FIRST SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT FOR *"MEMBINA JALAN BARU DARI KG. BUKIT KHOR KE MEDAN JAYA, MARANG, TERENGGANU"*

EXECUTIVE SUMMARY

Project Owner:

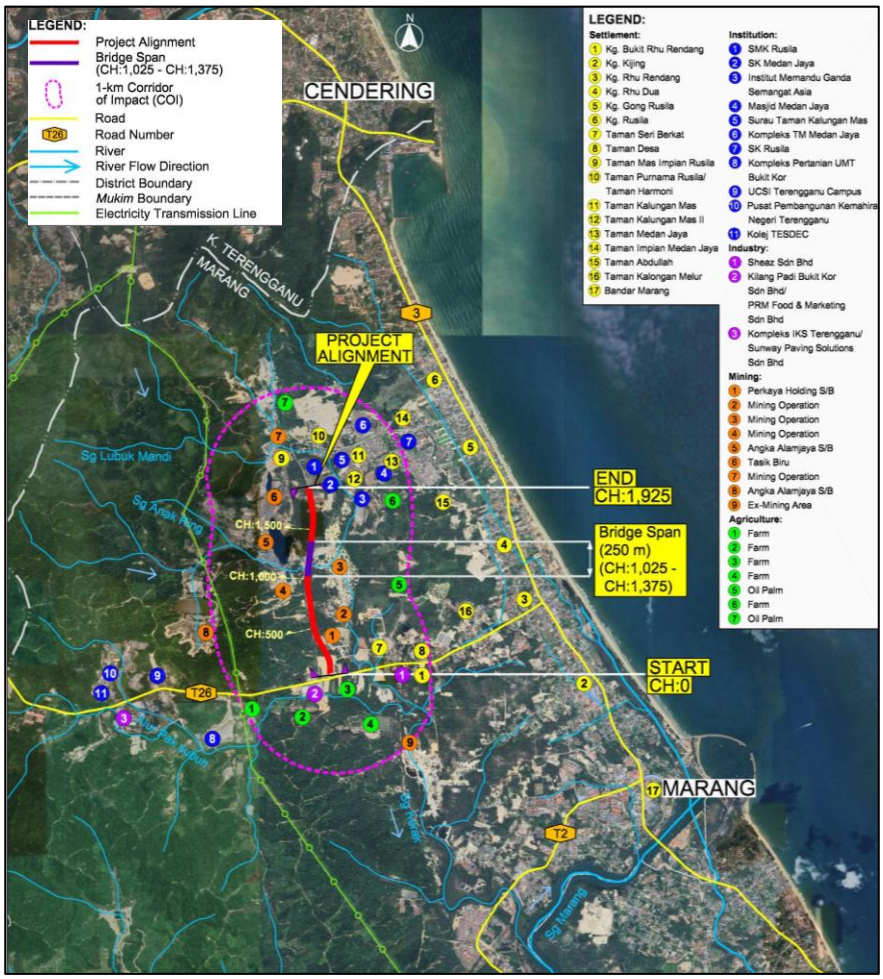
Kementerian Kemajuan Desa dan Wilayah (KKDW)

Project Implementer:

Jabatan Kerja Raya CASKT

Environmental Consultant:

Asia Pacific Environmental Consultants Sdn Bhd



Project Brief

- Located within Marang District, Kuala Terengganu.
- Construction of new JKR R2 road of ~2 km (CH0.000 – CH1,925.000).
- Connecting State Road T26 (Rhu Rendang – Bukit Payung) to Medan Jaya.

Project Concept

- Construction of a new two-lane single carriageway.
- Provision of bridge crossing, drainage, street lighting, road furniture, etc.
- Relocation of existing utilities and services along the Project alignment.
- Environmental Protection Works (EPW).

DETAILS OF PROJECT TEAM

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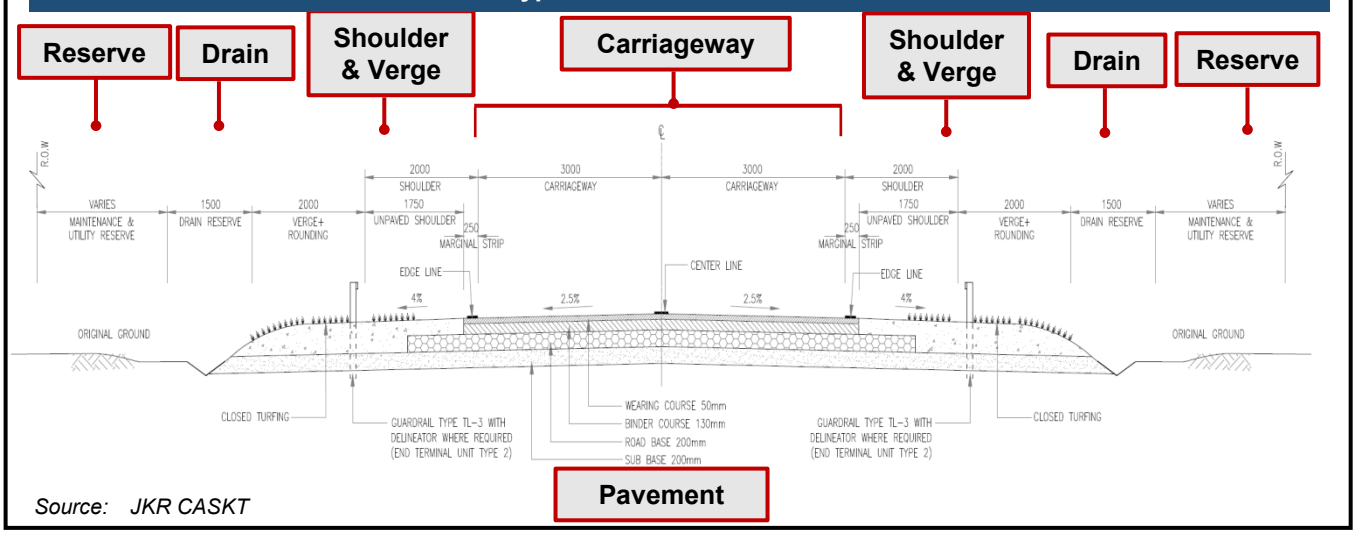
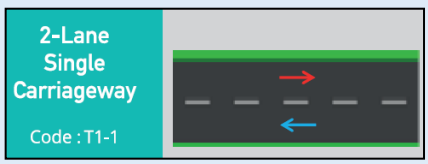
PROJECT COMPONENTS

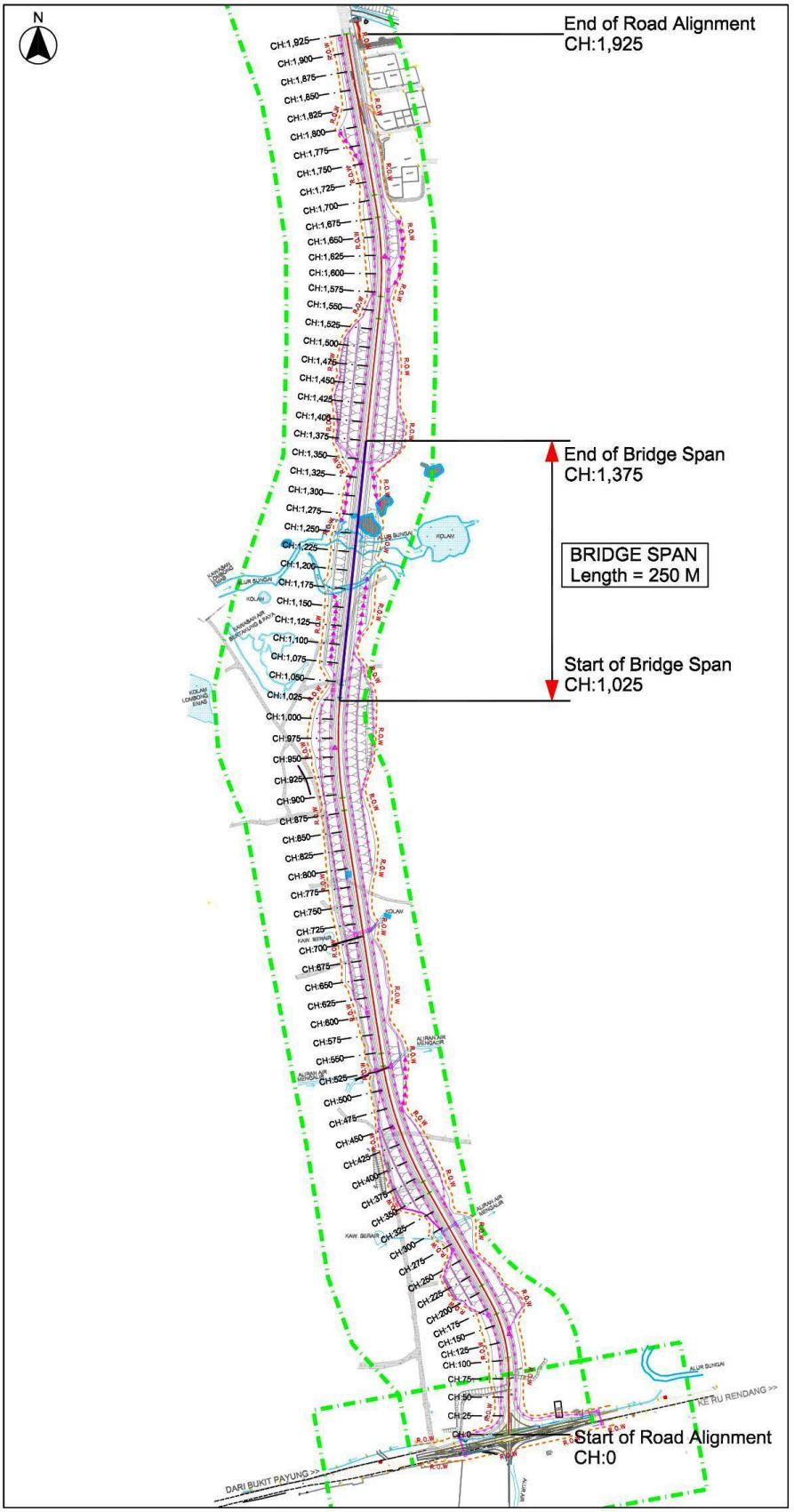
Typical Road Cross Section



Source: JKR CASKT

Component	Description
Mainline  Source: Road Traffic Volume Malaysia 2019 (KKR, 2019)	• JKR R2. ~2 km. • Start Point (SP) CH0.000 (N 5.21647° E 103.17693°). • End Point (EP) CH1,925.000 (N 5.23344° E 103.17498°). • Two-lane single carriageway (3 m per lane): a) Lane width: 3 m. b) Shoulder width: 2 m. c) Verge width: 2 m. • Design speed: 50 km/hr.
Pavement Design 	• Wearing Course: 50 mm. • Binding Course: 130 mm. • Roadbase Course: 200 mm. • Sub-base: 200 mm.
Main Access Provisions 	At-grade junction along State Road T26 (Rhu Rendang – Bukit Payung) (CH 0.000).
Bridges 	Bridge span: CH1,025.000 – CH1,375.000 Dimensions: 250 m L X 11 m W
Drainage and Culverts 	• Drainage design: 20 years ARI. • Culvert design: 50 year ARI. • Culverts: 10 nos. Crossing Culverts, 2 nos. Access Culverts
Other Components 	• Street lighting. • Road furniture. • Traffic management and control systems.

SCHEMATIC PROJECT LAYOUT



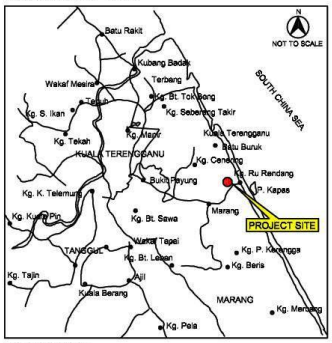
LEGEND:

- Project Alignment
- Bridge Span (CH:1,025 - CH:1,375)
- Limit of Work
- ROW

Chainage (CH)	Coordinates	
	Latitude (N)	Longitude (E)
CH:0	5.21647°	103.17693°
CH:200	5.21827°	103.17661°
CH:400	5.21980°	103.17577°
CH:600	5.22155°	103.17532°
CH:800	5.22334°	103.17505°
CH:1,000	5.22693°	103.17505°
CH:1,200	5.22791°	103.17488°
CH:1,400	5.22873°	103.17524°
CH:1,600	5.23053°	103.17540°
CH:1,800	5.23232°	103.17517°
CH:1,925	5.23344°	103.17498°

DATA SOURCE:
(1) Pelan Topografi, Jabatan Kerja Raya Malaysia, December 2024.

LOCATION PLAN:



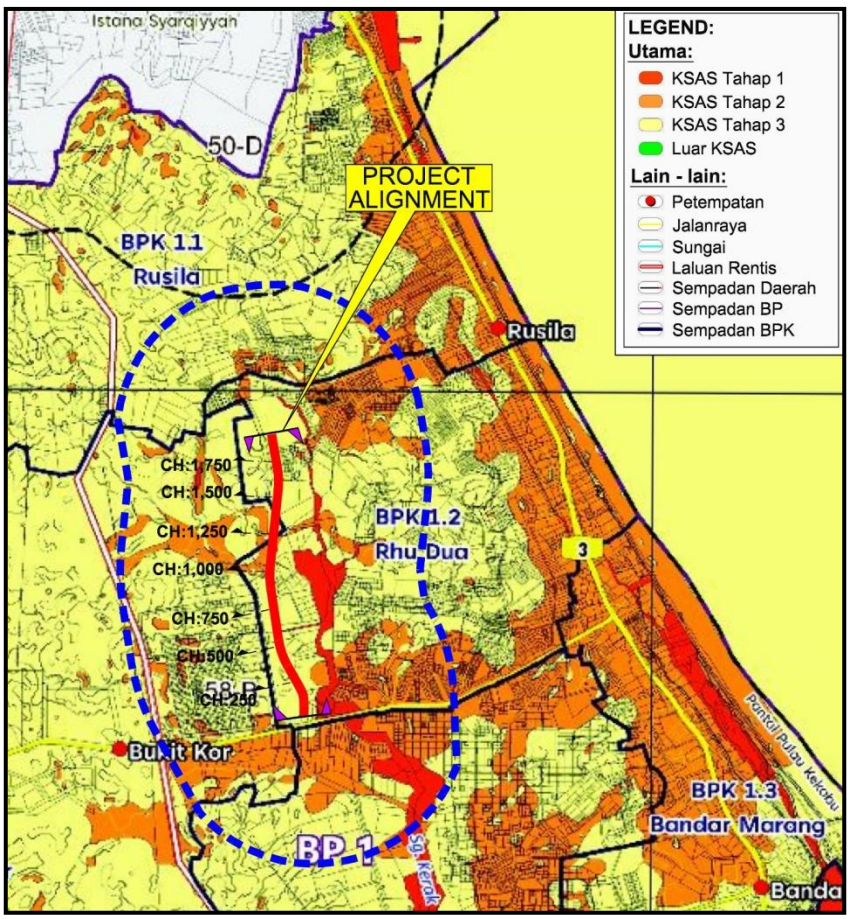
KEY PLAN:

PROJECT PROPONENT:	ENVIRONMENTAL CONSULTANT:	PROJECT TITLE:	DRAWING TITLE:	DRAWING TITLE:	PAGE NO:
JABATAN KERJA RAYA (JKR) MALAYSIA	ASIA PACIFIC ENVIRONMENTAL CONSULTANTS SDN BHD	FIRST SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR MEMBINA JALAN BARU DARI KG. BUKIT KHOR KE MEDAN JAYA, MARANG, TERENGGANU.	NOT TO SCALE	SCHEMATIC DRAWING OF PROJECT ALIGNMENT	5-12
				DRAWING NO: FIGURE 5.3.1	DATE: JULY '25

STATUTORY REQUIREMENTS

	Schedule	Prescribed Activity	Details
Statutory Requirements	First Schedule	**Activity 20: Road** (c) Construction of roads, tunnels or bridges that cross or are adjacent to or in close proximity to environmentally sensitive areas.	Construction of a new 2 km JKR R2 road, connecting Kg. Bukit Khor to Medan Jaya

ENVIRONMENTAL SENSITIVE AREAS & RECEPTORS



Environmentally Sensitive Areas

Rivers:

Sg Lubuk Mandi

Sg Anak Ring

Sg Kerak

Flood-Prone Areas:

Sg Anak Ring

State Road T26

Mining & Resources:

Lubuk Mandi Gold Mine

Environmentally Sensitive Receptors

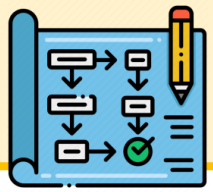
Settlements (Within COI):

Taman Mas Impian Rusila
Taman Harmoni
Taman Seri Berkat
\
Taman Kalungan Mas
Taman Purnama
Kg Bukit Rhu Rendang

PROJECT ACTIVITIES

Pre-Construction

- Project planning.
- Preliminary survey (e.g. topographical survey, soil investigation, etc.).
- Conceptual design.
- Detailed design.
- Data gathering for EIA.
- Land acquisition.



Construction

Site Preparation

- Labour recruitment.
- Mobilisation by contractors.
- Construction of temporary access road and other preliminary works.
- Setting up of temporary site facilities (base camp, site office, workshops, storage facilities, etc.).
- Mobilisation of construction equipment and materials.
- Relocation and installation of existing utilities.

Land Clearing and Earthworks

- Land clearing and biomass removal at site.
- Platform formation.
- Providing stockpile area(s).

Structural Construction

- Foundation works.
- Drainage works.
- Bridge construction.
- Road construction.

Final Finishing

- Final finishing and landscaping.
- Site inspection, verification and handing over of Project.

Operations

- Operations of the Project.
- Maintenance of the Project.

PROJECT SCHEDULE AND STATEMENT OF NEEDS

PROJECT SCHEDULE

No.	Activity	Start Date	End Date	Duration (Months)
1.	Planning and Design	May 2023	May 2025	24
2.	Procurement	May 2025	Nov 2025	6
3.	Construction	Nov 2025	Nov 2027	24
4.	Project Handover	Nov 2027	Nov 2028	12

STATEMENT OF NEEDS

Complement Development Policies

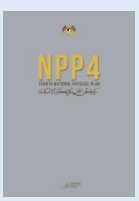
National Physical Plan-4 (NPP-4)

Rancangan Struktur Negeri (RSN) Terengganu 2050 [PLANMalaysia@ Terengganu 2019]

Rancangan Tempatan Daerah (RTD) Marang 2008 – 2020 (PLANMalaysia@ Terengganu, 2009

RTD Marang 2030 (Pengubahan) (PLANMalaysia@ Terengganu, 2019)

RTD Marang 2035 (PLANMalaysia@ Terangganu, 2025)



Improved Transportation Network

The new road will provide greater access, comfort and safety for the community.

Ensure better and improved driving experience for those travelling along FR3, Jalan Medan Jaya and State Road T26 (Rhu Rendang – Bukit Payung).

Connects to the network of roads including the new road from Kg Gong Nangka to Bukit Khor.

Spur Socio-Economic Development

Road networks are important to convey both goods and people.

Greater connectivity and access will provide socio-economic gains and further improve the quality of life of the local communities.

ROADBUILDING

EXISTING ENVIRONMENT, IMPACT ASSESSMENT & MITIGATION MEASURES

LANDUSE

Existing Environment

- **Characteristics of COI:** Cleared land with secondary vegetation and large swatches of mining areas, with active gold mining at Lubuk Mandi.
- **Settlements:** Kg Bukit Rhu Rendang, Taman Seri Berkat, Taman Desa, Taman Medan Jaya, Taman Kalungan Mas, Taman Harmoni, Taman Purnama Rusila, Taman Mas Impian Rusila.
- **Institutions:** SK Medan Jaya, SMK Rusila, Surau Taman Kalungan Mas, Masjid Medan Jaya, Institut Memandu Ganda, Kompleks TM Medan Jaya.
- **Mining**: Active gold mines and mining areas, e.g. Angka Alamjaya S/B, Perkaya Holdings S/B.
- **ESAs:** Sg Kerak, Sg Anak Ring, Sg Lubuk Mandi, Lubuk Mandi Gold Mine, Flood-prone areas.
- **Future Landuse:** Residential areas.
- **Policy Approval:** The current road has been approved and detailed in *Rancangan Tempatan Daerah (RTD) Marang 2035* (PLANMalaysia@Terengganu, 2025).

Potential Impact

Pre-Construction Phase:

- Land acquisition of seven private lots (~3 ha) within the ROW under the Land Acquisition Act 1960.
- Permanent change of existing landuse to infrastructure (road).

Construction Phase:

- Land clearing and demolition of any existing structures within the ROW.
- Relocation of existing utility and amenities within ROW.

Operational Phase:

- Spur development along road alignment.
- Improved transport network and road connectivity in the region for local communities.

Pollution Prevention and Mitigation Measures (P2M2)

Pre-Construction Phase:

- Land acquisition to be carried out based on proper procedure and compensation paid to affected owners.

Construction Phase:

- All works to be carried out only within the ROW/ Limit of Work.
- Avoid encroachment into adjacent lands.
- Rehabilitate all work area post-construction.

Operational Phase:

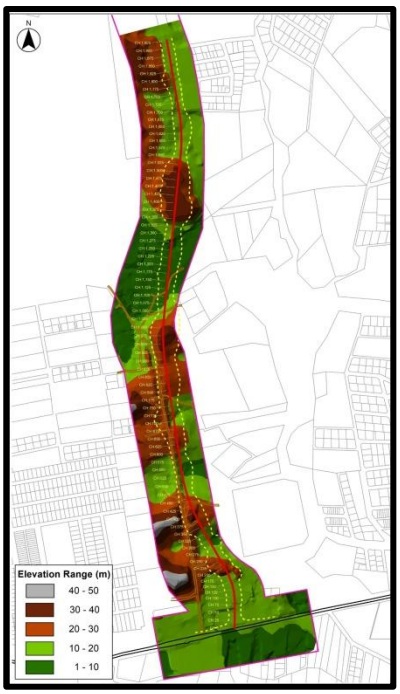
- Maintain the road to ensure its functionality.

EXISTING ENVIRONMENT, IMPACT ASSESSMENT & MITIGATION MEASURES

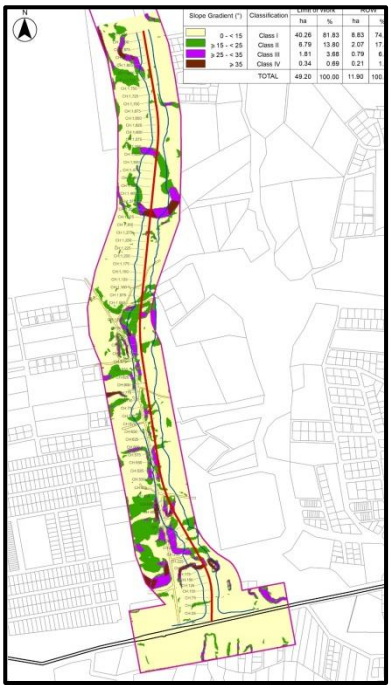
TOPOGRAPHY, SOIL EROSION AND SEDIMENTATION

Existing Environment

Terrain:



Slopes:



- Terrain: flat to undulating, 1 – 50 m above mean sea level (MSL).
- Class I & II slopes: 95.63%
- Class III slopes: 3.68%
- Class IV slopes: 0.69%

Potential Impact

Erosion and Sedimentation:

Scenario	Average Soil Loss (t/ha/yr)	Sediment Yield (tonnes/storm)
Pre-construction Phase	660.51	118.91
Construction Phase (Without Mitigation Measures)	1,664.10	335.81
Construction Phase (With Mitigation Measures)	146.44	29.55
Operations Phase	8.98	0.37

Pollution Prevention and Mitigation Measures (P2M2)

Construction Phase:

- Implement the recommended LD-P2M2 and BMPs for runoff management (temporary earth drains, check dams, silt fence, silt traps), erosion control (wash trough, water bowsing, stockpile cover), sediment control, slope stabilisation, waterway crossings and ensure regular monitoring and maintenance.

Operational Phase:

- No additional P2M2 needed as most areas have been paved.
- Ensure turfing or slope stabilisation measures are properly maintained.

EXISTING ENVIRONMENT, IMPACT ASSESSMENT & MITIGATION MEASURES

GEOLOGY AND SOILS

Existing Environment

- **Regional Geology**:

a) Alluvium (Quaternary – Recent to Pleistocene).

b) Argillaceous and Arenaceous sediments (Triassic to Permian).

c) Maras/Jerong Granite (Late Triassic).

- **Geology (Alignment)**:

a) Sungai Perlis Beds (Carboniferous – Permean beds).

- **Soils**:

a) Nami Soil Series (NMI/4 & NMI/5).

b) Marang Soil Series (MRG/2 & MRG/3).

c) Bukit Tutu – Awang Soil Series BTU-AWG/2).

- **Boreholes:** Six nos. of boreholes were drilled along the alignment. Results reported in the Soil Investigation (SI) Report.
- **Seismicity**: Area is located within an area with a maximum peak ground acceleration (PGA) of 3% to 4% g (or 0.03 to 0.04 g) is expected with a 10% probability of exceedance in 50 years.

Potential Impact

Construction Phase:

- Soil erosion and sedimentation resulting from clearing of vegetation cover along ROW.
- Stability of embankments and slope cuts, especially in hilly terrain.
- Surface drainage impediment in low-lying areas.
- Low seismicity risk.

Operational Phase:

- Surface erosion at fill areas, slope cuts and embankments.
- Surface erosion and small failures at cut slopes due to heavy rainfall possible.
- Surface drainage blockage.
- Low seismicity risk.

Pollution Prevention and Mitigation Measures (P2M2)

Construction Phase:

- Minimising soil erosion through adoption of erosion and sediment control (ESC) measures, e.g. use of canvas sheets, hydroseeding, turfing of exposed surface, etc.
- Construction to be carried out during dry months.
- Establish proper drainage system along slope cuts.
- Application of geotechnical treatment of slopes where required.
- Site inspection, monitoring and undertaking periodic maintenance of slopes and embankments.

Operational Phase:

- Ensure vegetative cover along slopes and embankments are well established and maintained.
- Periodic inspection and monitoring of slopes to detect problems early on.

Example of Slope Turfing

EXISTING ENVIRONMENT, IMPACT ASSESSMENT & MITIGATION MEASURES

CLIMATE

Existing Environment

- **Rainfall**: Highest: 3,816.0 mm (2023), Lowest: 1,860.4 mm (2015).
- **Temperature**: Max: 31.9°C (2019) to 31.1°C (2022); Min: 25.4°C (2024) to 24.5°C (2017/2021).
- **Relative Humidity**: Maximum: 89.1% – 92.7%, Minimum: 74.0% – 77.3% .
- **Surface Wind**: Mostly from the southwest (22.3%), south (20.8%) and northeast (19.2%).

HYDROLOGY

- **Rainfall and Surface Runoff**:
  - Average annual rainfall: 2,750 mm.
  - Annual potential evapotranspiration: 1,500 – 1,750 mm.
  - Potential runoff: 1,000 – 1,250 mm.
- **Groundwater**: No active groundwater abstraction found within the vicinity of Project site.
- **River Basin**: Sg Kerak basin (3,935.60 ha).
- **Main Rivers**: Sg Lubuk Mandi, Sg Anak Ring and Sg Kerak
- **Stream Gauging (12 locations):** Width: 0.56 – 46.1 m, Velocity: 0.08 – 0.3 m/s.
- **Flood Hazard**: Floor risk during monsoon (Nov – Dec), along Sg Anak Ring, Sg Kerak and State Road T26.
- **Water Intake Point/ Water Treatment Plant:** There are none downstream of the Project site. Marang District receives water supply from the Sg Terengganu Basin via LRA Kepong and LRA Bukit Losong.

Potential Impact

Construction Phase:

- Increased surface runoff due to vegetation clearing.
- Increased erosion and sedimentation in waterways causing stream bed shallowing.
- Localised flooding from waterway obstruction.

Operational Phase:

- Increased surface runoff due to increase in impervious surface.
- Clogged drains and ponding.

Pollution Prevention and Mitigation Measures (P2M2)

Construction Phase:

- Provide adequate temporary drainage system to channel runoff into the silt traps.
- Regular inspection and maintenance of temporary drainage, check dams and silt traps.
- Maintain riparian buffers and rehabilitate work area post-construction.

Operational Phase:

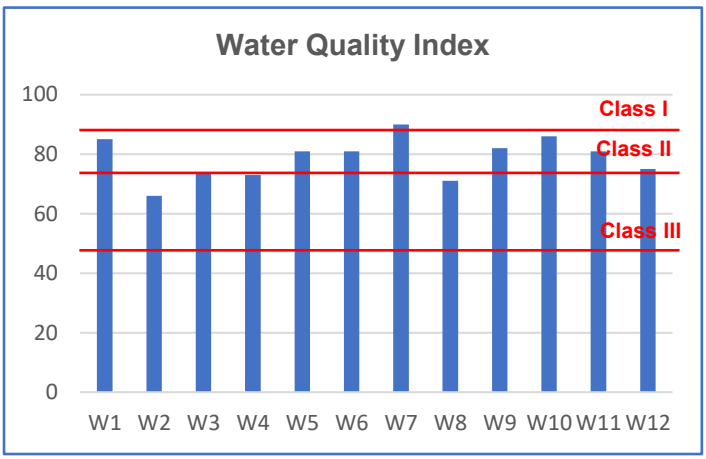
- Ensure all drainage systems along the Project alignment are maintained on a regular basis, to the standard of *Street, Drainage and Building Act 1974*.
- Ensure periodic riverbank monitoring and maintenance.

EXISTING ENVIRONMENT, IMPACT ASSESSMENT & MITIGATION MEASURES

WATER QUALITY

Existing Environment

- **Baseline sampling**: 12 river water sampling points selected along the main rivers (Sg Lubuk Mandi, Sg Anak Ring and Sg Kerak).
- **Exceedence**: All tested parameters complied with the Class IIB limits of NWQS except for pH, turbidity, dissolved oxygen (DO), ammoniacal nitrogen (AN), copper, iron, manganese, arsenic, chemical oxygen demand (COD), nickel, total suspended solids (TSS) and boron at selected sampling points.
- **Pollution Sources**: The high heavy metal content and COD values is likely indicative of pollutants from mining activities and contaminants from ex-mining areas.
- **Water Quality Index (WQI)**: Ranged from 66 – 90 within Class II – III. Status ranged from Clean – Slightly Polluted.



Potential Impact

Construction Phase:

- Increased silt and sediments (modelling showed that with mitigation measures, TSS levels would be maintained or better).
- Improper management of stockpiles.
- Oil spills/leaks.
- Indiscriminate waste disposal (biomass, solid waste, sewage and scheduled wastes).

Operational Phase:

- Increased contaminated surface runoff.
- Nutrients and residues from landscaping maintenance.
- Illegal disposal of wastes by motorists.
- Accidental spills of cargoes.

Pollution Prevention and Mitigation Measures (P2M2)

Construction Phase:

- Implement erosion and sediment control (ESC) measures.
- Proper management of stockpile areas.
- Provide 110% capacity bunding for fuel storage tanks.
- Oil spill kits.
- Ensure proper site waste management.
- Carry out periodic water quality monitoring.

Operational Phase:

- Landscaping and road maintenance.
- Spillage and waste management.

Scheduled Waste Storage Area

EXISTING ENVIRONMENT, IMPACT ASSESSMENT & MITIGATION MEASURES

AIR QUALITY

Existing Environment

- **Baseline sampling**: Four locations at the nearest receptors along the alignment were selected.
- **Results**: All baseline air quality parameter (NO_2, SO_2, CO, O_3, $PM_{2.5}$ and PM_{10}) levels complied with the Standard 2020 of the Malaysian Ambient Air Quality Standards (MAAQS).

Potential Impact

Construction Phase:

- Wind and heavy vehicle movement increases fugitive dust from cleared areas.
- Emissions from fuel burning equipment, machinery and vehicles.
- Illegal burning of wastes.

Operational Phase:

- Impacts from vehicular emissions to the nearest receptors are not significant and within prescribed limits (based on modelling results).

Pollution Prevention and Mitigation Measures (P2M2)

Construction Phase:

- Apply wet suppression and water bowsing.
- Service and maintain vehicles and machinery.
- Ensure PPE for workers are issued.
- Ambient air quality monitoring in work sites.
- Open burning is prohibited.

Operational Phase:

- Plant trees and landscape the buffer areas.
- Impose speed limits near settlements.

NOISE AND VIBRATION

Existing Environment

- **Baseline sampling**: Four selected sensitive receptor areas.
- **Results:** Existing noise complied with DOE's Recommended Permissible Sound Level. Ground vibration were within the recommended DOE vertical velocity limits.

Potential Impact

Construction Phase:

- Noise: Based on simulation results, the noise level will be within the DOE's recommended limits while the community noise response can range from "None" to "Strong".
- Vibration: Within DOE's permissible limits.

Operational Phase:

- Noise: anticipated noise can be "None" to "Strong".
- Vibration: No impacts expected.

Pollution Prevention and Mitigation Measures (P2M2)

Construction Phase:

- Noise: Limit work hours to day time. Address public concerns and complaints. Issue PPE to workers. Impose speed limits.
- Vibration: Adopt engineering measures to reduce vibration if necessary.

Operational Phase:

- Adopt additional BMPs if required.

EXISTING ENVIRONMENT, IMPACT ASSESSMENT & MITIGATION MEASURES

BIOLOGICAL RESOURCES

Existing Environment

- **Flora**:
  - Habitat along the Project alignment comprise mainly secondary vegetation and shrub vegetation and is highly disturbed by anthropogenic activities (land clearing, mining, roads, agriculture).
  - 46 species from 22 families found within the COI. No HCV species sighted.

- **Fauna**:
  - Four mammal species from four families recorded. One Totally Protected (TP) species (Common Tree Shrew) and two Protected (P) species (Long-tailed Macaque and Common Palm Civet) identified under the WCA 2010.
  - 13 species of birds from 12 families observed. Only the Javan Myna was listed as Vulnerable (VU) in the IUCN Red List. Under the WCA 2010, eight species were listed as TP while one was P.
  - Four species of herpetofauna from four families were sighted, all were of Least Concern (LC). Two species, the Water Monitor and Oriental Garden Lizard was listed as Protected (P) under the WCA 2010.

- **Human Wildlife Conflicts:** PERHILITAN recorded 431 cases in the district (2020 – 2024) mainly from Long-tailed macaques (221 cases) and wild boards (137 cases).

Potential Impact

Construction Phase:

- Flora
  - Loss of vegetation due to land clearing.
  - Reduction in soil quality.
  - Habitat loss for wildlife.
- Fauna
  - Habitat loss due to land clearing.
  - Human-Wildlife Conflicts (HWC).
  - Noise and light disturbance affecting normal animal behaviour.

Operational Phase:

- Flora
  - No major impacts after the initial losses during the construction phase.
- Fauna
  - Human-Wildlife Conflicts (HWC).
  - Roadkill.
  - Traffic induced disturbance.

Pollution Prevention and Mitigation Measures (P2M2)

Construction Phase:

- Flora
  - Land clearing limited to within the ROW.
  - Practise phased land clearing.
  - Timber removal only with authority approval.
  - Ensure biomass management.
  - Preserve topsoil.
- Fauna
  - Manage HWCs including relocation if needed.
  - Prohibit trespassing and poaching through monitoring.
  - Proper waste management at site.

Operational Phase:

- Flora
  - Carry out rehabilitation of worked areas.
  - Enhance regeneration of vegetation in buffer areas.
- Fauna
  - Implement habitat rehabilitation.
  - Implement active management of primates.
  - Install signages warning of possible animal crossings.

EXISTING ENVIRONMENT, IMPACT ASSESSMENT & MITIGATION MEASURES

SOCIO-ECONOMIC

Existing Environment

- **Settlements** located in the Project COI and surrounding areas: Kg Bukit Rhu Rendang, Taman Seri Berkat, Taman Desa, Taman Medan Jaya, Taman Kalungan Mas, Taman Harmoni, Taman Purnama Rusila, Taman Mas Impian Rusila.
- **Total population (Mukim Rusila)**: 19,865 people with estimated 2,997 households within the COI.
- **Social survey**: 30.5% of respondents were aware of the Project while **unanimously** all were in favour of the Project.

Potential Impact

Pre- Construction Phase:

- Acquisition of seven land lots within the ROW.

Construction Phase:

- Nuisance to community: noise, dust and traffic congestion.
- Accidents and safety risks to residents.
- Communicable disease.
- Flood risk.
- Employment and business opportunities.

Operational Phase:

- Traffic congestion.
- Effects of vehicular emissions on nearby receptors.
- Risk of traffic accidents.
- Improvement in travel time and convenience.
- Land and property value appreciation.
- Improved infrastructure and amenities.

Pollution Prevention and Mitigation Measures (P2M2)

Pre-Construction & Construction Phases:

- Carry out Land Acquisition in accordance with proper procedure and with compensation.
- Implement Traffic Management Plan.
- Implement P2M2 to address pollution impacts (water quality, air, noise and vibration) on nearby residents.
- Have an effective Emergency Response Plan (ERP) in place.
- Address any complaints from the residents as soon as possible.

Operational Phase:

- Carry out periodic road maintenance.
- Take all efforts to ensure the safety and health of the work teams.

EXISTING ENVIRONMENT, IMPACT ASSESSMENT & MITIGATION MEASURES

TRAFFIC

Existing Environment

- **Connectivity**: Federal Route 3 (FR3), State Road T26 (Rhu Rendang – Bukit Payung), Jalan Medan Jaya.
- **Morning Peak Hours**: 700 am – 800 am.
- **Evening Peak Hours**: 4.45 pm – 5.45 pm.
- **Vehicle Type**: Cars/Small Vans/Utilities (71.7% – 73.8%), Motorcycles (23.6% – 26.1%).
- **Level of Service (LOS)**: Screenline (LOS B – C), Junction 1 (LOS B), Junction 2 (LOS D – F).

Potential Impact

Construction Phase:

- Increase in heavy vehicle volume.
- Material spillage and road damage.
- Traffic congestion.
- Vehicular emissions.

Operational Phase:

- Higher traffic volume.
- Traffic emissions and noise.
- Accident risks.
- Lower Level of Service (LOS) for junctions.
- Improved connectivity to major roads.

Pollution Prevention and Mitigation Measures (P2M2)

Construction Phase:

- Implementation of a Traffic Management Plan.
- Schedule the logistics and heavy vehicle movements outside of peak hours.
- Impose speed limits at site.
- Ensure there are adequate warning signage and lighting.
- Ensure workers abide by the traffic laws and regulations.
- Repair and make good all damaged roads after construction ends.

Operational Phase:

- Proper traffic control and road safety procedures to be put in place.
- Carry out regular road maintenance.
- Impose speed limits.

State Road T26
(Rhu Rendang – Bukit Payung)

Road at the end of the Project alignment

Junction of Jalan Medan Jaya with FR3

EXISTING ENVIRONMENT, IMPACT ASSESSMENT & MITIGATION MEASURES

WASTE MANAGEMENT

Existing Environment

- The nearest local authority approved landfill is the Kg Tertak Batu Sanitary Landfill, located ~5.3 km south of the Project alignment.
- Potential waste sources from the Project (construction phase) include:

Source	Type of Wastes
Land clearing	Biomass wastes consisting of shrubs, bushes, branches, trunks, roots, woody materials, grass cuttings, etc.
Construction & Demolition	Construction and demolition (C&D) wastes including mortar, bricks, roofing, piling, wood, electrical cabling, etc.
Earthworks	Unsuitable and temporary earth materials for stockpiling.
Road construction	C&D wastes including wood, cement, plaster, iron bars, formworks, bitumen, used paints, etc.
Workshop/ service yard/ refueling area	Machine parts, oil and grease (O&G), used lubricants, coolant, transmission fluids, spent batteries, filters, etc. (scheduled wastes)
Workers quarters/ site office	Municipal wastes, food wastes, plastic, paper, aluminium, metal, etc.

Potential Impact

Construction Phase:

- Water pollution due to illegal disposal or putrefying wastes.
- Earth stockpiles may result in erosion and sedimentation.
- Municipal wastes generated at site can attract pests, clog waterways, cause health issues and general malodour.
- Scheduled wastes can result in land and water pollution. It is also toxic and hazardous.

Operational Phase:

- Motorists may indiscriminately dispose of wastes onto the road.
- Scheduled wastes may be generated from road maintenance or accidental spills.

Pollution Prevention and Mitigation Measures (P2M2)

Construction Phase:

- Establish proper stockpile areas (biomass, earth, etc.).
- Dispose of residual wastes at the nearest local authority landfill.
- Manage scheduled wastes and properly dispose after at licensed facilities.
- Maintain regular housekeeping.

Operational Phase:

- Regular street cleaning and maintenance of drains.

ENVIRONMENTAL MONITORING PROGRAMME
- Compliance & Impact Monitoring during Construction Phase

Component	Parameters	No. of Points/ Location	Frequency
Compliance Monitoring			
Discharge Quality from Silt Traps	• TSS • Turbidity	• Outlets of silt traps. • Outlets of pocket silt traps.	• After every rain event≥ 12.5 mm, by EO • Monthly by EnvMC
Sewage (if cumulative P.E. <150) and sullage	• Sufficient temporary toilet facilities • Mobile toilets • O&G trap maintenance (if any)	Within the Project site	• Daily by EO • Monthly by EnvMC
Sewage Effluent from Septic Tank (Note: If cumulative P.E. ≥ 150)	Temperature, pH, BOD, COD, SS, O&G, AN, Nitrate-Nitrogen	Cumulative septic tank's effluent discharge point	Monthly by EnvMC
Performance Monitoring			
Functionality of the P2M2 for Erosion and Sediment Control	• BMP availability • Structure design • Functionality • Maintenance record	All BMPs proposed in the LD-P2M2 and ESCP approved by DID	• Weekly and after every heavy rain event by EO • Monthly by EnvMC
Solid Waste Management (i.e. biomass, construction, domestic wastes)	• General cleanliness • Adequate garbage bins provided • Condition of biomass stockpile area • Condition of drainage systems	Within the Project site	• Daily by EO • Monthly by EnvMC
Scheduled Waste Management	• Waste disposal at licensed scheduled waste disposal facility • Condition of storage area • Oil spills • Condition of vehicles and detection of leakages	• Storage areas for scheduled wastes • Workshop • Active work areas • Vehicles	• Daily by EO • Monthly by EnvMC

ENVIRONMENTAL MONITORING PROGRAMME
- Compliance & Impact Monitoring during Construction Phase (cont')

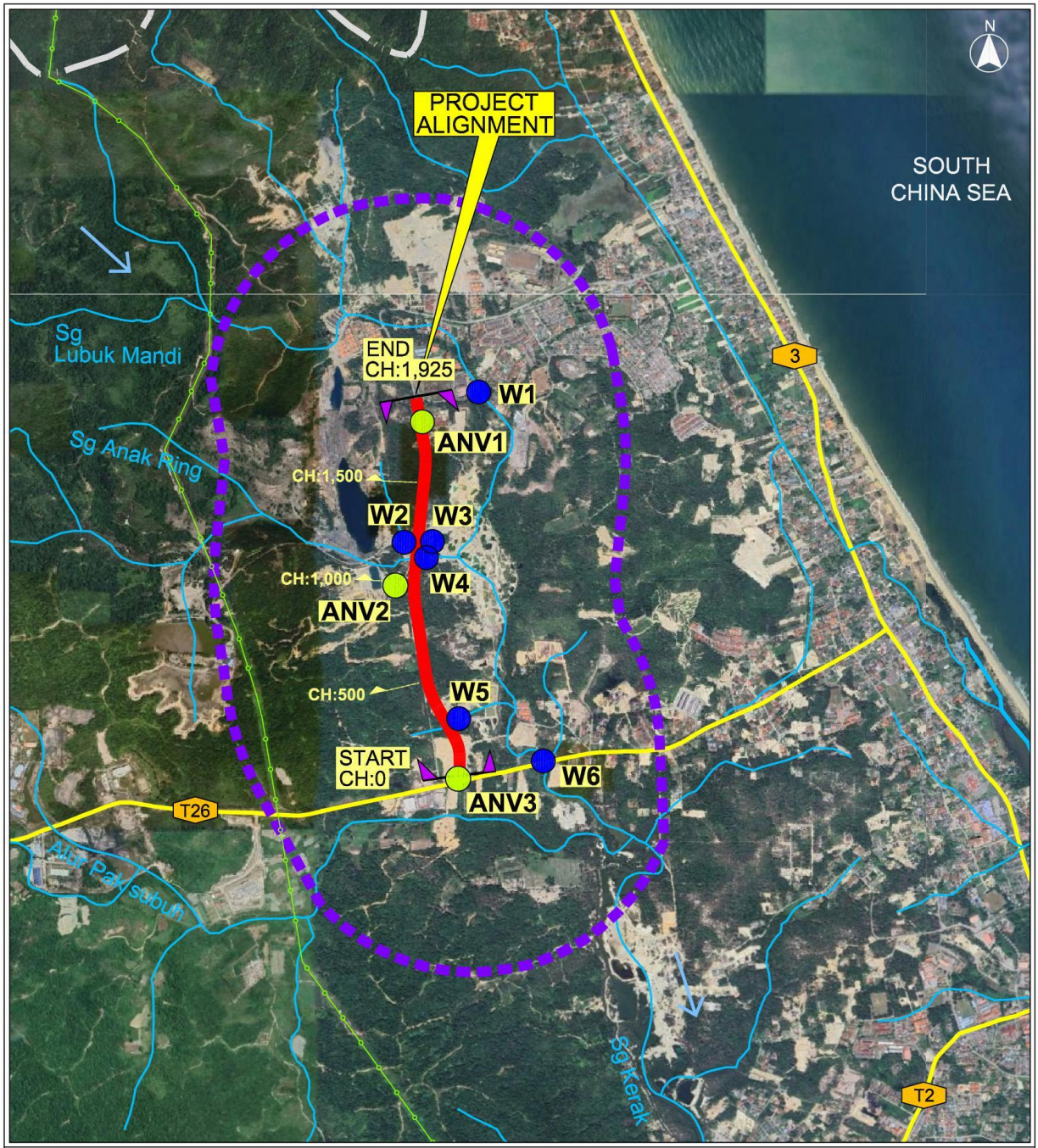
Component	Parameters	No. of Points/ Location	Frequency
Impact Monitoring			
River Water Quality	Temperature, pH, Conductivity, DO, BOD, COD, TSS, AN, O&G, *E. coli*, Faecal Coliform, Total Coliform	<u>Points</u> W1, W2, W3, W4, W5 & W6	Monthly by EnvMC
Air Quality	NO_2, SO_2, CO, $PM_{2.5}$, PM_{10}, weather conditions	Points A1, A2 & A3	Quarterly by EnvMC
Noise	L_{eq}, L_{10}, L_{50}, L_{90}, L_{min}, L_{max}	Points N1, N2 & N3	Quarterly by EnvMC
Ground Vibration	• Peak particle velocity (mm/s). • Frequency (Hz)	Points V1, V2 & V3	Quarterly by EnvMC
Ecology	Sighting of rare, endangered and threatened wildlife species	Along the Project alignment.	Report to PERHILITAN

ENVIRONMENTAL MONITORING PROGRAMME
- Impact Monitoring during Operational Phase

Component	Parameters	No. of Points/ Location	Frequency
Impact Monitoring			
Cut and Fill Slopes, including Critical Natural Slopes	• Stability of slope • Signs of distress • Signs of erosion	Whole Project site where cut and fill slopes has been formed, including critical natural slopes	Yearly

Note:
EO: Environmental Officer
EnvMC: Environmental Monitoring Consultant

ENVIRONMENTAL MONITORING PROGRAMME
- Monitoring Points



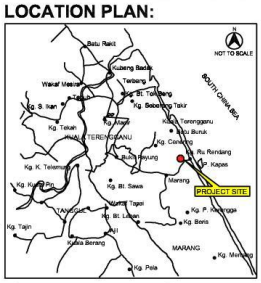
LEGEND:

- Project Alignment
- 1-km Corridor of Impact (COI)
- Road
- T26 Road Number
- River
- River Flow Direction
- District Boundary
- *Mukim* Boundary
- Electricity Transmission Line
- River Water Quality Sampling (W1 - W6)
- Air Quality, Noise and Vibration Levels Measurement Points (ANV1 - ANV3)

DATA SOURCE:

(1) Google Earth Map, Imagery date: 14 May 2020, Accessed date: May 2024.
(2) Pelan Topografi, Jabatan Kerja Raya Malaysia, December 2024.

LOCATION PLAN:



KEY PLAN:

PROJECT PROPONENT:	ENVIRONMENTAL CONSULTANT:	PROJECT TITLE:	SCALE:	DRAWING TITLE:	PAGE NO:
JABATAN KERJA RAYA (JKR) MALAYSIA	ASIA PACIFIC ENVIRONMENTAL CONSULTANTS SDN BHD	FIRST SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR MEMBINA JALAN BARU DARI KG. BUKIT KHOR KE MEDAN JAYA, MARANG, TERENGGANU.	0.3 0 0.3 km	PROPOSED LOCATIONS FOR WATER, AIR QUALITY, NOISE AND VIBRATIONS LEVELS MONITORING	9-58
				DRAWING NO: FIGURE 9.6.1	DATE: JULY '25