Executive Summary

PROPOSED MINING AND BENEFICIATION OF LANTHANIDE ELEMENT ION-ADSORPTION DEPOSIT ON A TOTAL AREA OF ABOUT 5,339 ACRES (2,161 HA), IN MUKIM KENERING, DAERAH HULU PERAK, PERAK DARUL RIDZUAN

Project Proponent (Mine Operator)

MCRE Resources Sdn Bhd (1366182-T)

Level 8, Menara Zenith, Jalan Putra Square 6, Putra Square, 25200 Kuantan, Pahang

Tel.: +609-5488888

Fax: +609-5488800

Contact Person: Dato' Sri Pek Kok Sam

Land Owners / Mineral Tenement Holders

Menteri Besar Incorporated (MBInc.) Perak

Perbadanan Pembangunan Pertanian Negeri Perak (PPPNP)

FELCRA Berhad

EIA Consultant

Chemsain Konsultant Sdn Bhd

No. 41, 1st Floor, Jalan USJ 10/1D, 47620 Subang Jaya, Selangor Darul Ehsan

Tel.: +603 5637 0163

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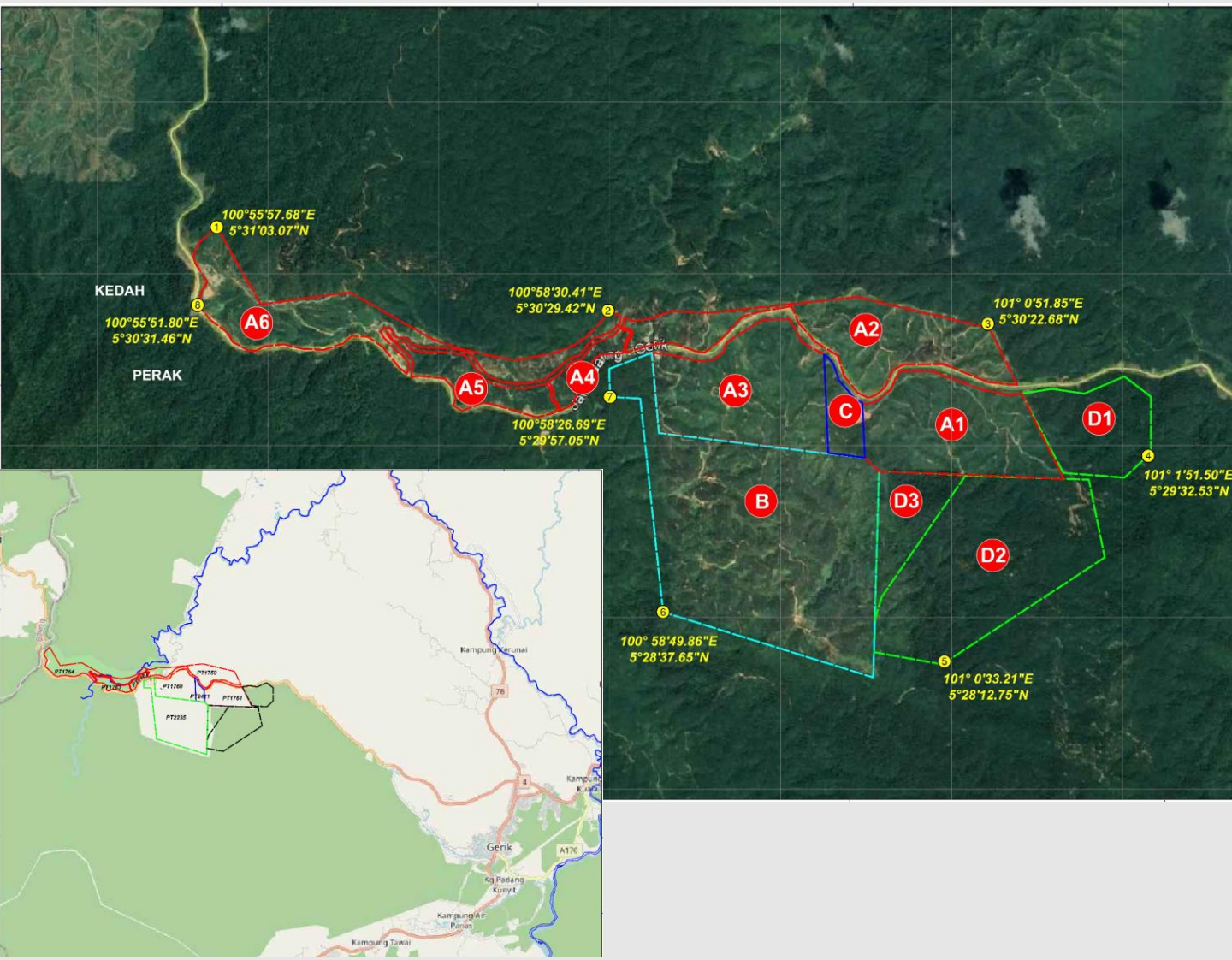
EIA Team Leader: Ms Lina Chan

Project Location



Parcel ID	Lot Number	Acreage
Land Proprietor	**PPPNP**	
Developer	**Aras Kuasa Sdn Bhd**	
A1	PT 1761	528.216 acres (213.761 ha)
A2	PT 1759	533.198 acres (215.778 ha)
A3	PT 1760	573.072 acres (231.914 ha)
A4	PT 1762	61.923 acres (25.059 ha)
A5	PT 1763	145.327 acres (58.812 ha)
A6	PT 1764	476.156 acres (192.694 ha)

Land Proprietor	FELCRA Berhad via MB Inc Perak	
Developer	**Tulus Mentari Holdings Sdn Bhd**	
B	PT 2235	1500 acres (607 ha)

Land Proprietor	Majlis Daerah Gerik	
Developer	**Tulus Mentari Holdings Sdn Bhd**	
C	PT 2411	89.99 acres (36.42 ha)

Land Proprietor	MB Inc Perak	
Developer	**Aras Kuasa Geological Sdn Bhd**	
D1	Forest Land (No. Syit Peta: 3566, Kenering, Hulu Perak)	310.381 acres (125.61 ha)

Land Proprietor	MB Inc Perak	
Developer	**Tulus Mentari Holdings Sdn Bhd**	
D2	Forest Land (No. Syit Peta: 3566, Kenering, Hulu Perak)	922.452 acres (373.30 ha)

Land Proprietor	MB Inc Perak	
Developer	**Tulus Mentari Holdings Sdn Bhd**	
D3	Forest Land (No. Syit Peta: 3566, Kenering, Hulu Perak)	197.801 acres (80.047 ha)

Total	**11 land parcels**	**5,339 acres (2,161 ha)**

Land Status

- PPPNP and FELCRA have consented for EIA study to be conducted on their respective lands.
- Department of Forestry Perak have given permission for EIA study to be conducted on the related Forest Reserve.
- Proprietary Mining Licenses (PML) have been approved by the State Authority on PT1759, PT1760, PT1761, PT1762, PT1763 and PT1764, for 30 years period to PPPNP

Overview

METHODOLOGY

In-situ Leaching Mining Method

Targeting on Ion-Adsorption Clay, Non-Radioactive Rare Earth Element (NR_REE) / Lanthanide Deposits

RAW MATERIAL

Ammonium Sulphate

Ammonium Bicarbonate

COMPONENTS

7 Hydrometallurgical Plants (4 with 5,555 TPA & 3 with 8,340 TPA) – Developed in Phases

Leaching Solution Injection System

Pregnant Solution Collection System

PRODUCT

Lanthanide Carbonate (Production depends on reserves and element exchange efficiency)

Legislative Requirements

Based on the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015, the proposed Project is categorised as a prescribed activity under Second Schedule as follows:

Second Schedule

Activity 8. Mining

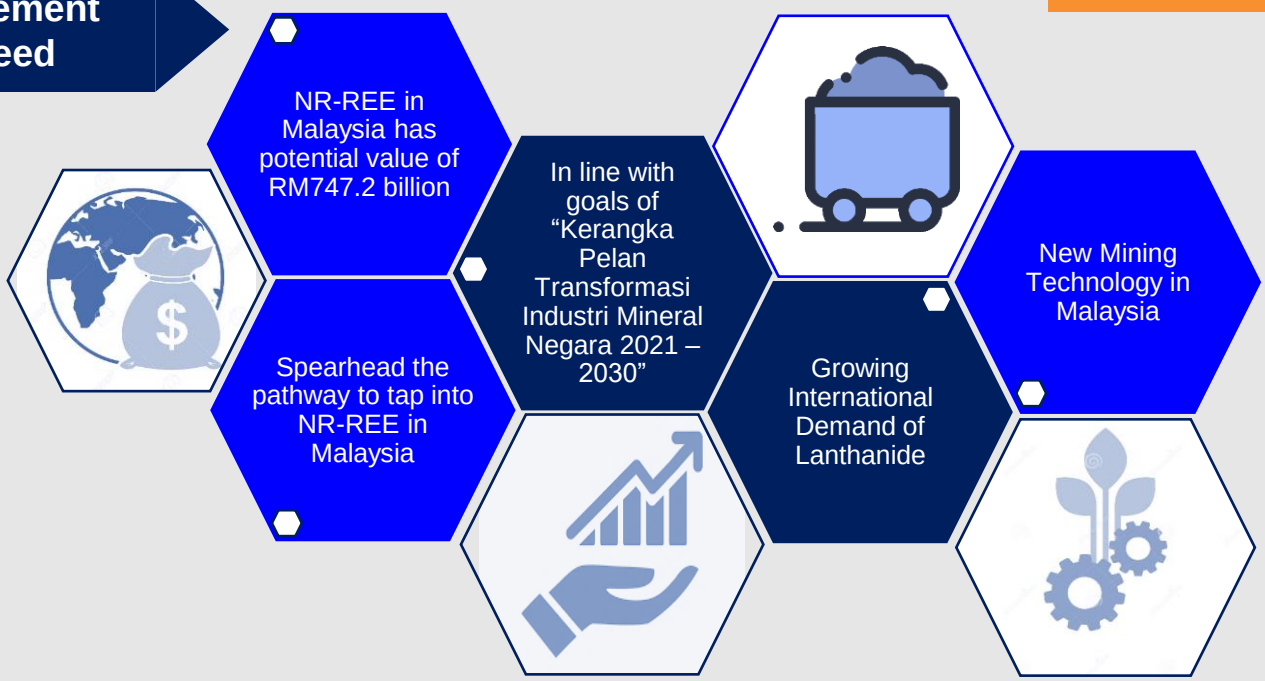
(a) Mining of minerals in new areas involving large scale operation.

(b) Mining of minerals within or adjacent or near to environmentally sensitive areas.

First Schedule

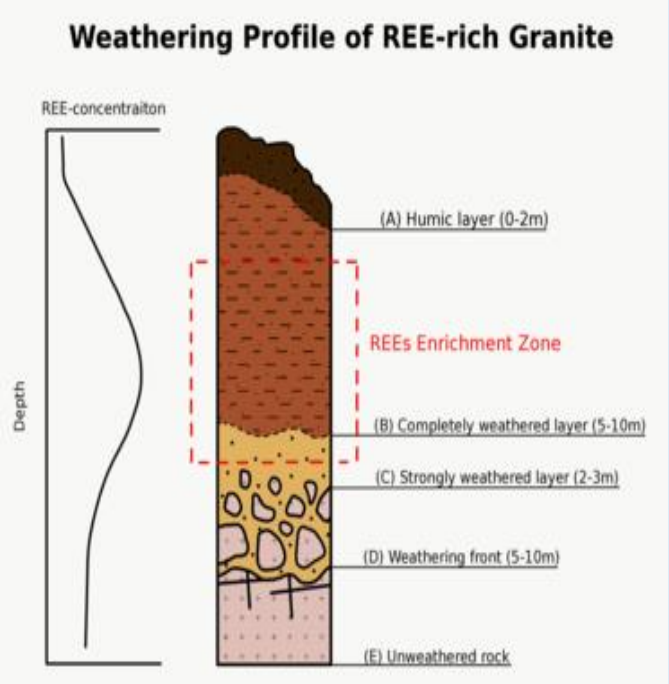
Activity 13. Development in slope area.
Development or land clearing less than 50 per cent of an area with slope greater than or equal to 25° but less than 35°.

Statement of Need

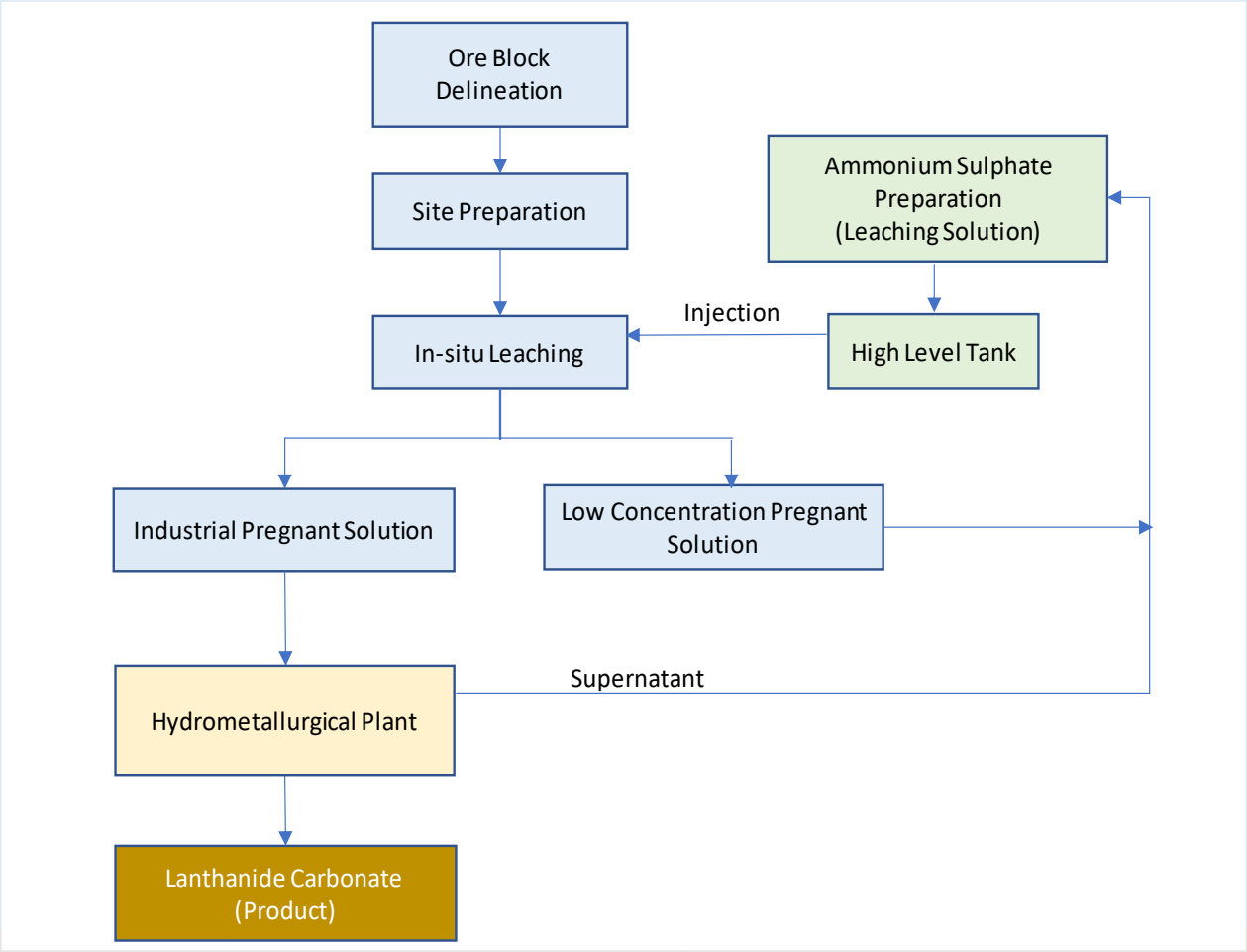


Project Concept

- Ionic lanthanide extraction using in-situ leaching (ISL) method.
- Mine development shall include the construction of 7 hydrometallurgical plants and establishment of injection holes and piping system for the in situ leaching.
- Targeting weathered granite layer with rich REE resources.
- Ore processing to produce lanthanide carbonate as final product.
- This proposed Project does not cover the separation and refinery processes of lanthanide elements.
- The Project will reuse all of the collected supernatant, no discharge during normal operation.



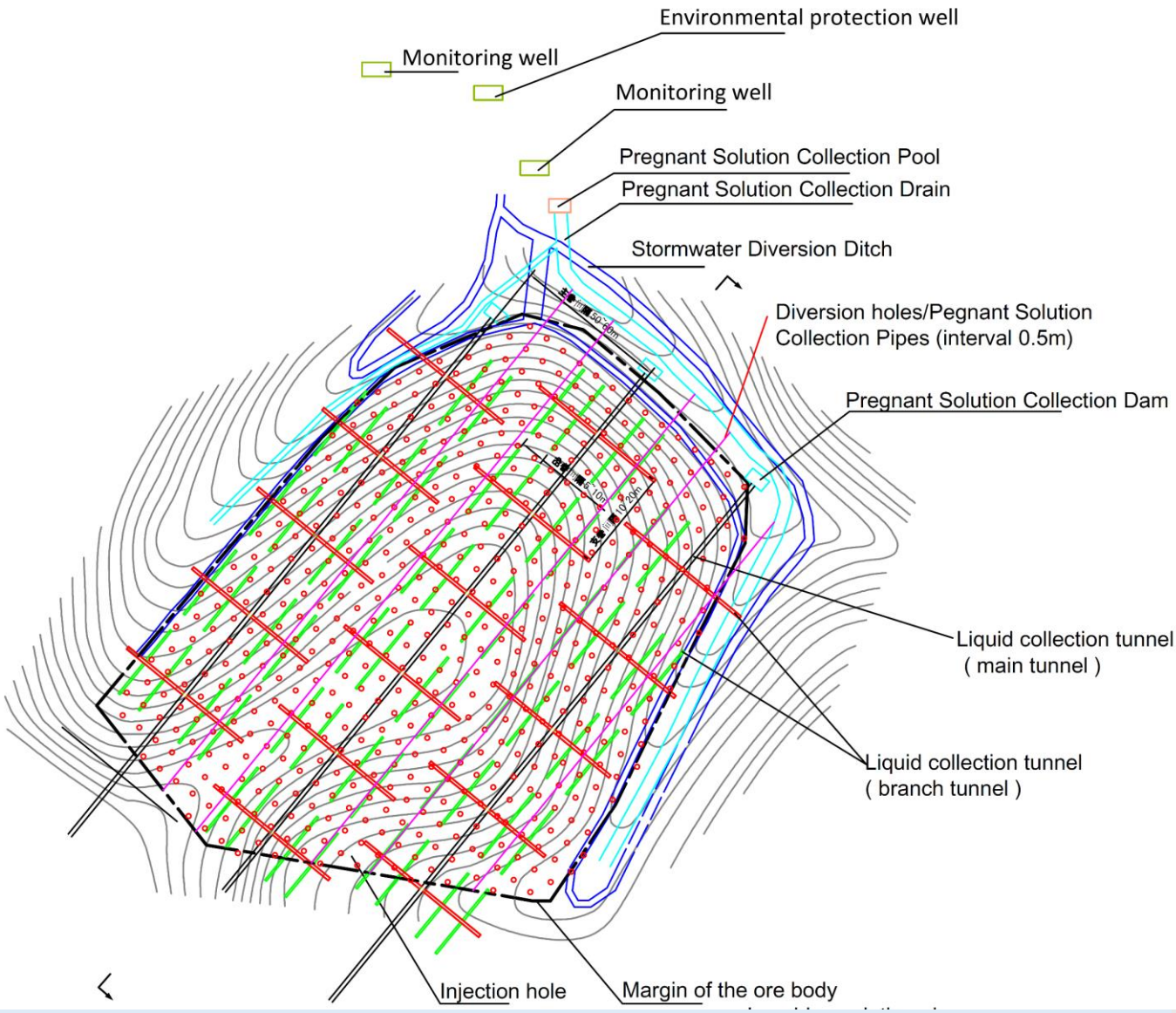
In-situ Leaching Process Flowchart



Injection and Leaching Process

- Leaching solution: 1% to 2% Ammonium Sulphate [$(NH_4)_2SO_4$]
- Leaching solution transferred using pump through PVC pipelines to high place tank, and distributed to injection holes via PVC pipes network setup on top of hills with ore bodies
- Leaching solution is injected through liquid injection hole – normally controlled between 0.6 m³/d and 1.0 m³/d for a single borehole
- Cation with higher exchange potential will exchange with lanthanide in the soil

$$2\ (Kaolin)^{-3}\ RE^{+3} + 3(NH_4)^{+1}{}_2SO^{-2}{}_4 \rightarrow 2\ (Kaolin)^{-3}6(NH_4)^{+1} + RE_2{}^{+3}(SO_4)^{-2}{}_3$$



Pregnant Solution Collection System

- Pregnant solution leached from ore bodies collected via collection tunnels, diversion holes and collection drains
- Collected at collection pools at the end of collection drains and pumped to hydrometallurgical plant for process

Hydrometallurgical Process

1

Decontamination

- Impurity ions Al3+, Fe3+, Ca2+ and Mg2+, unconsumed pregnant solution, fine clay particles
- Impurities removed using different pH values for carbonate precipitation and hydroxide precipitation
- Purification process takes about 12 hours

2

Precipitation Process

- Saturated ammonium bicarbonate added with continuous air stirring, controlled pH 6.7 for 8 to 10 hours
- Generated supernatant to be reutilized as leaching solution

3

Aging Crystallization of Lanthanide Carbonate

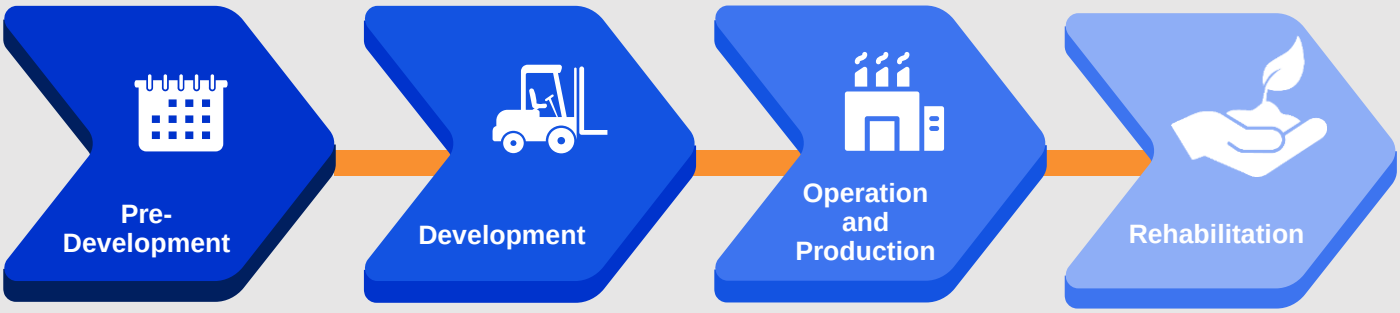
- Precipitated lanthanide carbonate 10 hours in sedimentation tank
- Lanthanide carbonate crystalizes

4

Filter Press

- Remove excessive water
- Lanthanide carbonate packed and stored for dispatch

Project Activities



Pre-Development	Development	Operation and Production	Rehabilitation
Project planning	Mobilisation of workers	Preparation of leaching solution	Clear Water Leaching (End of mining process)
Design works	Transportation of construction material and equipment	Delivery of leaching solution through pipelines	Land stabilization
Site surveys and prefeasibility studies	Development of hydrometallurgical plant	Injection	Soil Improvement
Baseline monitoring	Development of injection system	Collection of pregnant solution	Vegetation Restoration
Environmental Studies	Development of pregnant solution collection system	Processing of pregnant solution	
Technical Submissions	Installation of pollution control system	Filter press and packaging lanthanide / REE carbonate	
		Recirculate of supernatant for injection	

Mining Schedule

- Each parcel of land has multiple ore bodies with each ore body requires certain time frame for the leaching process, depending on the amount of reserves and leaching efficiency.
- Development and mining operation will be conducted in phases according to the approved parcels of land with the area located within forest reserve onwards the end of overall schedule. Development within each ore body will be in phases as well.
- Total expected year of completion – 12 years (depends on actual site condition)

Comparison of Mining Methods

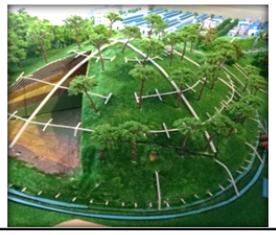
Open Pit Mining

Advantages	Disadvantages
Open Pit	
Technology inexpensive	Require total clearing of the site
Less requirement for skilled workers	Mine and facility setup footprint are large
Visible and clear mining progress	Significant environmental impact – air, water, noise, vibration, large ecological loss
Less limitation on production capacity as expansion is dependent on mechanical process and machinery	High risk of soil erosion and landslide
	Require intensive rehabilitation

In-situ Leaching

Advantages	Disadvantages
In-situ Leaching	
Require smaller work force	Skilled workers are needed
Shorter lead time for mine development and smaller footprint for facility setup	Intensive planning on proper implementation approach
Significantly less clearing and maintain soil cover	Production capacity may be limited by efficiency of leaching process
Less noise and dust pollutions	Potential risk to surface and groundwater
No generation of overburdens and other residues	Potential risk to changes in soil characteristic (more porous and less stable) and landslide risk
Less intensive rehabilitation	Potential changes to soil composition

Comparison With Other Projects In Malaysia

Proposed Project, Gerik	**Asia Rare Earth, Perak (1982)** https://en.wikipedia.org/wiki/1982_Bukit_Merah_radioactive_pollution	**Lynas, Pahang** EIA and QRA of the Proposed Advanced Materials Plant
		
To mine Lanthanide Ion-Adsorption Clay deposit using in-situ leaching mining method with Lanthanide Carbonate as the final product for export (No Lanthanide elements splitting process)	Extraction of Rare Earth Element, yttrium from monazite where the extraction process generates radioactive contaminated waste, which includes thorium and uranium	RE refining facility to produce individual lanthanide elements or mixtures of elements for selected Industries application
Export Lanthanide Carbonate for further processing to China or other countries	Monazite was extracted from amang, byproduct of tin mine in Kinta Valley	Import Lanthanide concentrate from Mt Weld Australia
Produce scheduled wastes and No radioactive residue	Produce radioactive residue and scheduled wastes	Produce radioactive residue and scheduled wastes
Potential public concerns: • Transparency on information of proposed project • Impact to forest land and ecology • Other environmental risks	Public concerns: • Odour and smoke from factory • Radioactive residue disposal • Reported health impact	Public concerns: • Potential risk from storage of radioactive residue in Gebeng

Existing Environment

TOPOGRAPHY

Located on an undulating land to hilly area from 360m to 575m

GEOLOGY

Bintang range granite mainly acidic intrusive rocks of Permian-Jurassic

SOIL

Based on soil composition analysis, lead and manganese are enriched in the weathered granitic soil, whereas chromium, vanadium and nickel are depleted.

METEOROLOGY & CLIMATE

High annual rainfall with relatively uniform high humidity and temperature

ENVIRONMENTAL SENSITIVE AREA

Located within ESA Rank 1 based on third (3rd) RFN

Part of Central Forest Spine (CFS) 1 – (Primary Linkage) PL8: Kenderong FR (Bintang Hijau) – Bintang Hijau (Hulu Perak) FR (Bintang Hijau)

PUBLIC HEALTH

Existing disease burden in Hulu Perak is not immense

Communicable diseases presented were very low compared to other districts in the State except for Hepatitis A and dengue fever

Malaria and leptospirosis are important diseases that required attention due to the nature of the vegetated / forest area within the proposed Project site

SOCIO-ECONOMIC

Located within BPK 5.1: Hutan Simpan Bintang Hijau, Hulu Perak

Survey from 8 to 13 February 2021 (164 Respondents)

HYDROLOGY AND HYDROGEOLOGY

Located within Sg Perak basin

3 operating water treatment plants nearest to site, with 2 at tributaries and Kota Lama Kiri station about 161km downstream

Low groundwater aquifer potential

Granite layer with mostly low to certain location with medium permeability

TERRESTRIAL ECOLOGY (FLORA)

Floristic composition -late regenerating forest. Primary vegetation has been removed in previous logging activity, some parts of the land was cleared for skid trails, logging roads and timber landing areas

Active logging activities by different contractors around the site

TERRESTRIAL ECOLOGY (FAUNA)

Mammal - diverse in diversity Chiroptera (bats), Rodentia (rodents; squirrels), Carnivora (tiger, cats and civets) and Primates (macaques), Proboscidea (elephant), Perissodactyla (tapir) and Artiodactyla (pig and mousedeer).

Birds - 214 species from 62 families recorded

Other vertebrates - 68 reptile species from 14 families, 27 species of lizards and 36 species of snakes and five species of turtle recorded

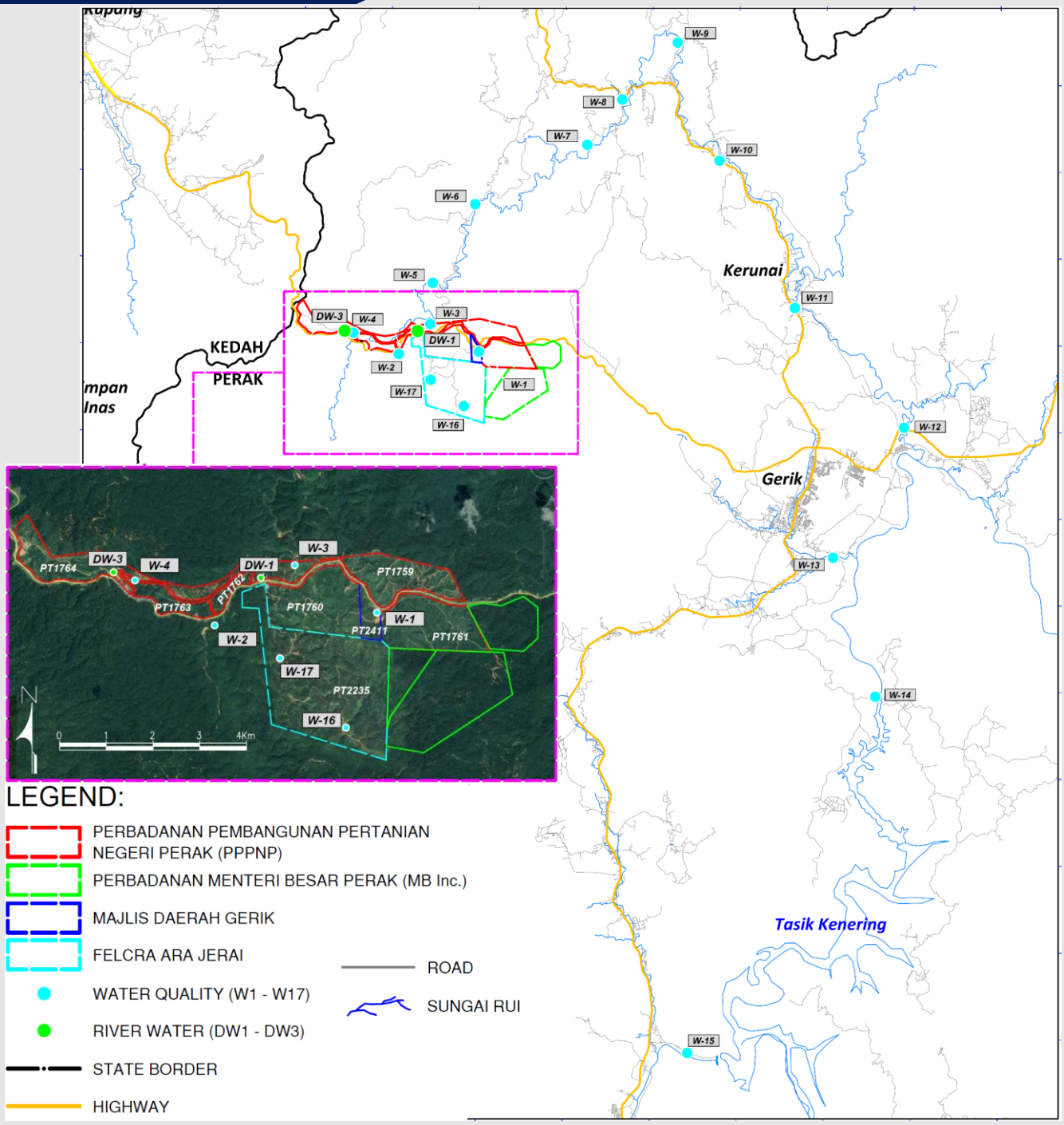
Human-Wildlife Conflict – Total of 8 reported cases involving wild boar, elephant and tiger (2015-2019)

RIVER ECOLOGY

A total of 12 fish species consisting five family of 131 specimens

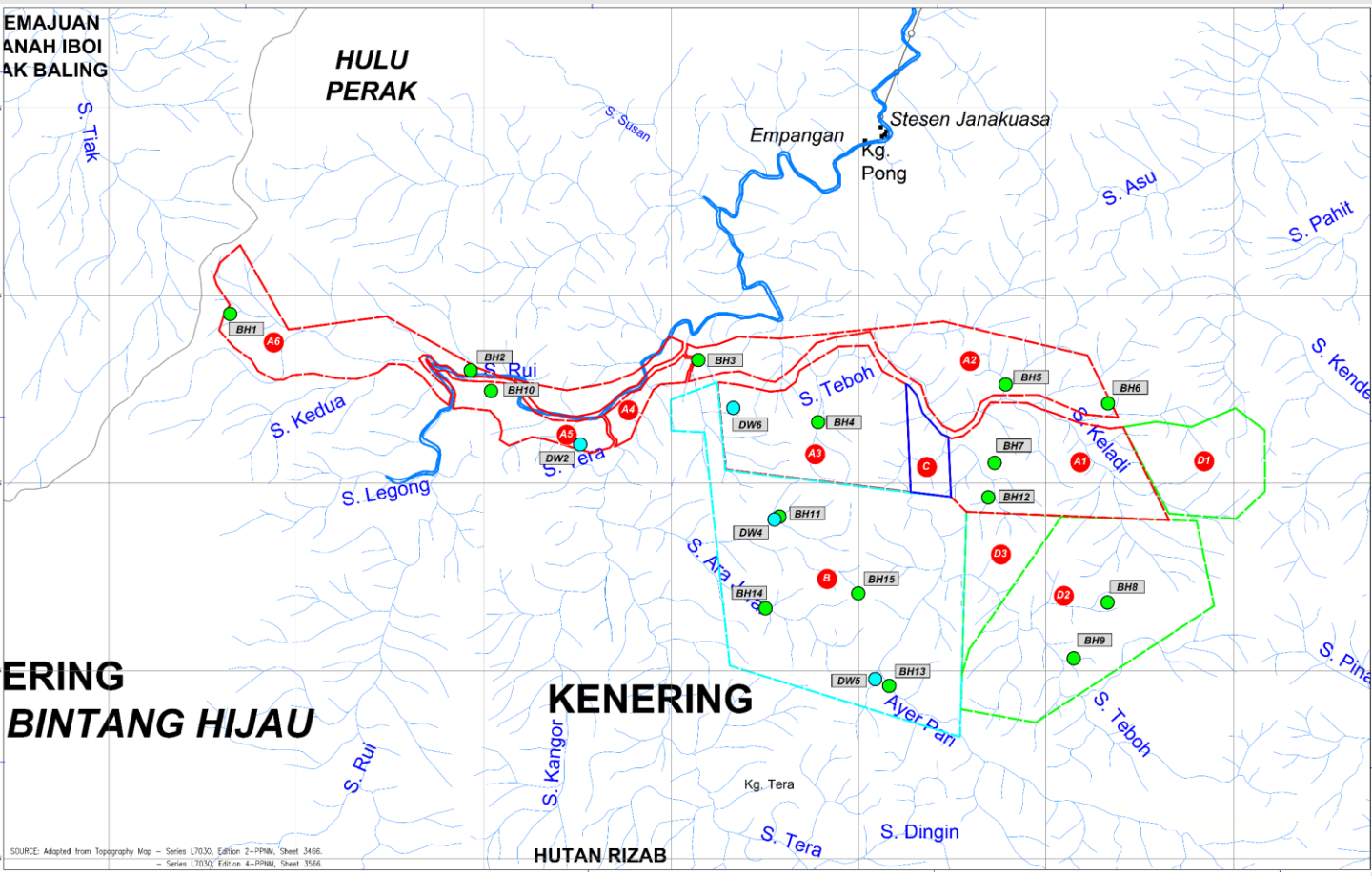
All the species identified in the study are common and widely found at lotic environment through out of Peninsular Malaysia.

Baseline Monitoring Locations (River)



- Water Quality Index (WQI) between 72.12 and 94.15, Class I and Class II (Clean), except W8 being Class III
- W8 is at Sungai Kepayang, downstream of a tin mining operation before flowing into Sungai Rui, TSS, sulphate, copper, nickel, iron, manganese and arsenic exceeding the Class IIA limits
- All the samples have high concentrations of feacal coliform
- Copper and iron concentrations at most locations exceed Class IIA of 0.02 mg/L and 1 mg/L respectively
- Manganese concentrations are found to exceed the Class IIA limit of 0.1 mg/L and RWQS requirement of 0.2 mg/L between W8 and W15, and W17
- Arsenic levels from W8 to W12, W14 and W15 are found to exceed the Class IIA and RWQS limits of 0.05 mg/L and 0.01mg/L respectively
- It is established that arsenic and manganese are high along Sungai Kepayang, a tributary of Sungai Rui and downstream of this proposed Project site.

Baseline Monitoring Locations (Groundwater)

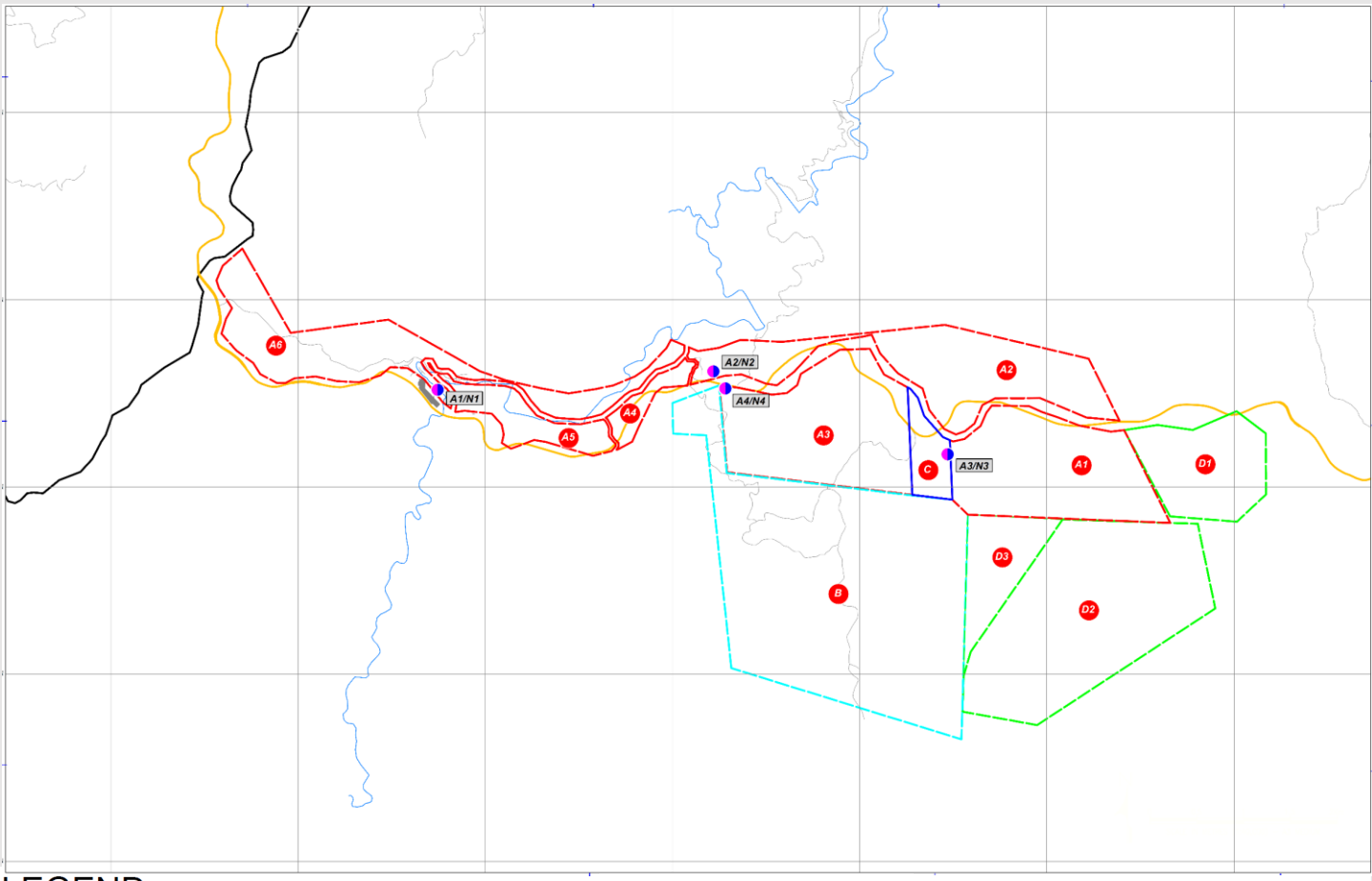


LEGEND:

- PERBADANAN PEMBANGUNAN PERTANIAN NEGERI PERAK (PPPNP)
- PERBADANAN MENTERI BESAR PERAK (MB Inc.)
- MAJLIS DAERAH GERIK
- FELCRA ARA JERAI
- GROUNDWATER (BH1 - BH15)
- RIVER WATER (DW2,DW4 - DW6)
- RIVER / STREAM

- BH1 to BH15 have BOD, COD, and oil & grease levels exceeding the stipulated MGSI limits
- Existing DW2, DW4, DW5 and DW6 wells are complying to the standard limit for drinking application, except for DW4 which is reported with high coliforms.
- Lead is also reported in the groundwater from the newly established BH1 to BH15 wells. The presence of lead may be residue from drilling to establish wells. Lead is not detected in the groundwater samples from existing wells.

Baseline Monitoring Locations (Ambient Air and Noise)



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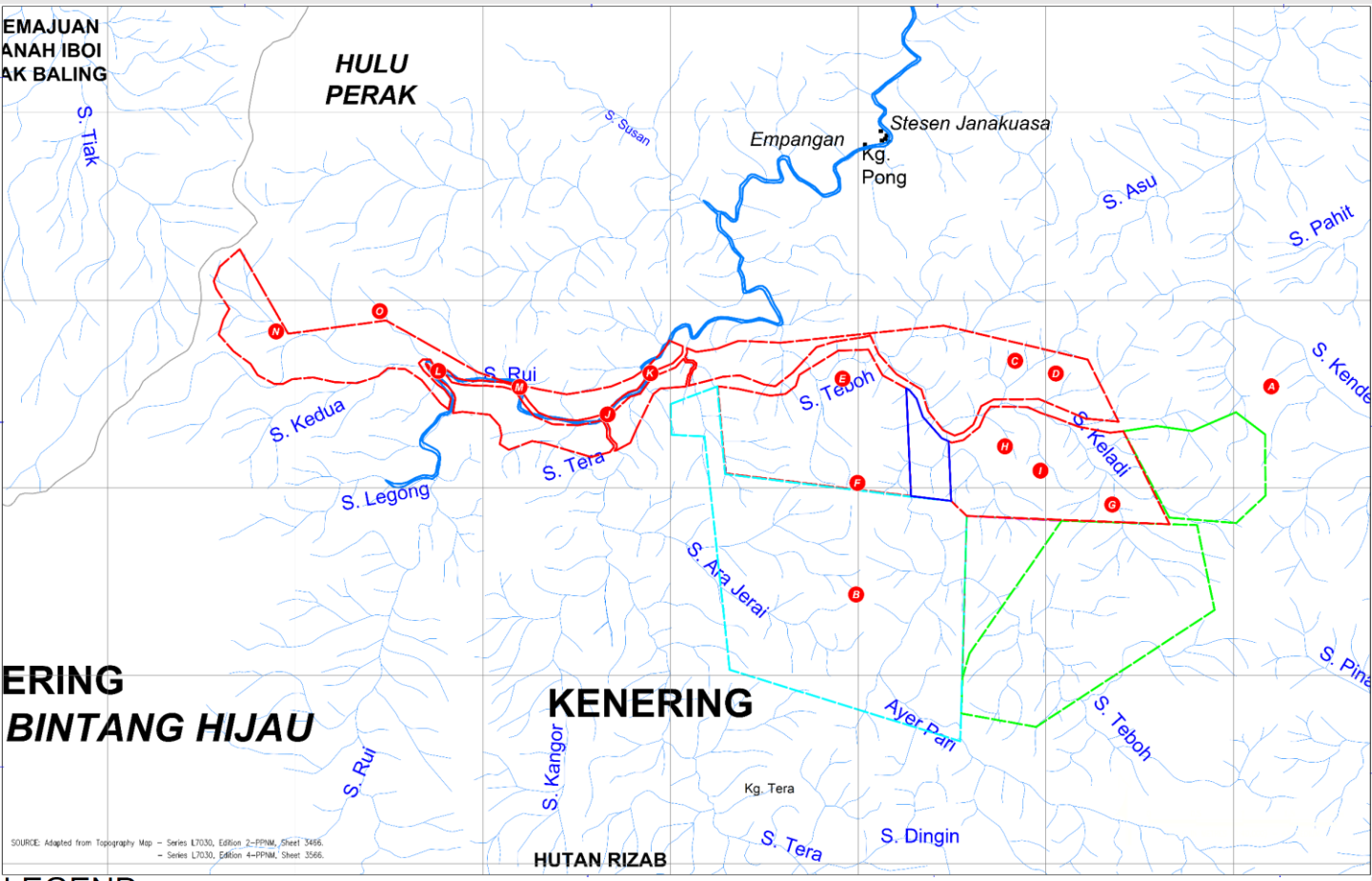
- AIR (A1 - A4)
- NOISE (N1 - N4)
- HIGHWAY
- ROAD
- DISTRICT BORDER
- RIVER / STREAM

Ambient air quality at all sampling locations complied with MAAQS

N3 (Project's workers quarter) exceeded the recommended guideline limit for both daytime (60 dB(A)) and night time (55 dB(A)), ;N1 (R&R Bintang Hijau) slightly exceeded the night time limit.

Baseline Monitoring Locations (Radioactivity Analysis)



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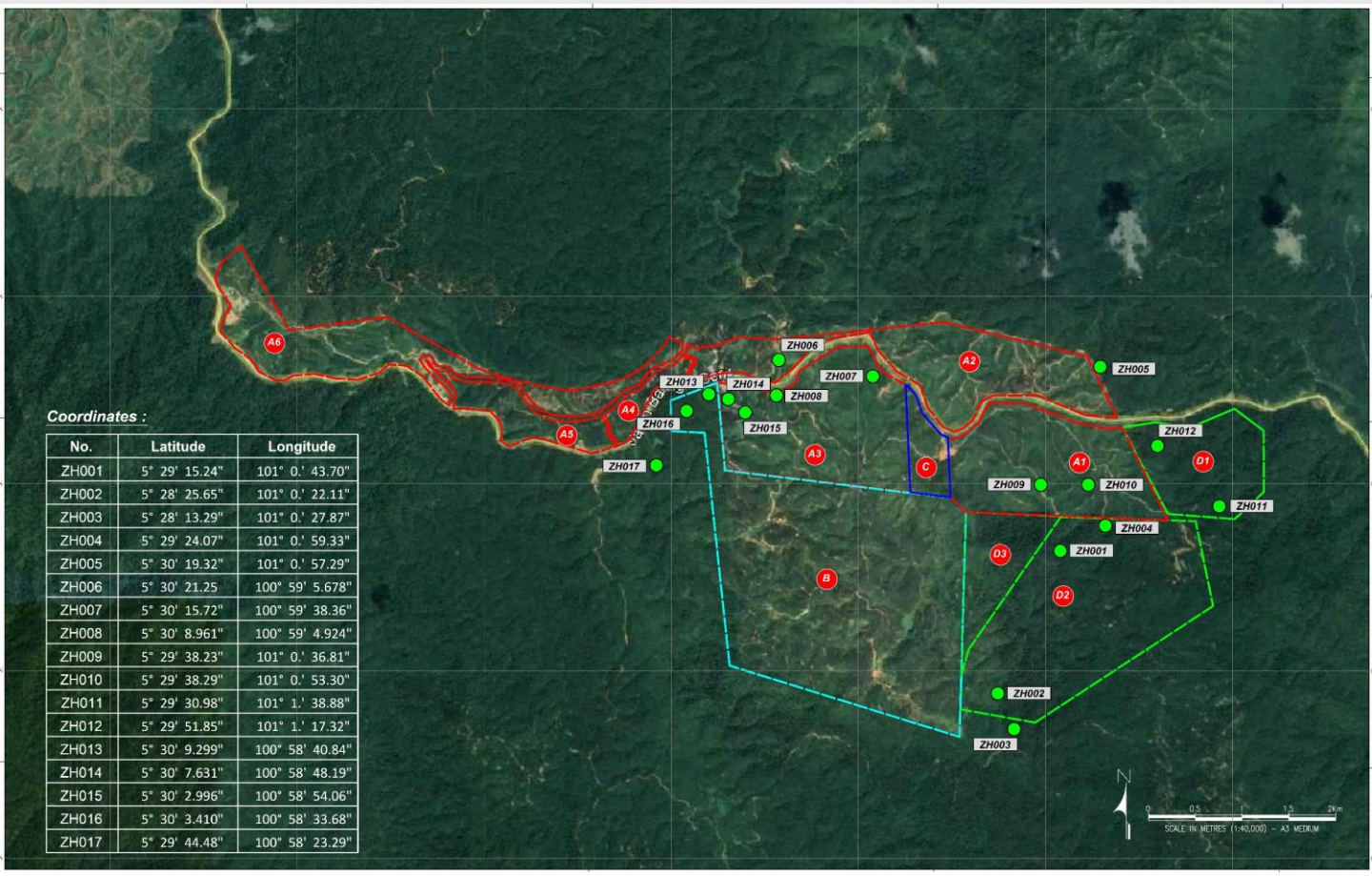
- FELCRA ARA JERAI

A) FELCRA - 01	E) PT1760 - 01&02	I) PT1761 - 03	M) PT1763 - 02
B) FELCRA - 02	F) PT1760 - 03	J) PT1762 - 01	N) PT1764 - 01
C) PT1759 - 01	G) PT1761 - 01	K) PT1762 - 02	O) PT1764 - 02
D) PT1759 - 02	H) PT1761 - 02	L) PT1763 - 01	

- Tested soil samples are below the stipulated NORM standard, except for Th-228 levels in soil samples from PT1764-2 (1.02 Bq/g) and FELCRA 01 (1.34 Bq/g), which are reported to be above the regulated 1 Bq/g.
- Activity concentration of 238U, 232Th and 40K in Gerik, Perak is higher than value reported by UNSCEAR 2000 for Malaysia.
- However, result from this study is within the reported background radiation in Perak. Wide variation data about natural radioactivity has been found which may be reflection of geological formation, geographic conditions, soil type, climate condition and climate distinctiveness

Baseline Monitoring Locations (Soil Composition)



Coordinates :

No.	Latitude	Longitude
ZH001	5° 29' 15.24"	101° 0.' 43.70"
ZH002	5° 28' 25.65"	101° 0.' 22.11"
ZH003	5° 28' 13.29"	101° 0.' 27.87"
ZH004	5° 29' 24.07"	101° 0.' 59.33"
ZH005	5° 30' 19.32"	101° 0.' 57.29"
ZH006	5° 30' 21.25	100° 59' 5.678"
ZH007	5° 30' 15.72"	100° 59' 38.36"
ZH008	5° 30' 8.961"	100° 59' 4.924"
ZH009	5° 29' 38.23"	101° 0.' 36.81"
ZH010	5° 29' 38.29"	101° 0.' 53.30"
ZH011	5° 29' 30.98"	101° 1.' 38.88"
ZH012	5° 29' 51.85"	101° 1.' 17.32"
ZH013	5° 30' 9.299"	100° 58' 40.84"
ZH014	5° 30' 7.631"	100° 58' 48.19"
ZH015	5° 30' 2.996"	100° 58' 54.06"
ZH016	5° 30' 3.410"	100° 58' 33.68"
ZH017	5° 29' 44.48"	100° 58' 23.29"

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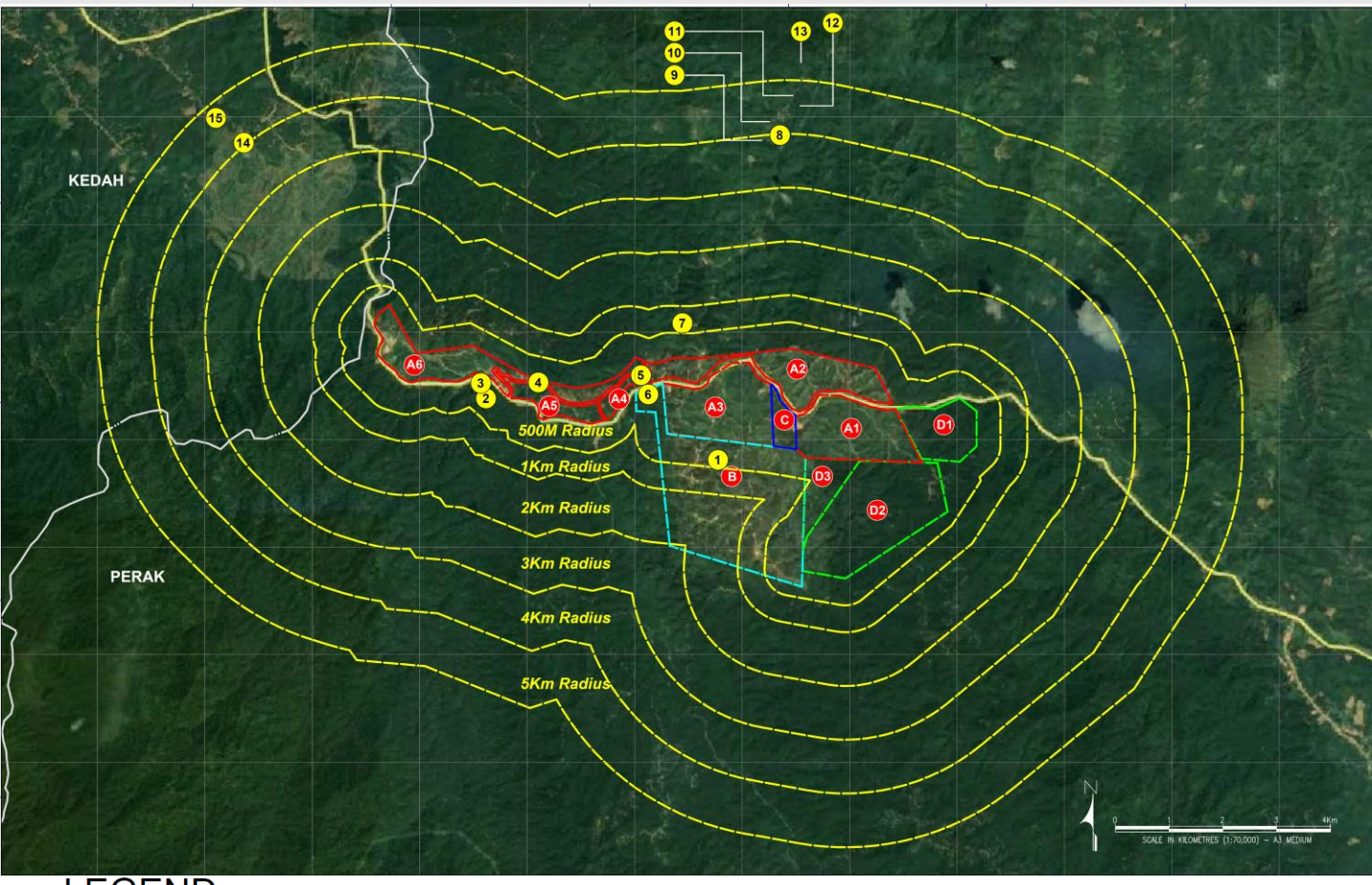
SOIL SAMPLE (ZH001 - ZH017)

A1) PT1761
A2) PT1759
A3) PT1760
A4) PT1762
A5) PT1763
A6) PT1764

B) FELCRA ARA JERAI
C) MAJLIS DAERAH GERIK LAND
D1) 311 Acre
D2) 922 Acre
D3) 198 Acre

Based on the comparison with existing soil composition data, lead and manganese are enriched in the weathered granitic soil, whereas chromium, vanadium and nickel are depleted. Aluminium derived from minerals such as feldspar and plagioclase are converted to clay minerals during weathering may be slightly depleted by leaching within the soil zone.

Land Use within 5 km Radius



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PERBADANAN MENTERI BESAR PERAK (MB Inc.)

MAJLIS DAERAH GERIK

FELCRA ARA JERAI

A1) PT1761
A2) PT1759
A3) PT1760
A4) PT1762
A5) PT1763
A6) PT1764

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D1) 311 Acre
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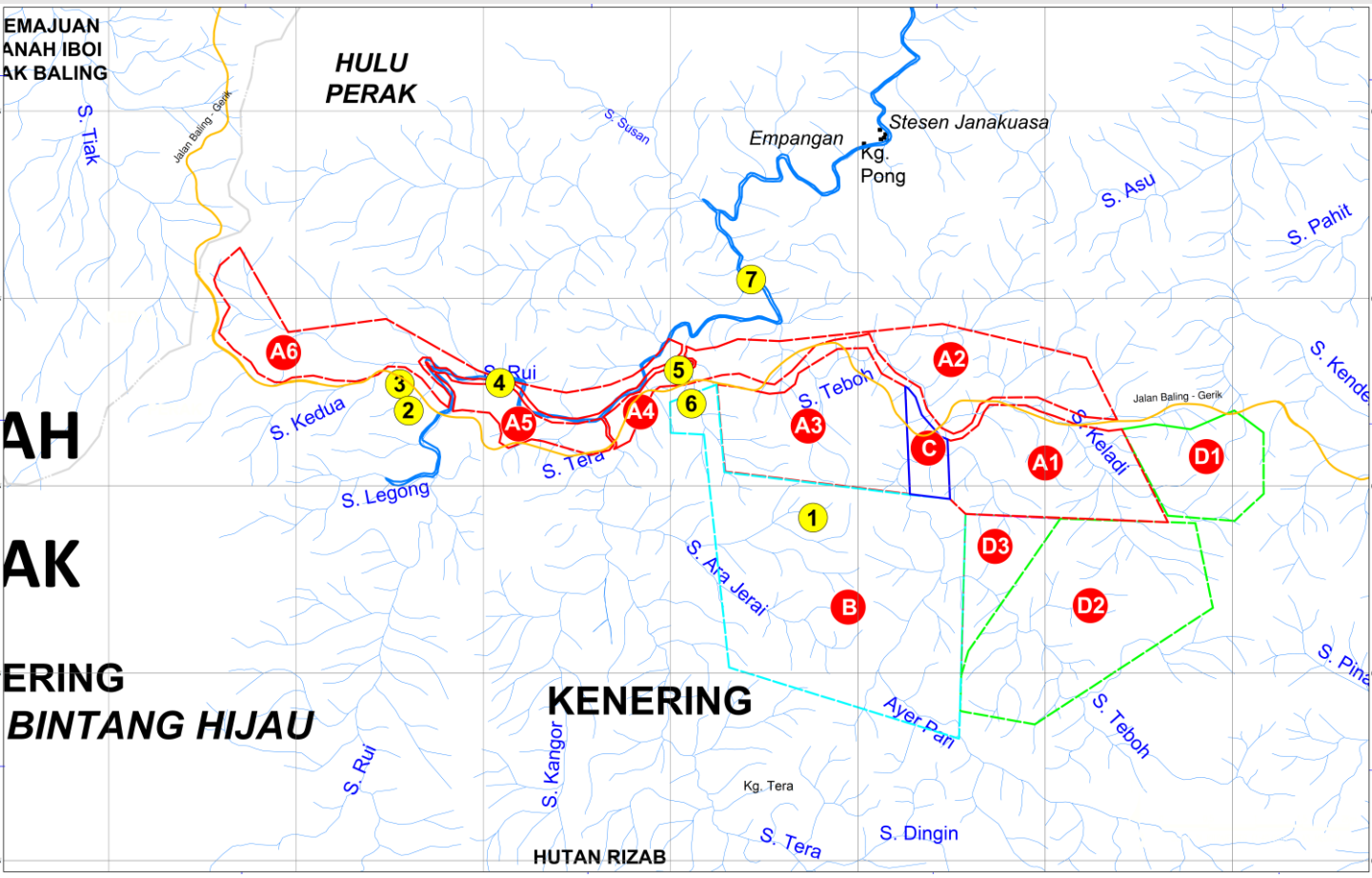
1) FELCRA ESTATE
2) HENTIAN R&R BINTANG SUNGAI RUI
3) PATRO (Perak Agrotourism Sungai Rui) Entrance
4) PPPNP RUBBER ESTATE
5) SUNGAI RUI RUBBER NURSERIES AND ESTATE OFFICE
6) FELCRA OFFICE
7) SAND MINING OPERATION
8) KG. PONG
9) WAT KG. PONG
10) SG. PONG JLN PONG 1&2
11) KUBUR KG. PONG
12) HANGING BRIDGE KG. PONG
13) DEWAN KOMUNITY KG. PONG
14) FELCRA ESTATE ENTRANCE
15) KG. SENIYEK SIGNBOARD

Sensitive Receptors



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6) FELCRA OFFICE
7) SAND MINING OPERATION

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B) FELCRA ARA JERAI
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D1) 311 Acre
D2) 922 Acre
D3) 198 Acre

Impact Assessment and Mitigating Measures

RIVER WATER QUALITY

Impact

Development Stage

- Potential stormwater runoff

Operation Stage

Water Quality Modelling Scenarios

Scenario	Description
Scenario 1 (Baseline)	To establish the existing water quality condition without the project during normal flow condition.
Scenario 2a (Operation)	To assess the impact during operation phase with WWTP effluent discharge during 3-month ARI rainfall
Scenario 2b (Operation)	To assess the impact during operation phase with WWTP effluent discharge during 2-year ARI rainfall
Scenario 2c (Operation)	To assess the impact during operation phase with WWTP effluent discharge during normal flow
Scenario 3a (Worst Case)	To assess the impact as a result of 8 hours of WWTP (at PT1759) failure during 7Q10 low flow
Scenario 3b (Worst Case)	To assess the impact as a result of 8 hours of WWTP (at PT1759) failure during normal flow
Scenario 4 (Worst Case)	To assess the impact as a result of leaching solution main supply pipeline leak (at PT1764) left undetected for 1 hour during 7Q10 low flow

Scenario 2 (Operation)

- Load from the WWTP discharged during 3-month ARI and 2-year ARI storm event, and normal flow is minimal. No significant impact to water quality.

Scenario 3 (WWTP Failure)

- Ammoniacal nitrogen concentration exceed the 0.3 mg/L Standard IIA limit at point W5, W6, W7, W9 and W10. Normal flow has 4 times the dilution than low flow.

Scenario 4 (Leaching solution pipeline leak for 1 hour)

- Ammoniacal nitrogen and sulphate significantly exceeded the limit at W5 to W14.

RIVER WATER QUALITY

Mitigation Measures

Development Stage

- BMPs (e.g. check dam, silt fence) are recommended to be implementation at the impacted work areas.
- To be carried out in phases

Operation Stage

- Engineering approach – using anti-seepage layers, provide containment bund, utilize pressure valves to detect potential leaks, alarm system, standby WWTP unit at all plants.
- Diversion ditch upstream of pregnant solution collection drain to divert surface runoff from the collection drain.
- Periodical maintenance
- Mining in phases
- Emergency response team on the ready in case of any incident happens
- River water monitoring

Impact Assessment and Mitigating Measures

GROUNDWATER QUALITY

Impact

Development Stage

- No significant impact as no injection is required.

Operation Stage

- Groundwater model carried out with the assumption of presence of crack is present throughout the whole site, up until 30 years with operation running for only 12 years.
- Existing shallow wells (< 30m deep) DW4, DW5 and DW6, will have high concentration of ammoniacal nitrogen and sulphate. Not suitable to be used and to be replaced.
- Existing deep well DW2 (about 180m) will not be affected.

GROUNDWATER QUALITY

Mitigation Measures

Operation Stage

- Checking of potential crack using clear water injection prior of leaching solution injection at each ore body. To consider not mining at area with identified crack.
- Anti-seepage layer at the bottom of collection tunnels and drains.
- Converting DW4, DW5 and DW6 to monitoring wells
- New water source for the replaced wells.
- Groundwater monitoring programme.

SOIL EROSION AND SEDIMENTATION

Impact

Development Stage

- Potential surface and stormwater runoff.
- Resurgence of dust.

Operation Stage

- Potential surface and stormwater runoff.

SOIL EROSION AND SEDIMENTATION

Mitigation Measures

Development Stage

- BMPs (e.g. check dam, silt fence, sediment basin) are recommended to be implementation prior of development of plants.
- Develop in stages

Operation Stage

- Maintain existing vegetation whenever possible
- Install all sediment control practices prior to any up-slop soil disturbing activities
- Diversion ditch to divert surface runoff from collection system
- Mining in stages

Impact Assessment and Mitigating Measures

ECOLOGY (FLORA) Impact

Development Stage

- Clearing for construction of plant area and access road, pipelines can be overlay on grasses.
- Expected total biomass to be removed about 15,512.30 tonne, in stages

Operation Stage

- Rubber trees, a species under the family of Euphorbiaceae, *Hevea brasiliensis* is among a sensitive plant to ammonium (NH^{4+})
- Potential ammonium toxicity's suppression of growth, leaf chlorosis, and reduction in root/shoot ratio with inhibition of roots.
- Rubber trees' rooting systems were found to be most dynamic between 1.5 to 4.0 m deep, leaching solution injection to be carried out at 8 – 12m deep, root system will be avoided

ECOLOGY (FLORA) Mitigation Measures

Development Stage

- Only vegetation directly in the path of the proposed hydrometallurgical plant and access roads to be removed..
- Vegetation at riparian area will be left undisturbed to protect the river water quality.
- Development in phases
- Open burning are prohibited

Operation Stage

- The supply levels of K+ have been shown to alleviate toxicity both in solution culture experiments and in the field.
- Applying the leaching solution as close as possible to the weathered granite layers.
- Riparian Management Plan shall be adhered throughout the Project period
- Open burning are prohibited

ECOLOGY (FAUNA) Impact

Development and Operation Stage (Terrestrial)

- Land clearing within the proposed areas may cause direct and indirect impacts on wildlife due to the loss of habitat.
- Potential loss of species
- Displaced animals
- Human-Wildlife Conflict

Development and Operation Stage (River)

- Suspended solid potentially damage gills of fishes
- During normal operation, based on modelling results, minimum impact is expected.
- Worst case scenario, high ammonium and sulphate potentially poison fishes

ECOLOGY (FAUNA) Mitigation Measures

- Wildlife Monitoring Team (WMT) with the supervision of PERHILITAN to manage all situations involving wildlife
- Prohibition of Wildlife Poaching and Trapping
- Phasing/ Directional Clearing
- Elephant trenches and electric fences
- Adhere to mitigating measures proposed for water qualities
- Mining in stages

Impact Assessment and Mitigating Measures

AIR QUALITY

Impact

Development Stage

- Dust pollution due to the development activities is temporary

Operation Stage

- Any potential impact to the ambient air quality as a result of the proposed Project activities is limited to the respective work areas and potential concern to other external receptors is insignificant.

AIR QUALITY

Mitigation Measures

Development Stage

- Proper installation of BMPs
- Development in phases

Operation Stage

- Development in phases
- Installation of bag filters at raw material storage areas

NOISE

Impact

Development Stage

- 60 dB(A) at a distance of about 794 m (worst case) (earth moving equipment), closest residential is 4.3km north. Impact from development activities is insignificant to external residential area

Operation Stage

- 60 dB(A) at a distance of about 708 m (worst case) (truck movements), closest residential is 4.3km north. Impact from development activities is insignificant to external residential area

NOISE

Mitigation Measures

- Establish periodical maintenance schedule for all motorised machineries and equipment.
- Enclosure or other type of acoustic measures shall be applied on equipment which contribute to noise levels higher than 85 dB(A).
- Periodic noise monitoring

Impact Assessment and Mitigating Measures

PUBLIC HEALTH

Impact

- The health risk assessment exercise found that the proposed project has a very minimal impact on the communities surrounding the site.
- River water and groundwater studies found high heavy metals that may naturally origin due to the soils of mining areas or from human activities.
- In general, the potential impact from the proposed Project is very minimal with proper mitigating measures in place.
- Most of the hazardous conditions and risks are due to the present condition of the environment.

PUBLIC HEALTH

Mitigation Measures

- Encourage personal hygiene among workers and those who enter the project site.
- Workers to get vaccinated for diseases like Hepatitis B and COVID-19
- Good housekeeping
- Project to adhere to environment and health guidelines and regulations
- Maintenance of treatment plants, equipment and machineries.
- Environmental quality monitoring
- Proper implementation of proposed mitigating measures

WASTE MANAGEMENT

Impact

Development Stage

- Generation of construction waste, domestic waste and scheduled waste.

Operation Stage

- Wastes generated during the operation stage can be categorised as process related schedule wastes (SW204, SW206,SW307, SW409,SW410), solid wastes and domestic wastes.

WASTE MANAGEMENT

Mitigation Measures

- Construction wastes shall be stockpiled at designated area and away from waterways and sensitive receptors.
- Procedures for waste reduction, recycling and recovery should be considered.
- Scheduled wastes shall be managed and handled in accordance with the Environmental Quality (Scheduled Waste) Regulation 2005.
- Open burning are prohibited.

Impact Assessment and Mitigating Measures

SOCIAL

Impact

- Many plantation workers are uncertain as to the extent that the benefits that the proposed Project is to bring about could materialized.
- About one-third of responded plantation workers did agree that there are potentials for benefits to local people in terms of employment and income opportunities.
- Local communities have a more forthcoming perspective of the opportunities that potentially would arrive from the proposed project.

SOCIAL

Mitigation Measures

- Establish community grievance mechanisms and allocate focal person to receive any complaints and/or suggestion.
- Project proponent could establish Corporate Social Responsibility (CSR) programmes with the local communities and plantation workers.
- Opportunities of employment and supplies should be given due consideration to the locals where possible.
- Project Proponent shall be responsible for their workers action inside and outside of the workers' camps.
- Ensure screening of health and vaccination where necessary are carried out and documented for all workers.

Proposed Environmental Monitoring Programme

Note: Monitoring applicable for development and operation unless specified

River Water Monitoring
(Impact Monitoring)

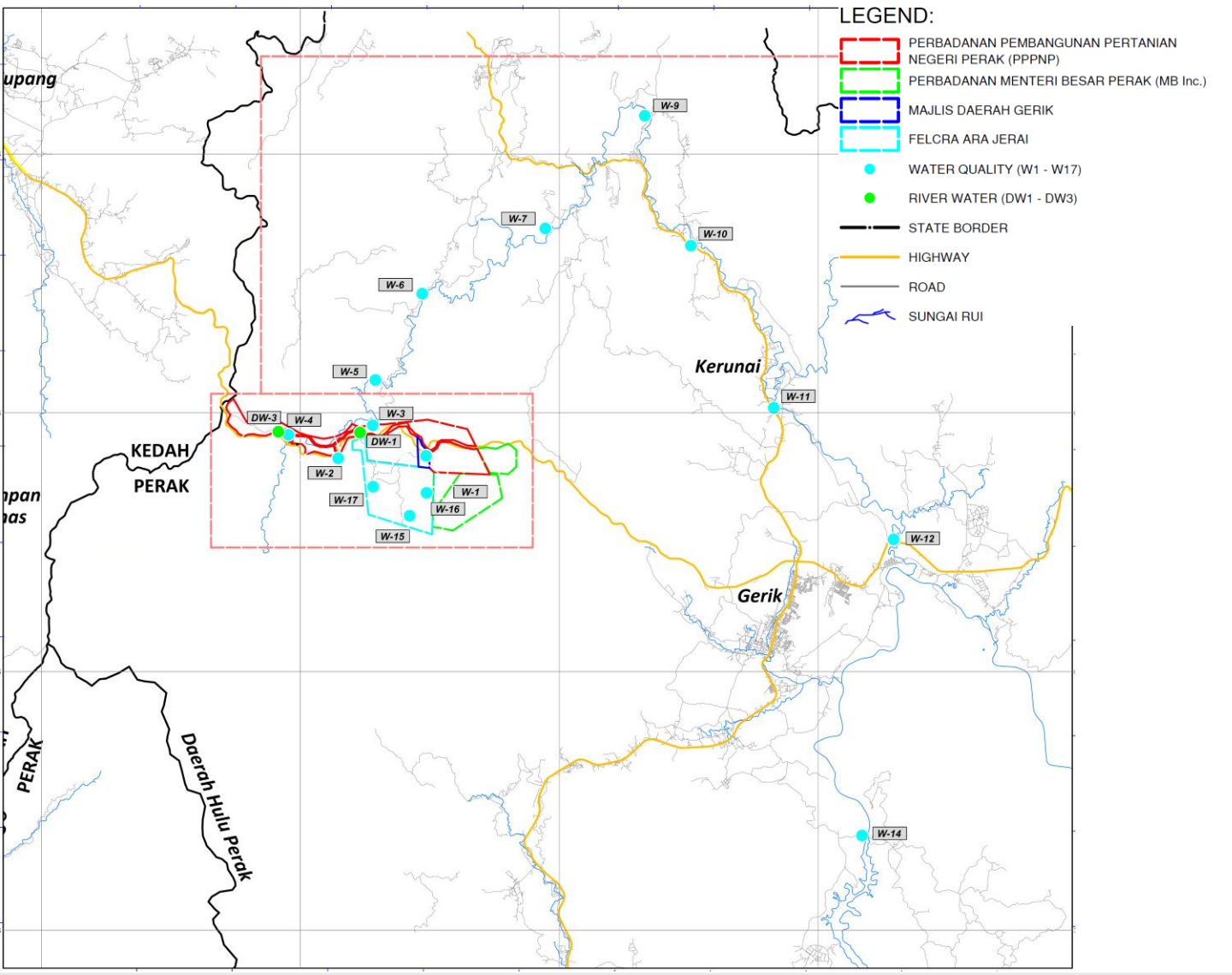
- Temperature, pH, Dissolved Oxygen, Turbidity, Total Suspended Solid, Oil and Grease, Ammoniacal Nitrogen, COD, BOD, Total Coliform, Faecal Coliform, Sulphate (SO_4^{2-})

Heavy Metals

- Aluminium (Al), Antimony (Sb), Arsenic (As), Barium (Ba), Beryllium (Be), Boron (B), Cadmium (Cd), Total Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Nickel (Ni), Selenium (Se), Silver (Ag), Tin (Sn), Vanadium (V), Zinc (Zn), Cyanide (CN), Mercury (Hg)

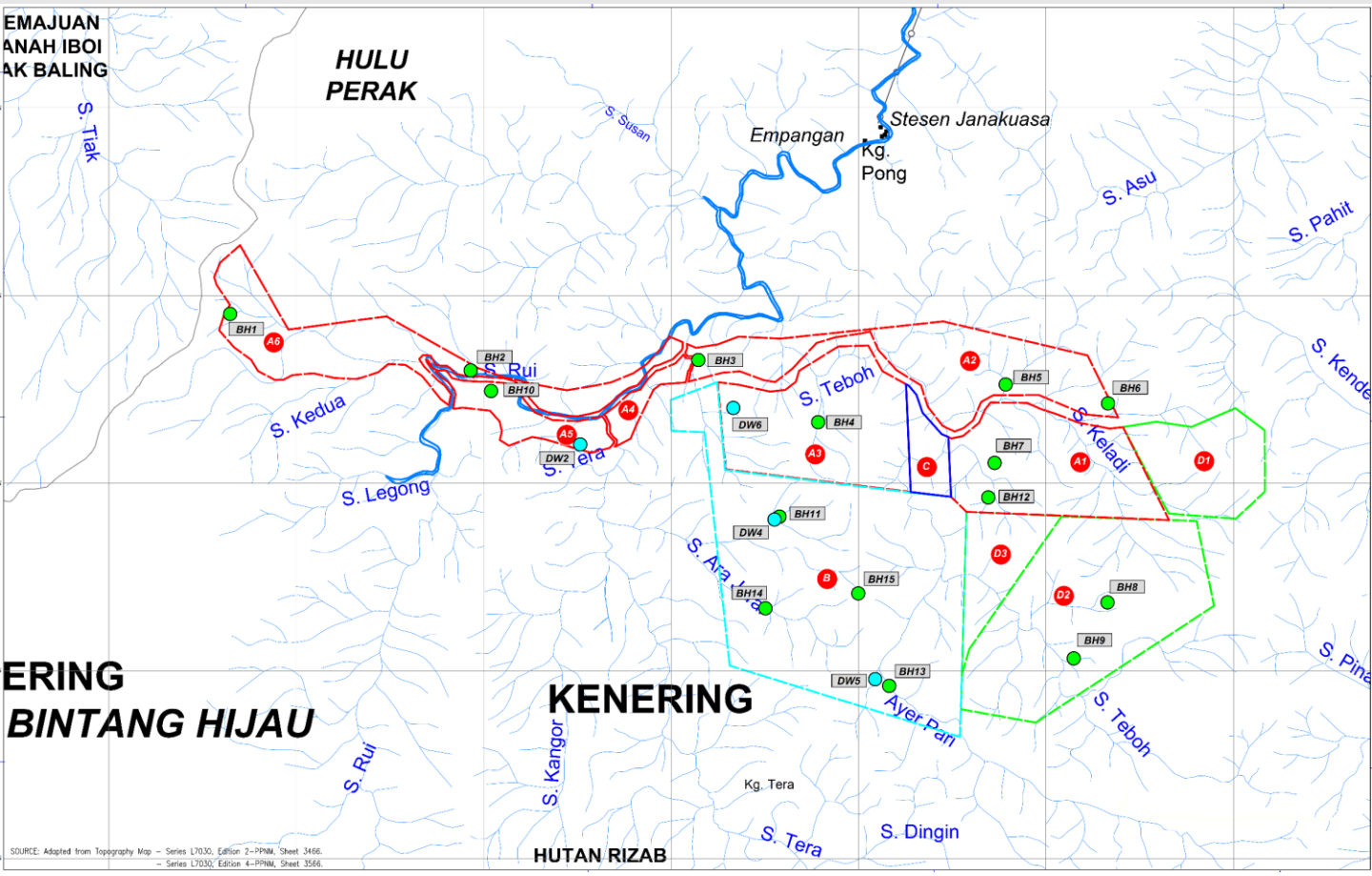
Lanthanide (Only applicable once mining starts)

- Quarterly
- Baseline
- National Water Quality Standards for Malaysia, Standard IIA



Proposed Environmental Monitoring Programme

Note: Monitoring applicable for development and operation unless specified



LEGEND:

- PERBADANAN PEMBANGUNAN PERTANIAN NEGERI PERAK (PPPNP)
- PERBADANAN MENTERI BESAR PERAK (MB Inc.)
- MAJLIS DAERAH GERIK
- FELCRA ARA JERAI
- GROUNDWATER (BH1 - BH15)
- RIVER WATER (DW2,DW4 - DW6)
- RIVER / STREAM

A1) PT1761
A2) PT1759
A3) PT1760
A4) PT1762
A5) PT1763
A6) PT1764

B) FELCRA ARA JERAI
C) MAJLIS DAERAH GERIK LAND
D1) 311 Acre
D2) 922 Acre
D3) 198 Acre

Groundwater Monitoring (Impact Monitoring)

(Unconfined, shallow wells (BH1 to BH15, DW4, DW5, DW6))

(DW2, Additional confined groundwater well locations to be determined and shall be established at each mining land lot at the lowest point (downstream from the ore bodies))

- Total coliform, E coli, Turbidity, Colour, pH, Temperature, Conductivity, Total Threshold Value, Chloride, Oil & Grease, Ammonia, COD, BOD, MBAS, Nitrate, Nitrite, Hardness, Fluoride, Iron, Manganese, Mercury, Cadmium, Arsenic, Cyanide, Lead, Chromium, Copper, Zinc, Natrium, Sulphate, Selenium, Silver, Magnesium, Pesticides, Phenol, Nickel, Gross alpha, Gross beta

Lanthanide (Only applicable once mining starts)

- Monthly during mining
- Quarterly post-mining for 1 year
- Baseline
- National Groundwater Quality Standards for Conventional Raw Water Treatment (Drinking Water) in Malaysia Groundwater Standard and Index Edition 2019

Proposed Environmental Monitoring Programme

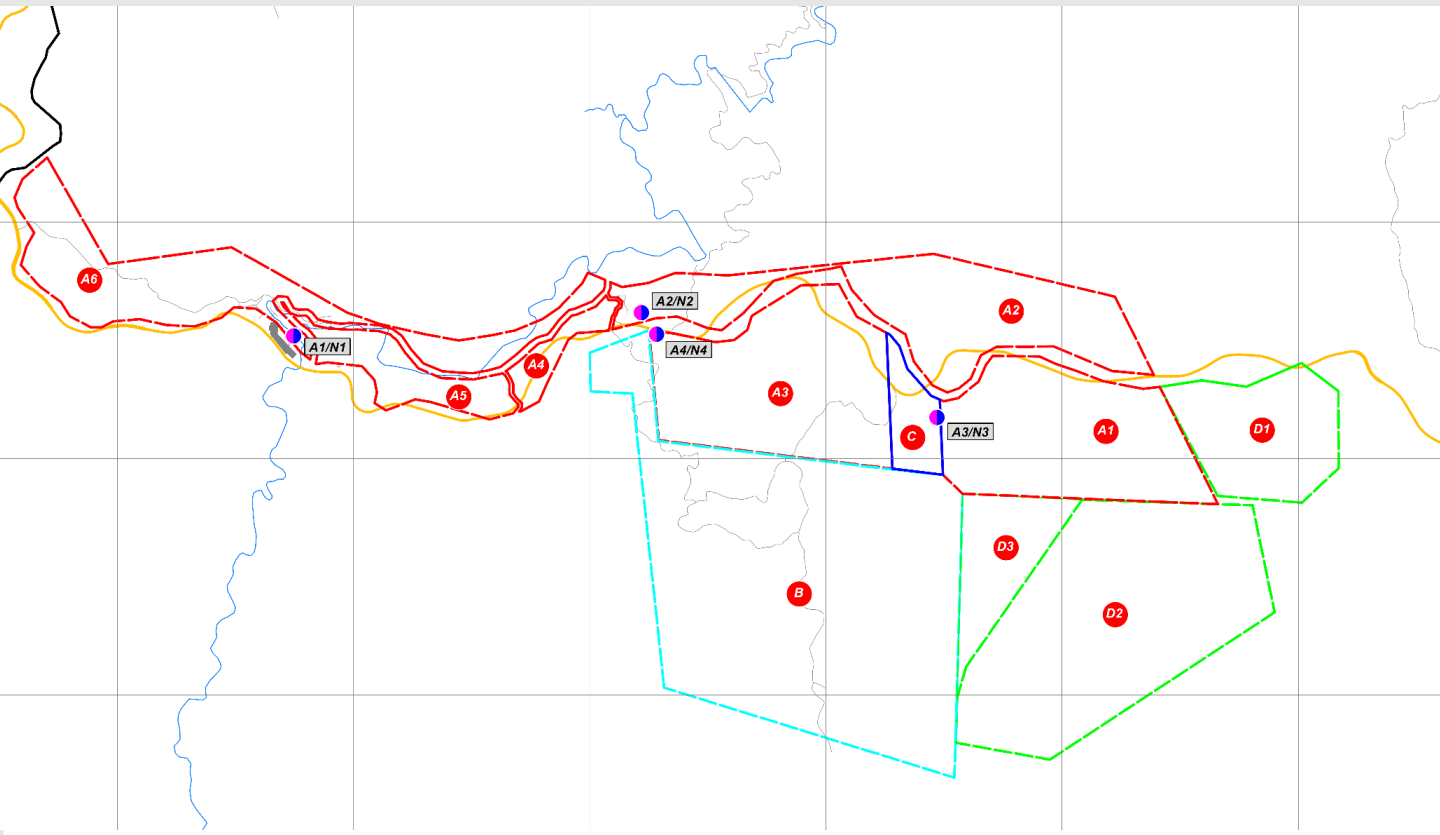
Note: Monitoring applicable for development and operation unless specified

Ambient Air Monitoring (Impact Monitoring)

- PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO
- Quarterly
- Baseline
- MAAQS 2020

Noise Monitoring (Impact Monitoring)

- L_{eq}, L_{max}, L_{min}, L_{90}, L_{10}
- Quarterly
- Baseline
- Guidelines for Environmental Noise Limits and Control 2019



LEGEND:

- PERBADANAN PEMBANGUNAN PERTANIAN NEGERI PERAK (PPPNP)
- PERBADANAN MENTERI BESAR PERAK (MB Inc.)
- MAJLIS DAERAH GERIK
- FELCRA ARA JERAI
- AIR (A1 - A4)
- NOISE (N1 - N4)
- HIGHWAY
- ROAD
- DISTRICT BORDER
- RIVER / STREAM

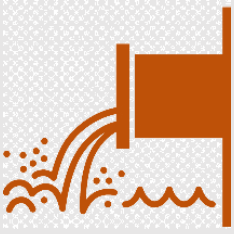
Proposed Environmental Monitoring Programme

Radionuclide activity Concentration

Samples of pregnant solution, sludge and product from each hydrometallurgical plant

- Ra-226, Ra-228, K-40, Th-228, Th-230, Th-232, U-234, U-235, U-238
- Quarterly
- AELB Guideline on Radioactivity LEM/TEK74

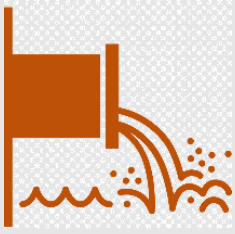
Compliance Monitoring



Discharge from Sediment Basins (during development of hydrometallurgical plant)

- TSS, Turbidity
- Monthly or
- After rainfall event of ≥ 12.5mm.

- Ammoniacal Nitrogen, Aluminium, Arsenic, BOD5 at 20oC, Cadmium, Iron, Lead, Mercury, Oil and Grease, pH Value, Sulphide, Total Suspended Solids, Total Dissolved Solids, Temperature, Copper, Manganese
- Whenever WWTP is in used during heavy rain
- Monthly during clear water cleaning stage



Discharge from WWTP (during heavy rain and clear water cleaning stage)