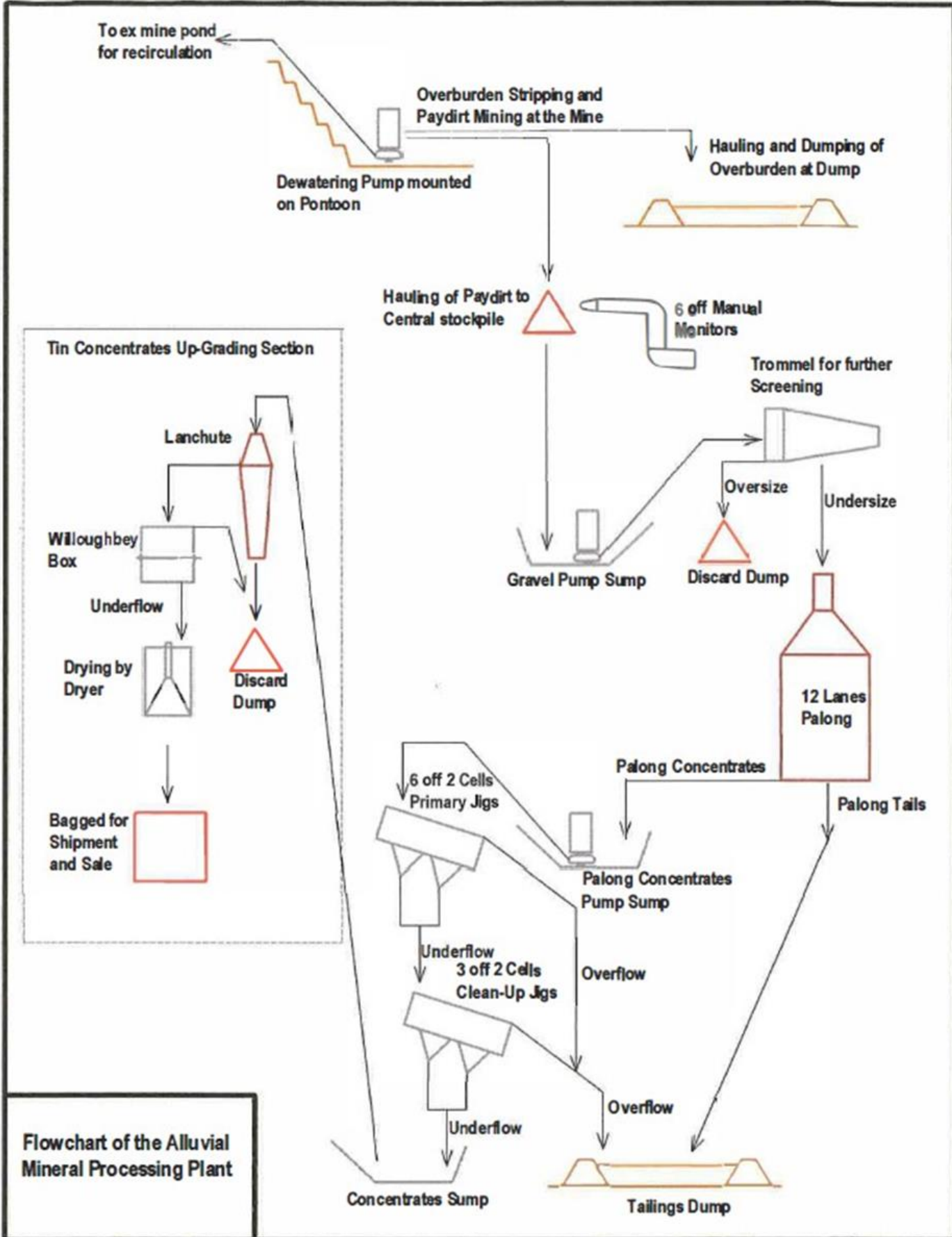
1. Closed circuit water recirculation
2. There will be no effluent discharge
3. Desilting (excavation of tailing) of the ponds will be carried out periodically to restore the tailing pond retention capacity.



**Transportation
Product**

Final product (tin ore) will be transported to Malaysia Smelting Corporation (MSC) Berhad in Butterworth, Pulau Pinang.

FLOWCHART



PROJECT ACTIVITIES

PROJECT PROPONENT: EMBI MINING SDN BHD

STAGE 1: LOGGING

PRE- LOGGING ACTIVITY

Planning Phase

- 1) Tree tagging
- 2) Inventory

Site Preparation Phase

- 1) Construction of internal access road
- 2) Construction of bridge/ culvert
- 3) Construction and establishment of drainage systems and sedimentation basins
- 4) Mobilisation of equipment and machinery
- 5) Establishment of Log yard (Matau)
- 6) Construction and establishment of base camp, site office, guard house and storage facilities
- 7) Procurement of utilities

LOGGING ACTIVITY

- 1) Timber extraction: Felling, Skidding, Loading & Unloading, Transportation
- 2) Waste Disposal
- 3) Best Management Practices

POST- LOGGING ACTIVITY

- 1) Demolition of building structures (workers facilities, store, office and log yard (Matau))
- 2) Removal of all machineries, vehicles, waste from concessions
- 3) Removal of timber residues
- 4) Temporary rehabilitation/revegetate
- 5) Mining operation starts

STAGE 2: TIN MINING

PRE- MINING ACTIVITY

- 1) Land cleared (from logging activities)
- 2) Access road (pre existing from logging)
- 3) Additional haul road construction
- 4) Mobilisation and mining equipment set up
- 5) Infrastructure set up (office, basecamp and utilities)
- 6) Construction of P2M2 and Best Management Practices (BMP's)

MINING ACTIVITY

- 1) Excavation of ores from working area
- 2) Overburden & waste rock generation handling
- 3) Loading and internal transportation of excavated Run-of-Mine (ROM)
- 4) ROM processing
- 5) Stockpiling of processed tin ores
- 6) Tailing water recycled/ tailing pond maintenance
- 7) P2M2 and BMPs maintenance
- 8) Maintenance of haul and access roads
- 9) Transportation of the products

POST- MINING ACTIVITY

- 1) Execution of Mine Closure Plan
- 2) Decommissioning
- 3) Reclamation
- 4) Rehabilitation



EXISTING ENVIRONMENT 

Land Use



- Project site has been degazetted from Kenderong Forest Reserve on 18th February 2021.
- Landuse within 5 km from the Project site are forests and agriculture.
- Nearest settlement: Kampung Pong (5.1 km from the site boundary)

Topography

- Hilly
- Elevation: 320 m - 450 m



Surface Hydrology

- Proposed development area lies within the Sg. Perak River Basin.
- Tributaries of Sg. Kenderong run through the project site.
- Nearest Water Treatment Plant (WTP): Air Ganda WTP (closed) (26.8 km river distance from Project Site) and Senawar WTP (116.2 km river distance from Project site). Water intake from Sungai Perak.
- Kenering Dam (54.8 km river distance from Project site).
- Flood risk to Gerik Town.

Soil Characteristic

- Soil series: Steepland (*Department of Agriculture*)
- The soils are characterised by weathered silty CLAY, clayey SILT, silty SAND and silty GRAVEL.



Site Geology

- Ordovician-Silurian rocks
- The Proposed Project site is underlain by sedimentary rocks, predominantly slate and shale from Baling Formation.

Climate and Meteorology



Rainfall

Highest : November (484.5 mm)
Lowest : March (47.3 mm)

Temperature

Highest : April (28.9 °C)
Lowest : November and December (25.4 °C)

Relative Humidity

Highest : November (86.4 %)
Lowest : March (63.9 %)

Rain Days

Highest : November (27 days)
Lowest : March (5 days)

Wind Speed

Highest : North (N) and Northeast (NE) (0.6 m/s)
Lowest : East (E) and Southeast (SE) (0.3 m/s)

EXISTING ENVIRONMENT 

**ENVIRONMENTAL
QUALITY**

Water Quality

- Fifteen (15) sampling points.
- Water Quality Index (WQI) for most sampling points classify as Class III except from W14 under Class IV. All river waters are considered as “slightly polluted”.
- Most of the water parameters are below the limit stipulated under Mineral Development (Effluent) Regulations 2016 except for DO, COD & BOD at W14.

Groundwater Quality

- Four (4) groundwater monitoring wells.
- Most of the parameters are below the limits stipulated in Malaysia Groundwater Quality Standards and Index and National Drinking Water Quality Standard except for Chemical Oxygen Demand (COD) and Turbidity.

Air Quality

- Two (2) monitoring stations.
- Baseline sampling shows that the parameter of PM₁₀, PM_{2.5}, NO₂, SO₂, CO, and Ozone are within the acceptable level of the Malaysia Ambient Air Quality Standards (2020).

Noise Level

- Two (2) monitoring stations.
- Daytime period level: 35.5 to 63.8 dB(A)
Nighttime period level: 34.7 to 53.3 dB(A)
- Mostly (90 %) the noise level were below the limit under Schedule 1 (Low Density Residential) of 55 dB(A) for daytime and 50 dB(A) for nighttime.
- Noise source: vehicles passing by main road, birds, civet cats, wild boars, frogs & monkeys at forest and insects.

Geotechnical

- Soil Properties: moisture content is 10 – 73 %, specific gravity range is 2.51 – 2.69, high to very high plasticity SILT/CLAY and low to intermediate plasticity silty SAND.
- Terrain classifications based on the site survey plan:

Terrain Classes	Area (m ²)	Percentage (%)
Class 1: 0° – < 15°	891,800	36
Class 2: ≥ 15° – < 25°	996,415	41
Class 3: ≥ 25° – < 35°	475,545	19
Class 4: ≥ 35°	86,240	3

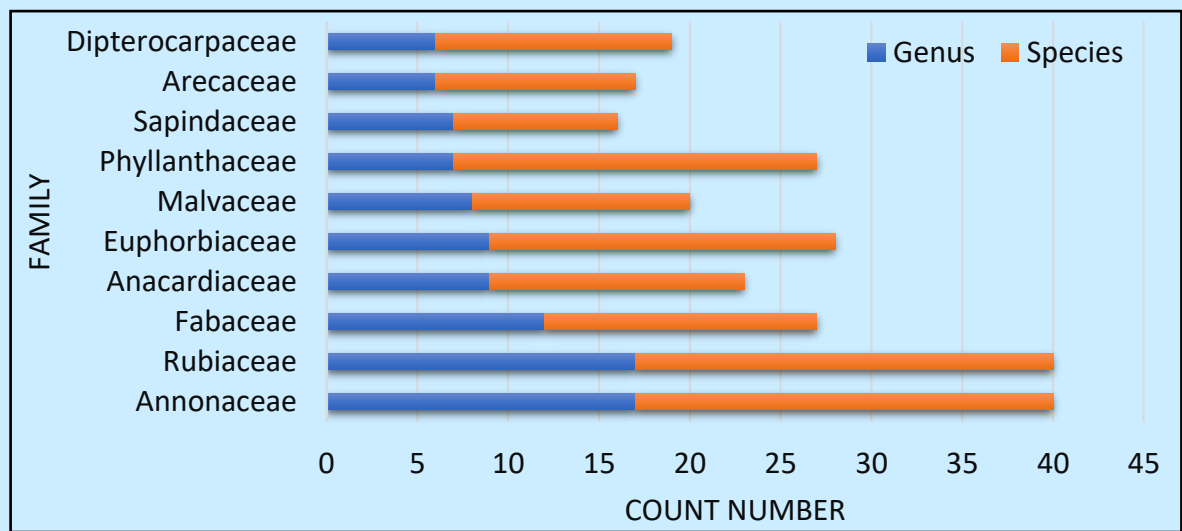
- Factor of Safety: 1.07 - 1.42.

**Terrain at
Proposed Site
CLASS 2**

EXISTING ENVIRONMENT 

Terrestrial Flora

- 410 species of plants were recorded from survey area. Tree (288), Shrub (29), Herbaceous (22), Fern (13), Palm (11) and Climber (47).
- Comprise of 86 families and 236 genera. Top ten family of plant:



- Biomass Estimation and Carbon Content:

Site	Tonnes/Ha	Carbon content (tC/Ha)
Biomass above tree	354.07	177.035
Biomass below tree	81.17	40.585
Average	435.24	217.620



Terrestrial Fauna (Wildlife)

- Mammals - 63 mammalian species from 21 families in 8 orders.
- Birds - 214 species from 62 families
- Amphibians- 39 species of frogs from 6 families.
- Reptiles - 68 reptile species from 14 families (27 - lizards, 36 - snakes and 5 - turtle).

Species	Protection Status Wildlife Conservation Act 2010 (Act 716)				IUCN Red List of Threatened Species (2020)				Red List of Mammals for Peninsular Malaysia (2017)					
	TP	P	NP	CR	EN	VU	NT	LC	CR	EN	VU	NT	LC	DD
Mammalia	15	11	37	1	3	5	7	47	1	4	3	11	43	1
Birds	194	11	9	-	0	1	28	185	-	-	-	-	-	-
Amphibians	0	8	31	-	0	0	1	38	-	-	-	-	-	-
Reptiles	2	36	30	-	1	3	1	63	-	-	-	-	-	-

(TP) Totally Protected (P) Protected (NP) Not Protected (EN) Endangered (VU) Vulnerable
 (NT) Near Threatened (LC) Least Concern (CR) Critically Endangered (DD) Data Deficient

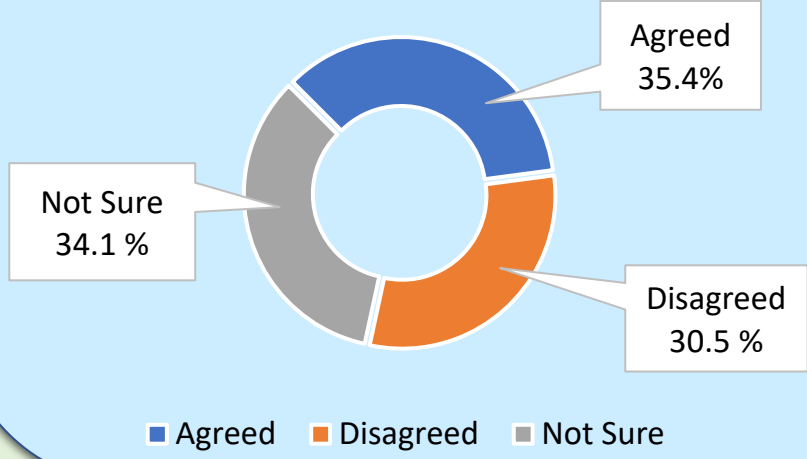
EXISTING ENVIRONMENT 

Socio-economic

Estimation of Population and Household within Study Area

Location	Distance from Site (km)	Population Estimation	Household Estimation
Kampung Pong	5.1	225	32
Kampung Orang Asli Ulu Gerik	8.9	260	65
Kampung Tanjung Kala	9.4	1,800	220
Kampung Ulu Kenderong	11.6	1,238	239
Gerik Town	11.8	34,321	8,495
Total		6,265	1,257

Respondents' Acceptance toward Proposed Project



Out of **243** respondents, 35.4 % have agreed on the proposed Project as they believed the Project will bring benefits to them.

Disagreed: Negative impacts such water pollution that caused Air Ganda WTP to be closed.



Kampung Pong



Kampung Orang Asli Ulu Gerik



Kampung Tanjung Kala



Kampung Ulu Kenderong



Gerik Town

SENSITIVE RECEPTORS WITHIN ZONE OF IMPACT (ZOI)

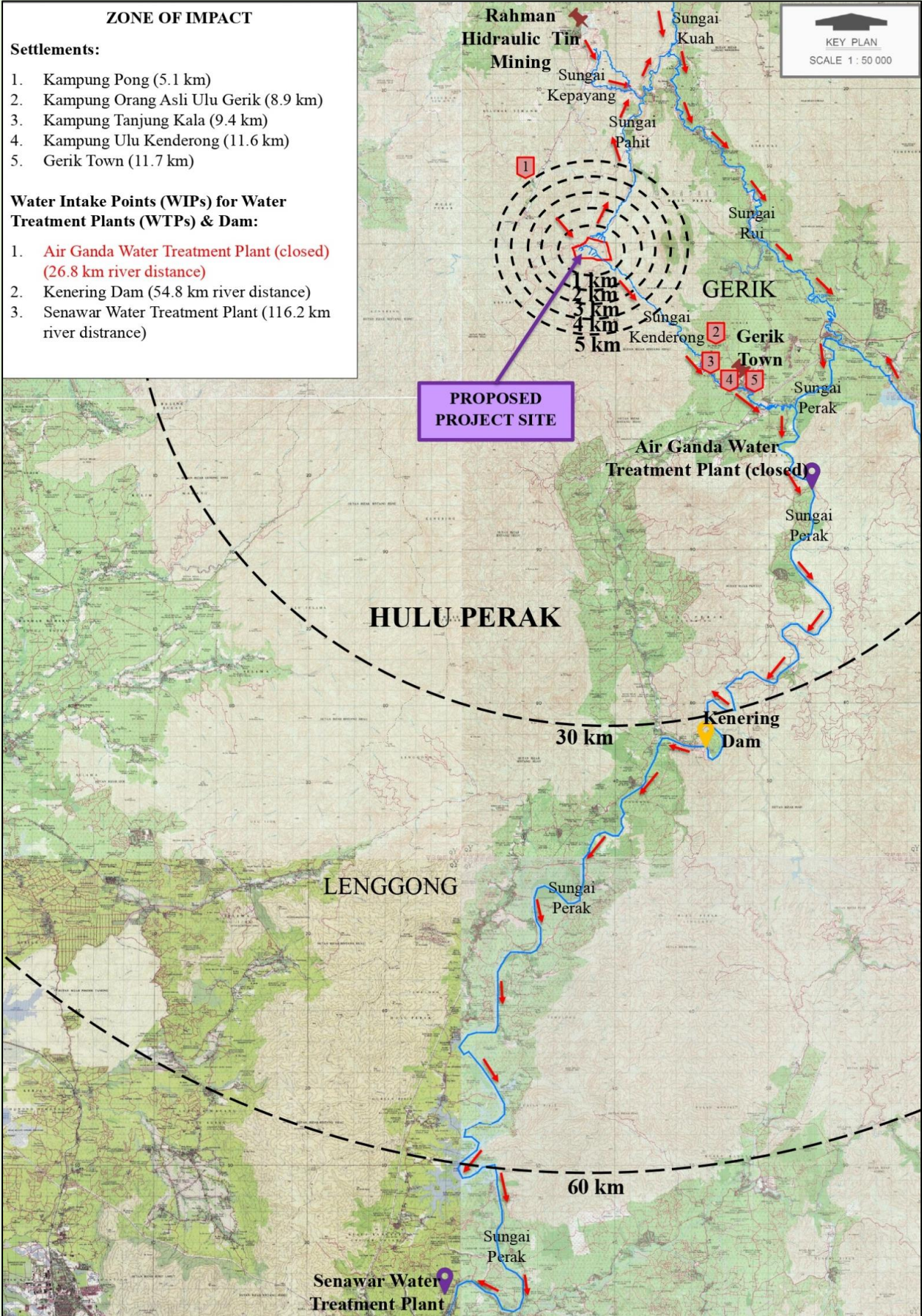
ZONE OF IMPACT

Settlements:

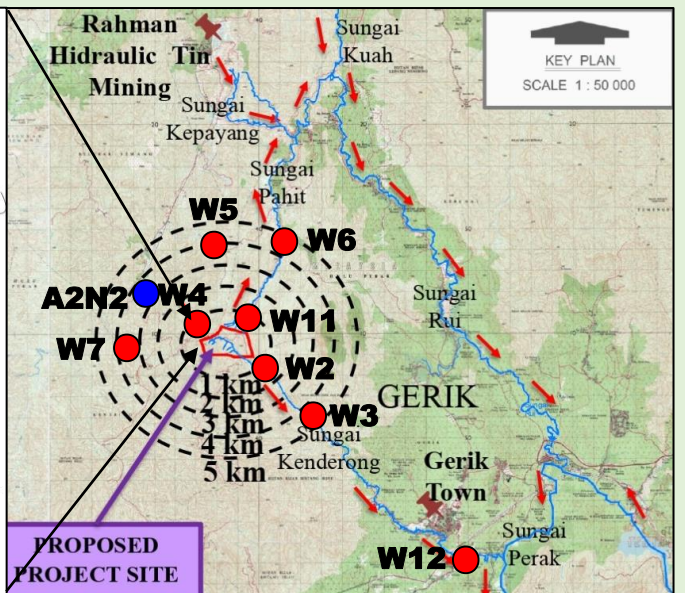
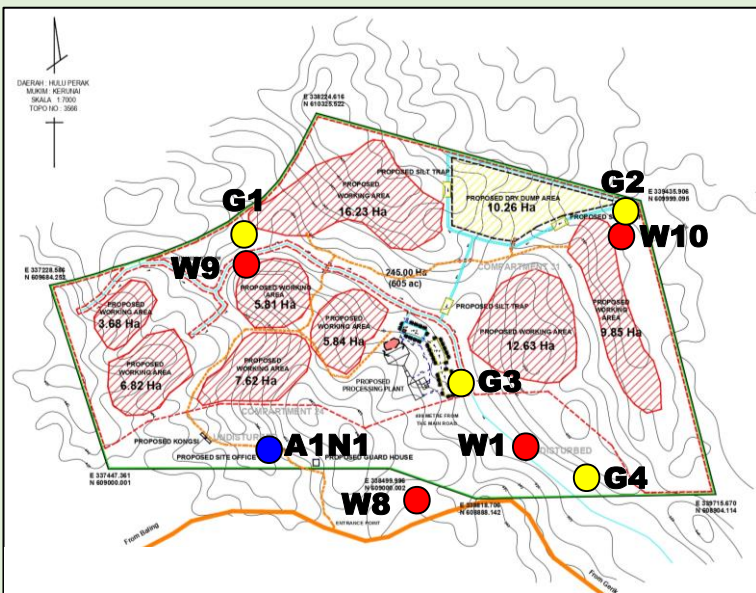
1. Kampung Pong (5.1 km)
2. Kampung Orang Asli Ulu Gerik (8.9 km)
3. Kampung Tanjung Kala (9.4 km)
4. Kampung Ulu Kenderong (11.6 km)
5. Gerik Town (11.7 km)

Water Intake Points (WIPs) for Water Treatment Plants (WTPs) & Dam:
















1. Air Ganda Water Treatment Plant (closed) (26.8 km river distance)
2. Kenering Dam (54.8 km river distance)
3. Senawar Water Treatment Plant (116.2 km river distance)

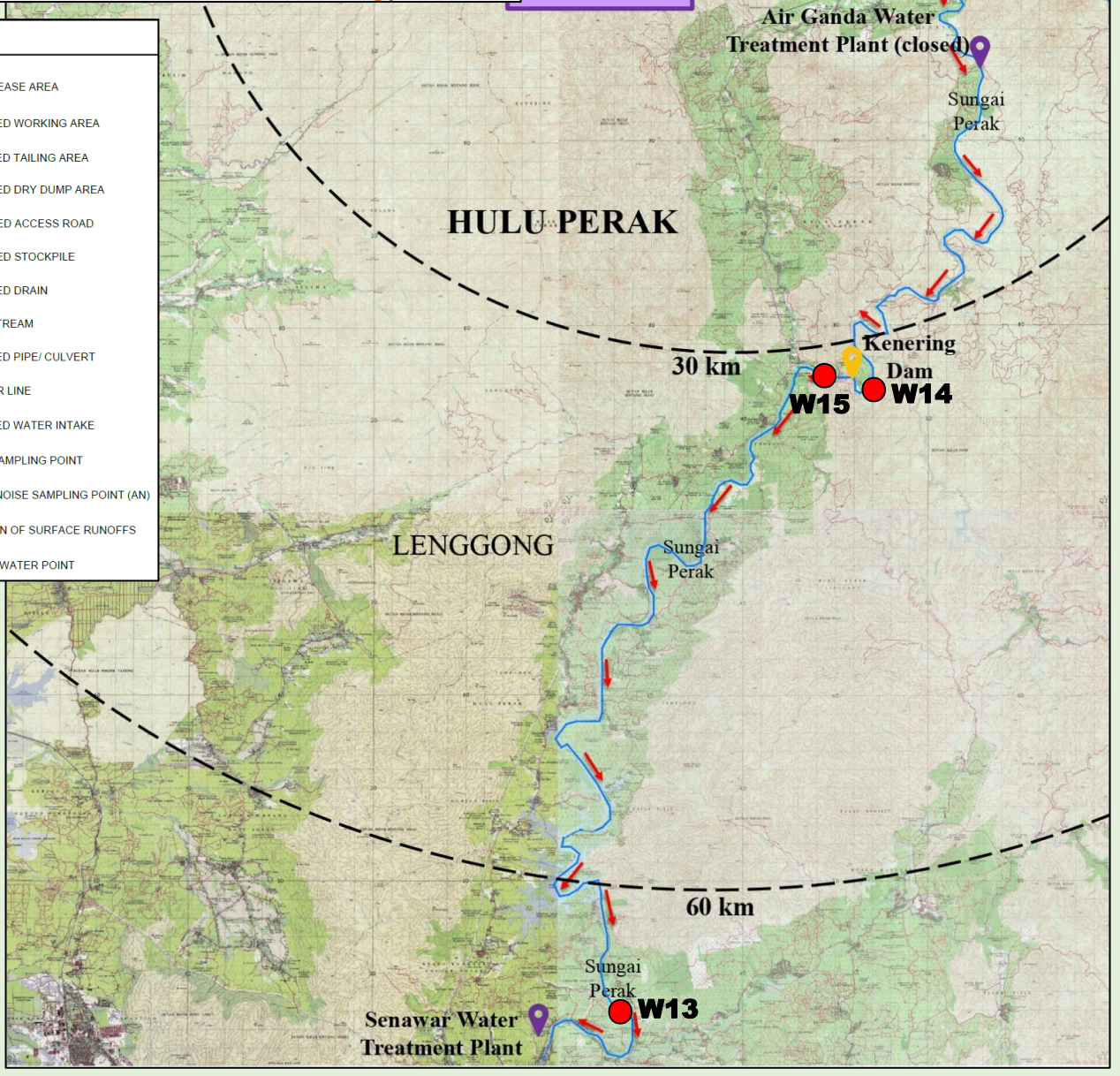


WATER, GROUNDWATER, AIR & NOISE SAMPLING POINTS



LEGEND

	MINING LEASE AREA
	PROPOSED WORKING AREA
	PROPOSED TAILING AREA
	PROPOSED DRY DUMP AREA
	PROPOSED ACCESS ROAD
	PROPOSED STOCKPILE
	PROPOSED DRAIN
	RIVER/ STREAM
	PROPOSED PIPE/ CULVERT
	CONTOUR LINE
	PROPOSED WATER INTAKE
	WATER SAMPLING POINT
	AIR AND NOISE SAMPLING POINT (AN)
	DIRECTION OF SURFACE RUNOFFS
	GROUND WATER POINT



KEY PLAN
SCALE 1 : 50 000

EVALUATION OF POTENTIAL IMPACTS

SOIL EROSION AND RIVER SEDIMENTATION

- When logging and mining activities are being undertaken, the potential for soil erosion by hydrological forces and subsequent sediment pollution will be greatly increased.
- Land degradation, land instability from earth removal or unstable deposition of spoil, leading to landslide and erosion, discharge of sediments into water courses.
- Increase in erosion/sediment deposition in streams/ increase in Total Suspended Solids (TSS) and reduction in DO. Affecting the aquatic life.

HYDROLOGICAL CHANGES

- The logging and mining works during operation may cause lots of eroded materials to be transported and reduce the soil retention capacity.
- In narrow and more shallow streams, the sedimentation will reduce the capacity of the rivers causing flash floods.
- Extensive flooding affect the property damage and loss of lives is imminent.

WATER POLLUTION

- Source of water pollution is from the sediments and heavy metals carried by surface runoffs on bare land from land clearing and ore excavation.
- Surface soil runoffs, and slope erosion can potentially increase silt/sediment deposition in Sungai Kenderong and its tributaries.
- Other potential contaminants include heavy metals such as arsenic. Acid Mine Drainage (AMD) could also potentially affect the water quality.

GROUNDWATER CONTAMINATION

- Logging activities prior to tin mining operation is expected to cause insignificant impacts to local groundwater flow and quality.
- Heavy metals are common source of contaminant associates with mine site as no chemical processing is involved.
- Simulation shows that the mobility of metal is low due to low permeability and hydraulic conductivity of the area.

EVALUATION OF POTENTIAL IMPACTS



AIR POLLUTION

- Large amounts of particulate matter (PM₁₀ and PM_{2.5}) will be released into the atmosphere due to the large mass of soil being handled in the clearing, logging and mining activities.
- Vehicle movements will result in higher level carbon release and lead particulate including gaseous pollutant such as CO, CO₂, SO₂ and NO_x.
- Being exposed in a long period and high density of these gaseous pollutant may give an indirectly impact to the surrounding material and human life.

NOISE POLLUTION

- Noise emanates from chain saw and any other cutting tree machines; generator and workshop equipment; road construction equipment such as bulldozer, graders, scrapers and compactors.
- The movement of heavy vehicles and machineries during logging and mining operations will inevitably increase the existing noise levels in the project site and surrounding area.

DISTURBANCE TO MOVEMENT AND HABITATS OF WILDLIFE

- Loss of habitat and loss of species.
- Human - wildlife conflicts.
- Loss of direction and displaced animals.
- Illegal hunting and poaching.

LOSS OF FLORA SPECIES

- Extensive vegetation removal during logging and mining operations.
- Habitat degradation due to vegetation clearing and removal.

SOCIAL IMPACTS

Potential Negative Impact:

- Perception towards project. The Proposed Project would lead to an increase in social and criminal problems.
- Quality of the surrounding environment will be reduced.
- In-migration. Increase number of foreign workers and traffic congestion.

Potential Positive Impact:

- Employment opportunity.
- Provision for Housing, Infrastructure and Services.

POLLUTION PREVENTION & MITIGATION MEASURES

SOIL EROSION AND RIVER SEDIMENTATION

- Retain vegetated buffer or natural buffer zones on both sides of streams.
- Control runoffs by installation of temporary earth drains, diversion channels and conveyance system that control flows and discharges from and within the site .
- Install interval check dams along the channel to reduce the runoff velocity and trap silts.
- Install perimeter runoffs control such as silt fence, perimeter drain.
- Install silt traps and sediment ponds to control sediment release to off site.
- Temporary soil stabilisation shall be applied to exposed areas within 7 days.

HIDROLOGICAL CHANGES (FLOOD RISK)

- The sediment basins that were used to trap sediment during logging will be converted into flood detention pond once the area has been replanted.
- The proposed detention ponds intend to bring down the post-development flow to the pre-development level.
- The ponds should provide temporary storage for the excess runoff during storm event.

WATER POLLUTION

- Ensure no direct water discharge into any of the nearby natural watercourses.
- Control of runoff flows into, through and from the site via stable drainage structures.
- Installation of perimeter controls: Silt fence, perimeter drains
- Fuel, grease, and engine oil storage must be carefully sited to avoid contamination of the surface waters.
- Streams must be protected with a vegetated buffer zone.
- Protect inlets, storm drain outfalls and culverts.
- Construction of sediment basin should follow the sequence of mining operation.
- Use hydrated lime as neutralisation agent in Acid Mine Drainage (AMD) treatment (other treatments are also available).

GROUNDWATER CONTAMINATION

- Compacted clay liner or other impermeable barriers should be installed at the base of tailing ponds in order to prevent direct contacts of groundwater with the overlying tailing materials.
- Ore excavation will be performed sequentially to minimise the accumulative impacts to the groundwater system.
- Backfilling of the excavated area will be executed and accomplished upon the completion of the excavation prior to beginning operation in other mine areas.
- A periodical groundwater monitoring should be conducted.

POLLUTION PREVENTION & MITIGATION MEASURES

AIR POLLUTION

- Open burning within or outside mining site is strictly prohibited.
- Periodically maintenance on engines of machinery and vehicles to prevent excessive emission of particulates.
- Reducing falling distance during loading and unloading
- Covering the transport vehicles with tarpaulin.
- Wet exposed soil surfaces and dust generated during processing operations with sprinkler.
- Spray the unpaved service roads in the working area with water to reduce the resuspension of particulate matter.
- Maintaining green belt boundary around the site to traps particulate matters in the air.

NOISE POLLUTION

- The machinery should be regularly checked and maintained to optimum operating conditions.
- Impose and enforce a speed limit on all vehicles moving within the mining site for example @30 km/h. Vehicles must have reverse beeper.
- Direct all heavy vehicles to the path that will cause minimal interruption.
- Install effective noise suppression systems.
- Installation of proper sound barriers and/or noise containment, with enclosures and curtains at or near the source equipment (e.g. crushers, grinders, and screens).
- Provide workers with earplugs or earmuffs.

DISTURBANCE TO MOVEMENT AND HABITATS OF WILDLIFE

- Establish Wildlife Monitoring Team (WMT) with the supervision of PERHILITAN to manage all situations involving wildlife, including wildlife conflict.
- Signage on the prohibition of wildlife poaching and trapping and/or keeping parts or derivatives from wildlife.
- Regulating the movement of vehicles that use the logging road leading to the interior forest area.
- Establish a 20 m buffer forest areas along the project boundary to minimise the movement of big wildlife into the project site.
- Any sighting of wildlife especially the big mammals within the areas or adjacent to the work areas need to be reported to the Department of Wildlife and National Park (PERHILITAN).
- Trench and electric fence to prevent movement of wildlife into working areas.
- Grow suitable plants(endemic and fast growing) in the disturbed area during rehabilitation stage as a source of wildlife food and reduce the human-wildlife conflict.

POLLUTION PREVENTION & MITIGATION MEASURES

LOSS OF FLORA SPECIES

- Strict prohibition on encroachment and biomass burning.
- Removal of vegetation should be restricted to the relevant infrastructure footprints only.
- Vegetation on higher elevations and steep slopes will be maintained as is or remained undisturbed to minimise soil erosion and filter the run-off during rainy days.
- No clearing of vegetation from stream banks to prevent the loss of critical species habitat.
- Progressive rehabilitation of affected areas to restore ecosystem function, where possible with fast growing trees and leguminous creeper species.
- Invasive alien species should be prevented from occurring on site.

SOCIAL IMPACTS

- Project Proponent shall plan a Grievance Management Plan and Procedure to support programs in order to manage the potential complaints from the local peoples.
- Project Proponent is advised to carry out a suitable continuous Company Social Responsibility (CSR) to build trust and responsibility to the surrounding community.
- If there are any issues regarding natural disasters and damage during the project development such as flooding, Project Proponent shall coordinate with National Disaster Management Agency (NADMA) to provide help to affected community such as temporary shelter and economic relief.
- Project Proponent shall comply with any mitigation measures suggested in P2M2 in reducing the impacts that may disrupt the community surrounding.
- Project Proponent is advice to give 60% job opportunities to local people especially from Mukim Kerunai for any job opportunities.

WASTE GENERATION

Scheduled waste (oil & arsenic):

- Scheduled waste should be collected, segregated and stored in a seal container with labelling to minimise the risk pollution.
- Bunds are to be constructed around each chemical or storage tank.
- Provide emergency response plan for oil spillage.

Domestic solid wastes:

- No haphazard disposal on site or off site and no open burning.
- Provisions of garbage bins/dumpsters and appoint regular domestic waste collector.

Sewage:

- Provision of hygienic sanitary system is essential to minimise any impacts and must be provided on-site throughout the logging and mining period.
- Use septic tanks that treat sewage to meets Standard A of the **Environmental Quality (Sewage) Regulation, 2009** for the discharge upstream.

ENVIRONMENTAL MANAGEMENT PLAN (EMP) 

PERFORMANCE MONITORING (PM)

LD-P2M2	PM Parameters	Recommended Limits	Frequencies
Silt Trap	Silt marker	-	Weekly or after rain event
Sediment Pond	Silt marker	-	
Earth Drains with Check Dam	Sediment level	-	Quarterly
Earth Bund	Performance	-	
Silt Fence	Performance	-	
Roadside Drain	Performance	-	
Overburden Stockpile	Performance	20 m away from any watercourse	
River Riparian Buffer Zone	Performance	25 m or more at both sides	
Riparian Corridor	Performance	50 m or more at both sides	
Boundary Buffer	Performance	20 m away from site boundary	

COMPLIANCE MONITORING (PM)

Item	Monitoring Frequency	Environmental Quality Standards
Water Quality	Once a month	<ul style="list-style-type: none"> i. Baseline samplings ii. National Water Quality Standards (NWQS). iii. Mineral Development (Effluent) Regulations 2016 iv. Drinking Water Quality Standard, Ministry of Health Malaysia. Recommended Raw Water Quality 2004.
Groundwater Quality	Twice a year	<ul style="list-style-type: none"> i. Baseline samplings ii. National Standard for Drinking Water Quality (Revised December 2000), Second Version (MOH, 2004). iii. Malaysia Groundwater Quality Standards and Index – for Conventional use of Raw Water Treatment (Drinking Water) (DOE, 2019).
Air Quality	Once a month	<ul style="list-style-type: none"> i. Baseline samplings ii. Malaysia Ambient Air Quality Standards (Standard value by 2020).
Noise Level	Once a month Daytime - 15 hours (from 7.00 am to 10.00 pm) Nighttime - 9 hours (from 10.00 pm to 7.00 am)	<ul style="list-style-type: none"> i. Baseline samplings ii. Guidelines for Environmental Noise Limits & Control, Third Edition (DOE, 2019), First Schedule of Permissible Sound Levels.

ENVIRONMENTAL MANAGEMENT PLAN (EMP) 

IMPACT MONITORING (IM)

Item	Impact Monitoring
Water Quality	<ul style="list-style-type: none"> i. Continuous water quality monitoring for turbidity and total suspended particulates. ii. If silt trap/sediment containment structure is employed to contain the suspended solids, this must be regularly monitored for tear and displacement from the intended location. iii. Even with a silt trap/sediment containment structure in place, the water quality beyond the silt trap/sediment must be sampled for turbidity/TSS. iv. Record the regular maintenance of the drainage and sediment ponds on site and ensure the drains are not blocked and the ponds capacity is met with no overflow.
Groundwater Quality	<ul style="list-style-type: none"> i. Continuous groundwater quality monitoring. ii. Records of measured water level. iii. Records regular maintenance of monitoring well to prevents well water quantity and quality deteriorating in longer term.
Air Quality	<ul style="list-style-type: none"> i. Records to show regular maintenance of equipment, machineries and vehicles used for this project development. ii. Records of provision of adequate dust protective device to workers working in dusty areas. iii. Records of provision of dust suppression facilities such as water bowser. iv. Records on air quality monitoring results. v. Checking on the soil surface to ensure proper soil compaction is practiced onsite especially on exposed area.
Noise Level	<ul style="list-style-type: none"> i. Records to show regular maintenance of equipment, machineries and vehicles used for this project development. ii. Records of provision of adequate noise protective device to workers working in high noise level areas. iii. Schedule of working hours, transportation in and out of the project site showing the type of loading and maintenance tasks carried out for vehicles.



CONCLUSIONS

The major activities that can potentially spawn impacts : Site clearing, Logging, Ore excavation, Ore processing, Haulage and Transportation.

The aspects of the activities annexed to impacts: Dust formation (air quality), Noise generation (noise level), Soil erosion and river sedimentation (water quality).

The major impacts ensuing these aspects; Air pollution (PM_{10} , $PM_{2.5}$, etc.), Noise pollution (increase dBA) and Water pollution (turbidity, total suspended solids, DO and metal contaminants).

Abatement of impacts:

- Pollution prevention and impact mitigating measures on land disturbance, operations and post operation.
- Maintenance and Monitoring of BMPs
- Environmental Management Plan
- Environmental Auditing
- Self Regulation
- Rehabilitation program.

The Proposed Project of logging and tin mining within Hutan Simpan Kenderong, Hulu Perak will not incur significant impacts if appropriate mitigating measures especially for air, noise, water and groundwater quality control are employed followed by rigorous environmental management plan, environmental monitoring and environmental auditing.