

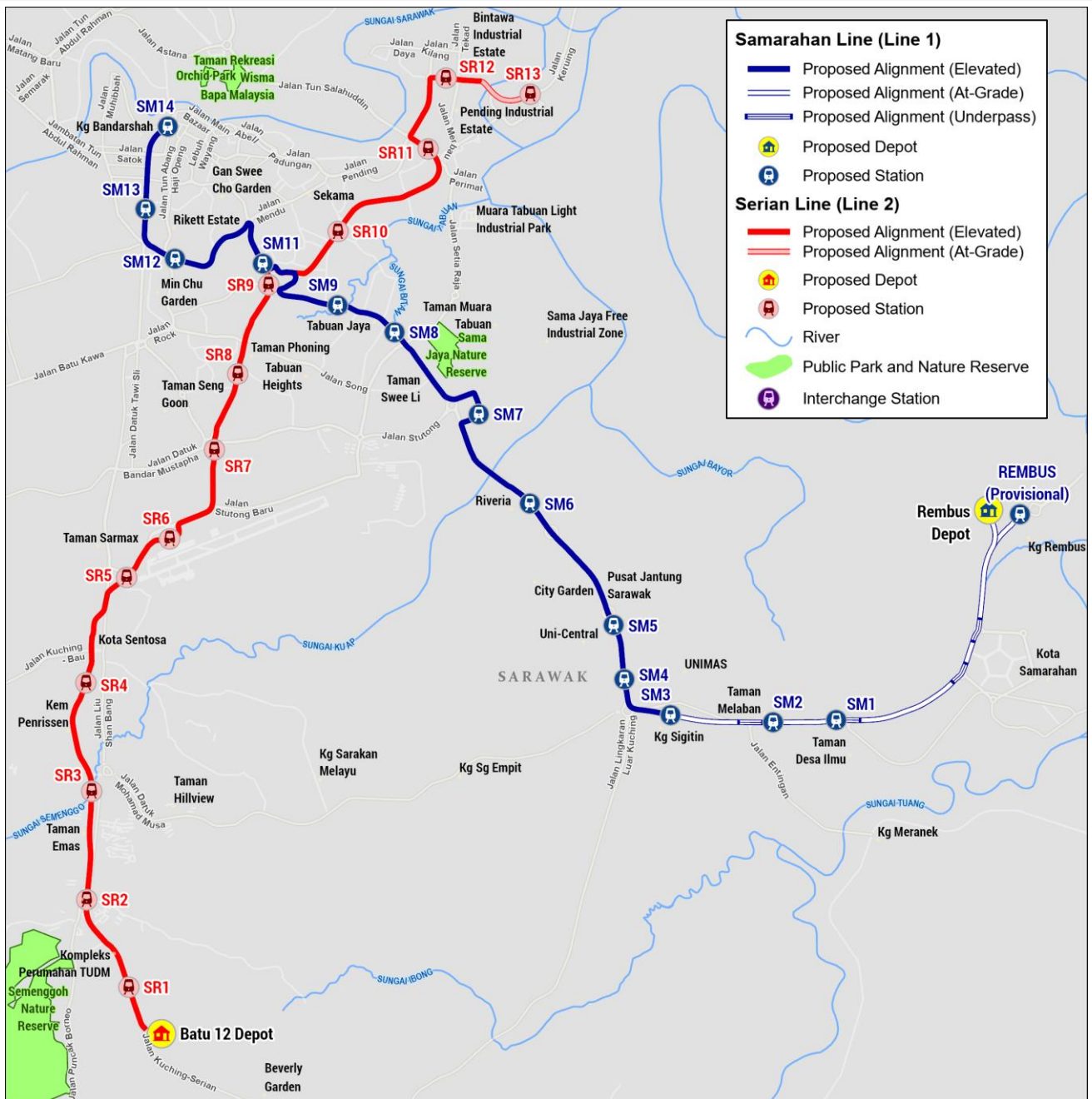
KUCHING URBAN TRANSPORTATION SYSTEM PHASE 1 – SAMARAHAN LINE AND SERIAN LINE

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT

EXECUTIVE SUMMARY

The Kuching Urban Transportation System (KUTS) will help transform Kuching into a dynamic & competitive city while alleviating traffic congestion. At the heart of KUTS is the Automated Rapid Transit (ART), a hybrid of a train, bus & a tram which will serve as the backbone of the public transport system in Kuching. KUTS ART Phase 1 will involve the construction & operation of two transit lines :

- i. Samarahan Line (Line 1) – Rembus to Hikmah Exchange (28.5 km)
- ii. Serian Line (Line 2) – Batu 12 to The Isthmus (24.5 km)



PROJECT PROPONENT



Sarawak Metro Sdn Bhd
Tel: 082-524 222
Fax: 082-524 224
E-mail: info@mysarawakmetro.com

EIA CONSULTANT



**EMS Progress Sdn Bhd –
ERE Consulting Group Sdn Bhd –
CGB Consultants Sdn Bhd**
Tel: 03-8024 2287
Fax: 03-8024 2320
E-mail: admin@ere.com.my

PROJECT DESCRIPTION



Line Length

Line 1 : 28.5 km (67 % Elevated)
Line 2 : 24.5 km (96 % Elevated)



Operating Hours

6.00 am – 12.00 am



Stations

Line 1 (SM) : 13 + 1 (provisional)
Line 2 (SR) : 13
Interchange : 1



Operating Speed

Average : 35 km/h
Maximum : 70 km/h



Depot

Line 1 : Rembus
Line 2 : Batu 12



Journey Time

Line 1 : Approx. 38 mins
Line 2 : Approx. 40 mins

Need For Project



Relieve Traffic Congestion



Stimulate Economy



Serve as backbone of public transport system (low usage of public transport : < 4%)



Promote Transit Oriented Development



Safe, Reliable & Convenient transport alternative

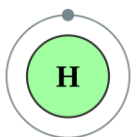
ART System



Hybrid of train, bus & tram



Trackless on dedicated lanes



Electric vehicle powered by Hydrogen (H₂) fuel cells



Runs on rubber tyres



Intelligent guidance system



Passenger capacity: 300 pax (3-car)

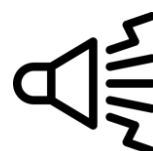
Advantages



Eco-Friendly : H₂ is non toxic & low carbon emission

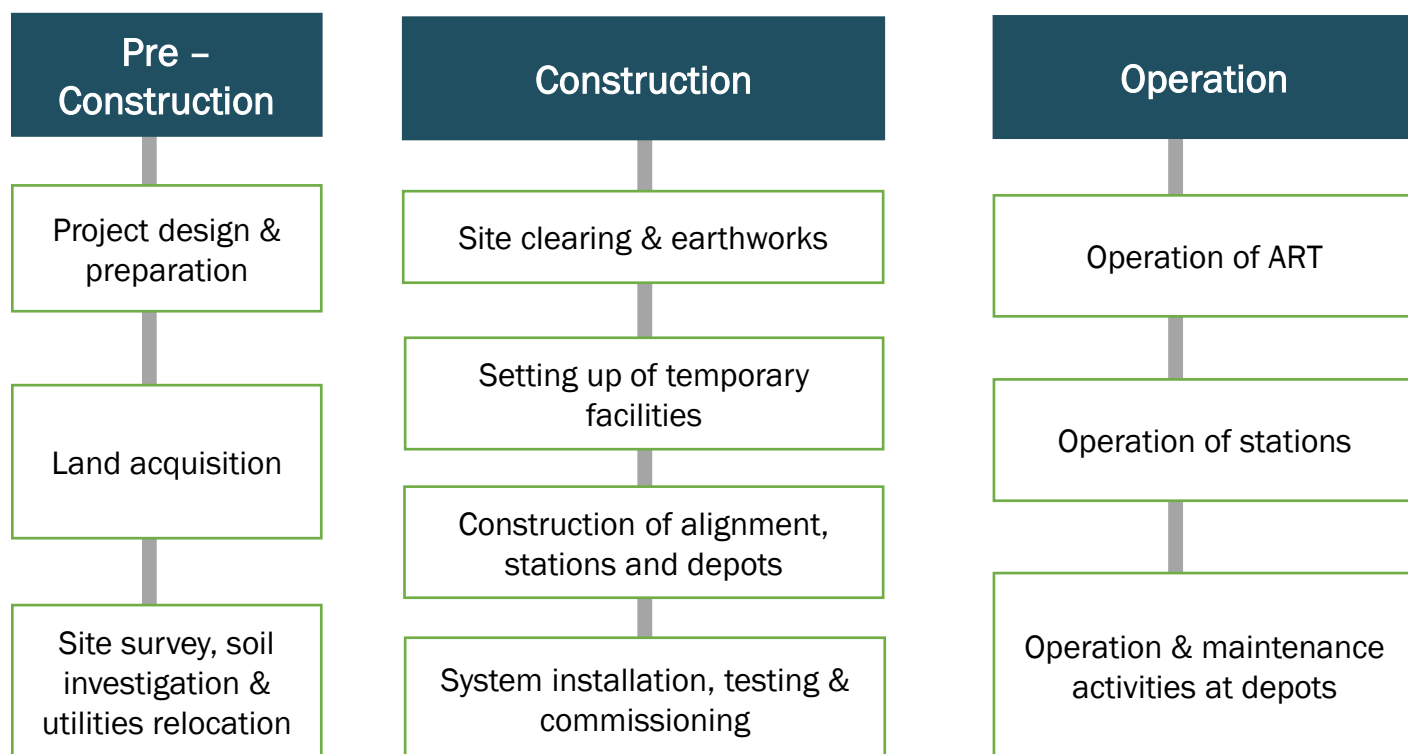


Reduced construction cost : No need tracks & electrification system

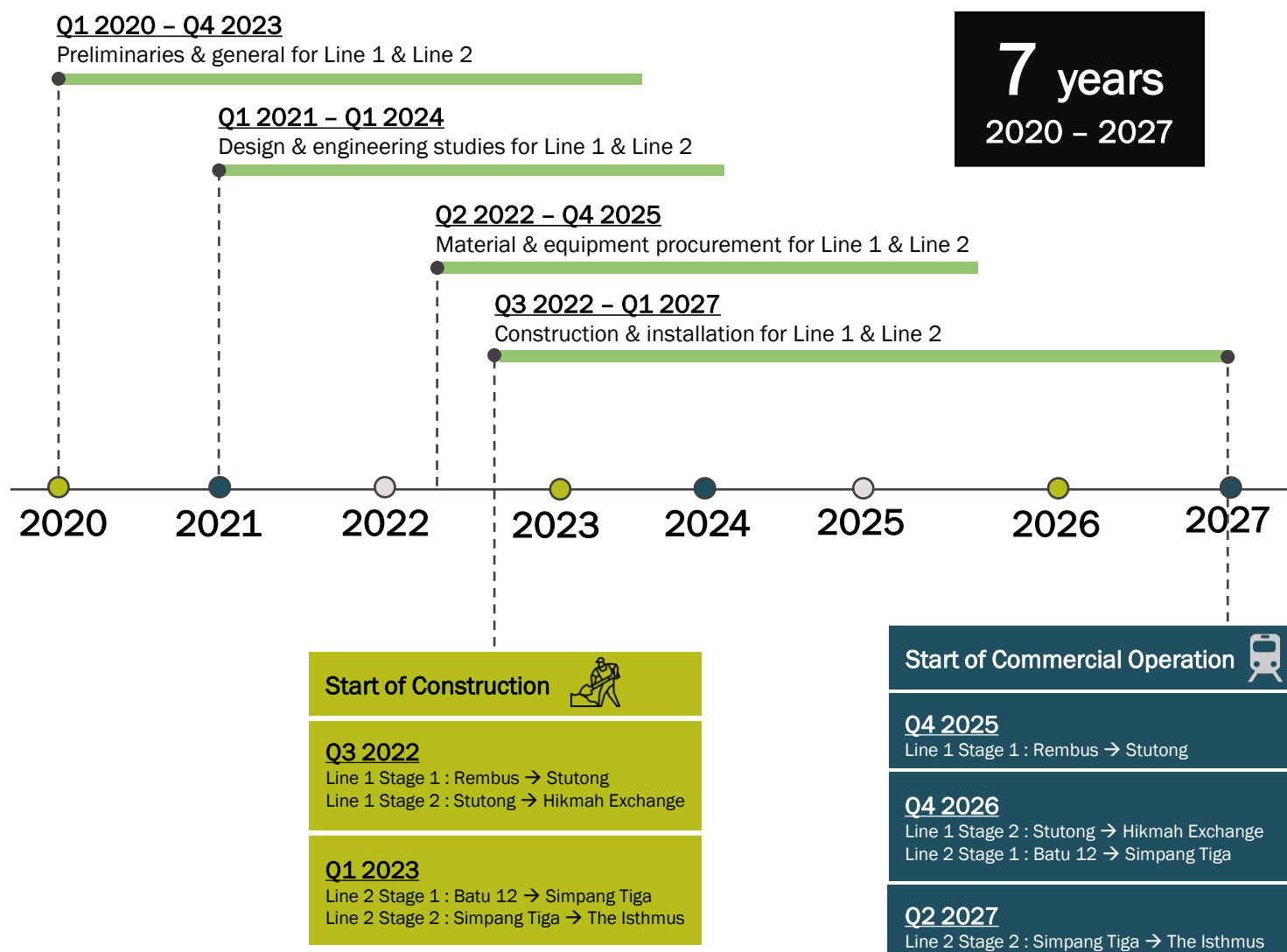


Less noise : ART vehicles run on rubber tyres on road pavement

PRINCIPAL PROJECT ACTIVITIES

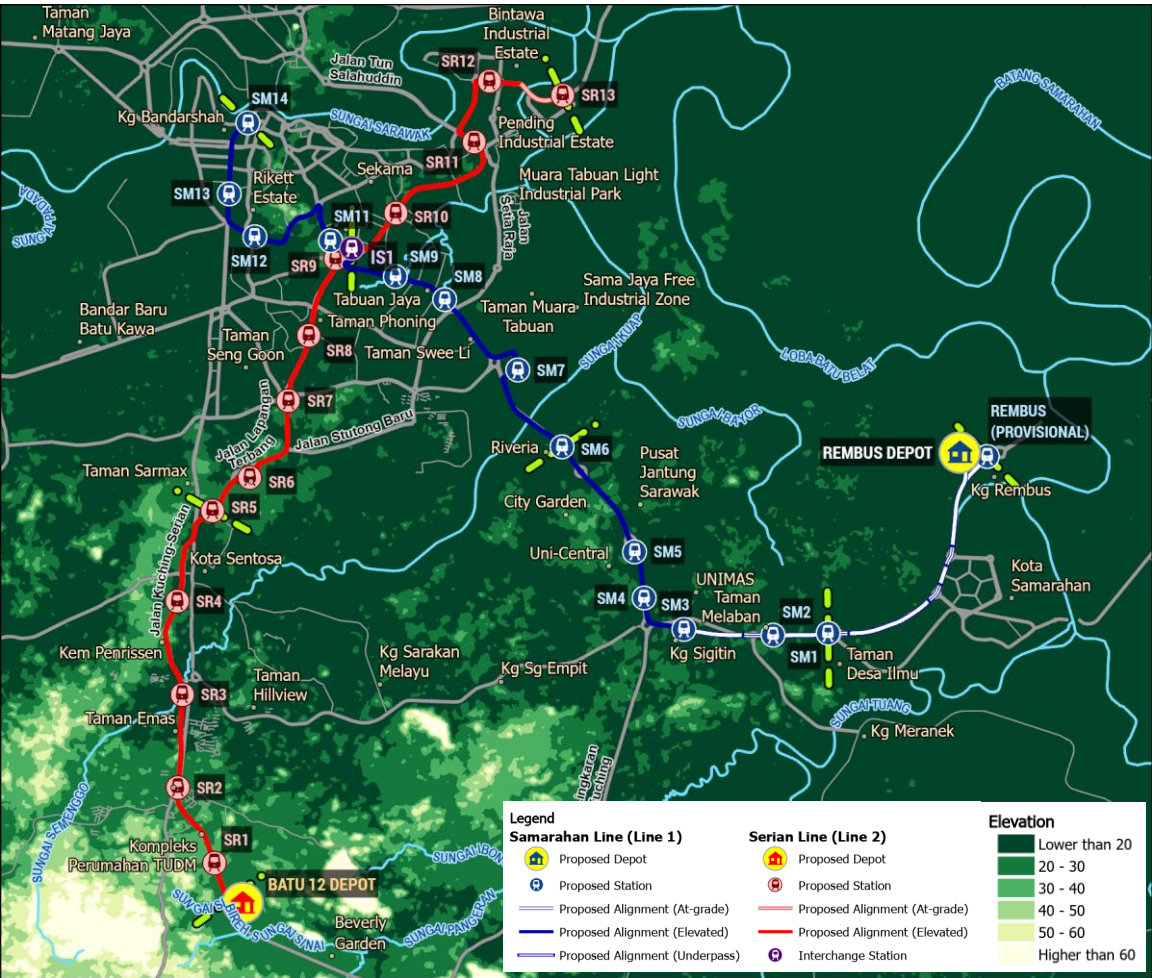


PROJECT TIMELINE



PHYSICAL ENVIRONMENT

Topography

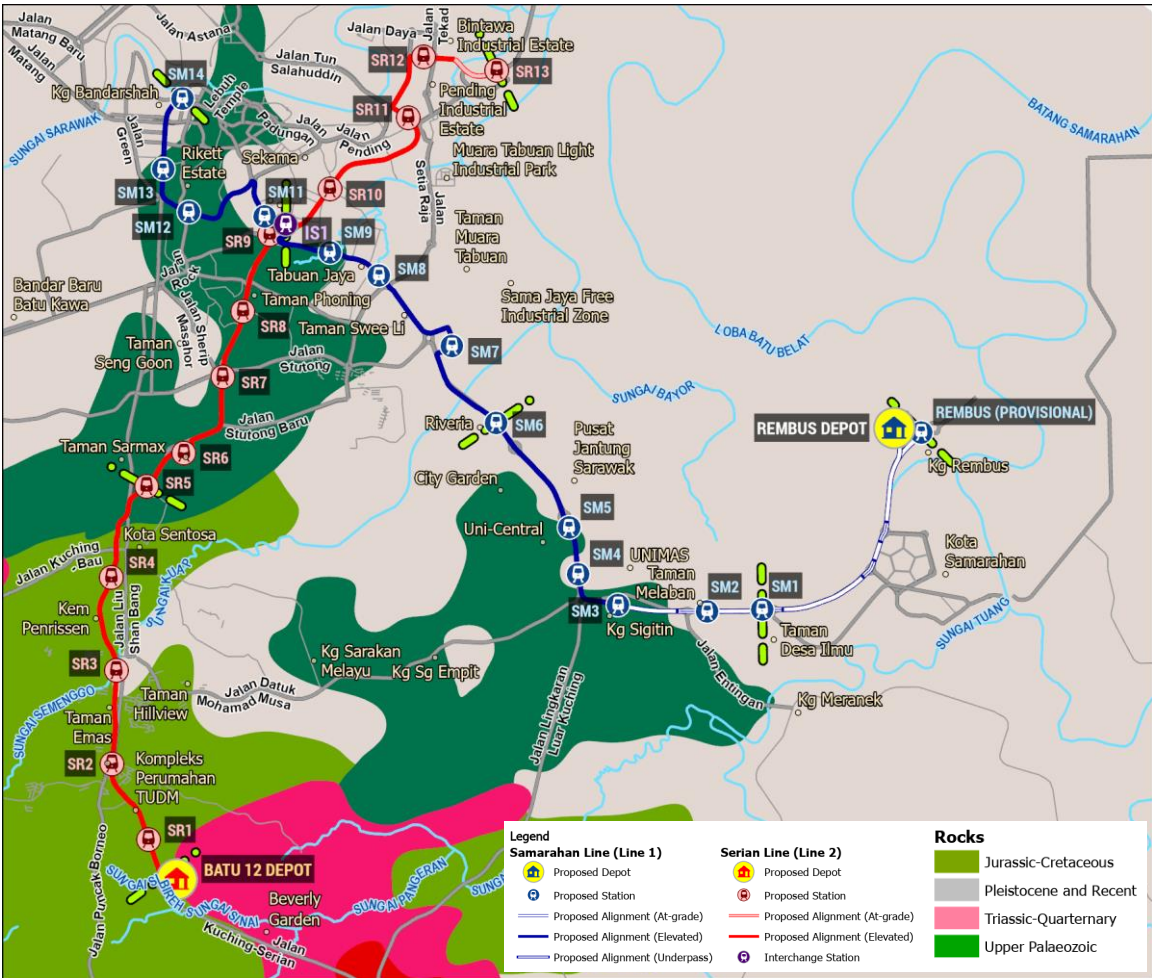


Predominantly flat & low-lying

Highest elevation :
Batu 12 depot
(33 m asl)

Gentle ground profile due to alignment following existing grading of road profile

Geology



Subsurface Geology

Pleistocene and Recent: Clay, silt, sand & peat (most of Line 1 & parts of Line 2)

Upper Palaeozoic: Phyllite, metagraywacke, limestone, schists & chert (Line 2 & parts of Line 1)

Jurassic-Cretaceous: Argillaceous rocks, arenaceous & calcareous rocks (Line 2)

PHYSICAL ENVIRONMENT

Hydrology



KUTS Phase 1 is within

3 River Catchments

- Batang Samarahan
- Sg. Sarawak
- Sg. Kuap

2 Water Treatment Plants Upstream

- Matang WTP
 - Batu Kitang WTP
- (not affected by KUTS alignment)

5 Main River Crossings

- Sg. Kuap
- Sg. Bitan
- Sg. Tabuan
- Sg. Semenggo
- Sg. Sarawak



36 Water Quality Sampling Points

Line 1 : 21 points

Line 2 : 15 points

Line 1 Water Quality Range:

- NWQS Class II – V
- WQI : 20 – 85

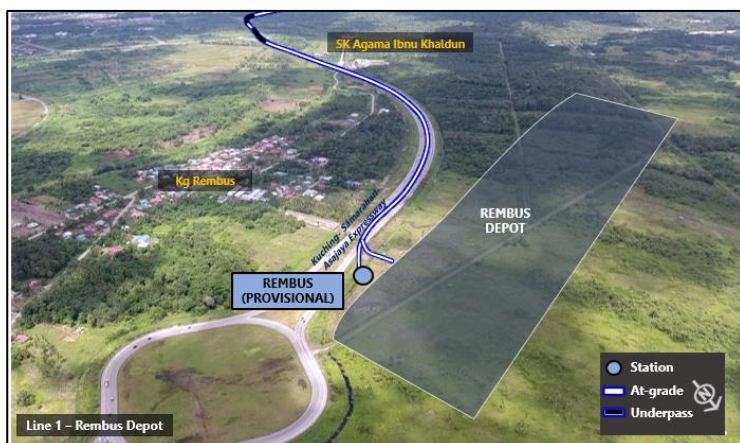
Line 2 Water Quality Range:

- NWQS Class II – V
- WQI : 28 – 91

Ecology

Alignment does not traverse through any Totally Protected Areas

No species of concern within alignment & depot



- Disturbed area due to agricultural activity & surrounding roads
- Typical fast-growing pioneer species
- Paddy planting & shifting cultivation



- Disturbed area as it is surrounded by residential developments
- Young secondary vegetation, thick undergrowth, & pioneer plant species



- Riparian mangroves - remnant mangroves affected by land clearing for development & Kuching-Samarahan Expressway
- Approximately 0.7 ha of mangroves will be cleared for the ART elevated alignment

Population & Household



Population

Kuching Division: 812,900
Samarahan Division: 187,500

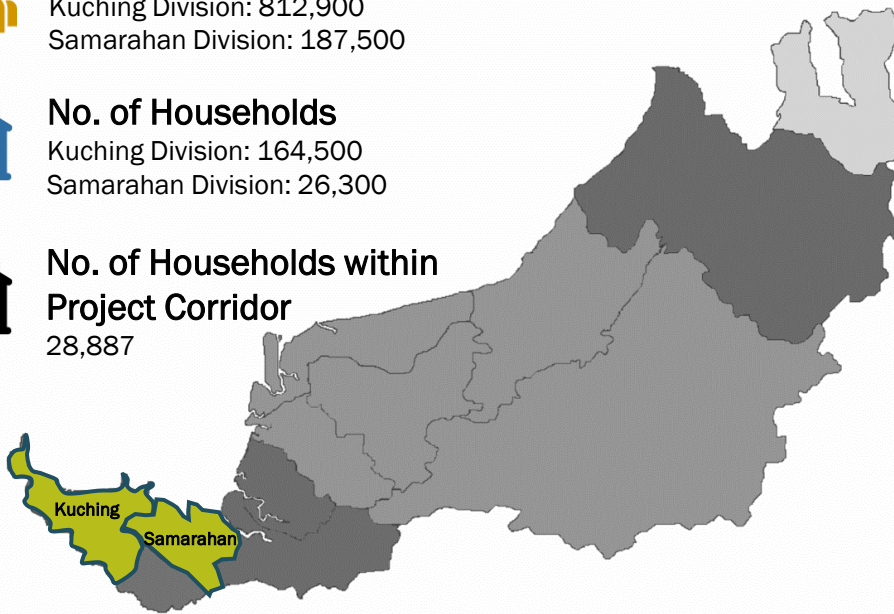


No. of Households

Kuching Division: 164,500
Samarahan Division: 26,300



No. of Households within Project Corridor
28,887



Main Economic Activity

Main Economic Activities in Kuching

High-Tech Industry
Finance
Tourism
Services
Education



Main Economic Activities in Samarahan

Education
Medical
Agriculture
Plantation



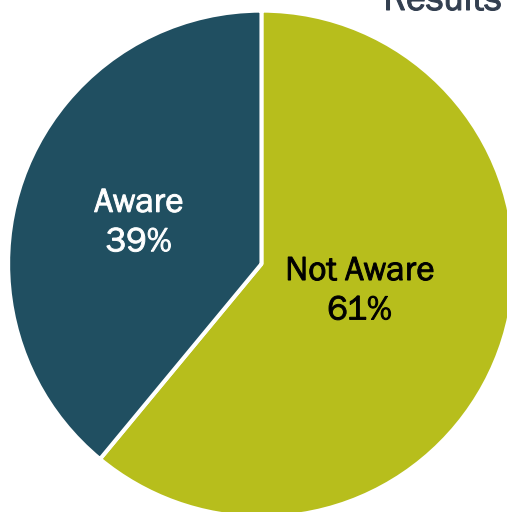
Perception Survey : 1,991 respondents

12th January 2021 – 26th February 2021
(within Project Corridor)

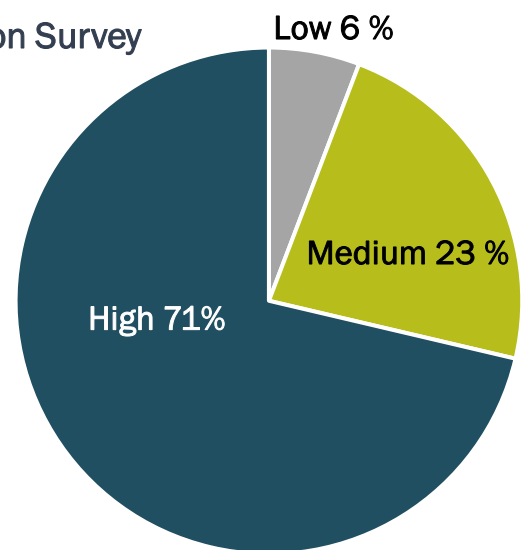
17 Focus Group Discussions & Interviews

30th December 2020 – 12th April 2021
(within Project Corridor)

Results of Perception Survey



Project Awareness



Level of Support for Project

Perception of Project Benefits

- Reduction in traffic congestion
- Travel time savings
- Better connectivity to destinations
- Reduced dependency on private vehicles
- Safer mode of travelling

Perception of Socio-economic issues

- Finding affordable replacement for properties affected by land acquisition
- Concerns over compensation
- Traffic congestion during construction stage & around stations during operation stage
- Public safety during both construction & operation
- Indiscriminate parking at stations
- Low usage of public transport

ROAD TRAFFIC



41 Traffic Survey Locations

Line 1 : 17
Line 2 : 20
S. Tiga : 4

Range of Level of Service during Peak Hours:

A (Free Flow Traffic) – E (unstable Flow Traffic)

Critical Areas

Kuching-Samarahan Expressway
Jalan Wan Alwi
Jalan Simpang Tiga
Jalan Penrissen
Jalan Tun Razak

Level of Service **E**



NOISE & VIBRATION



27 Monitoring locations

Line 1 : 15 locations
Line 2 : 12 locations

Noise

Day time L_{eq} : 56.2 – 77.8 dBA
Night-time L_{eq} : 53.0 – 72.1 dBA

Main source of noise : urban road traffic

Most locations exceeded permissible limit.
Only 2 monitoring locations (Kem Penrissen & Taman Lan Hua) are within permissible limits of day & night time.

Vibration

Peak Particle Velocity : All locations within DOE's recommended limits (Curve 4 & Curve 8) for both day & night time



17 Monitoring Locations

Line 1 : 11 locations
Line 2 : 6 locations

PM ₁₀	11 - 21	µg/m ³
PM _{2.5}	5 - 10	µg/m ³
SO ₂		µg/m ³
NO ₂	Below detection limit	µg/m ³
CO		mg/m ³
O ₃		µg/m ³

Ambient Air Quality at all monitoring locations are within limits of MAAQS

POTENTIAL IMPACTS : TRAFFIC CONGESTION

CONSTRUCTION

ACTIVITIES : Road widening, one-way movements, traffic diversion, lane closures, lane width reduction
RECEPTOR : Kuching-Samarahan Expressway, Jalan Wan Alwi, Jalan Simpang Tiga, Jalan Penrissen, Jalan Lapangan Terbang, Jalan Tun Razak



Impacts

- Reduction in mainline capacity due to lane width reduction
- Traffic flow disruption due to insufficient road capacity
- Temporary bottlenecks due to road diversions
- Prolonged delays especially during peak hours
- Safety risk for pedestrians & road users
- Removal of on-street parking spaces

Pollution Prevention & Mitigation Measures

- Preparation of detailed Traffic Management Plan to address vehicle access, rerouting options, road closure, pedestrian movement
- Maintain number of lanes on major roads where possible
- Sufficient warning signs, lighting & flagmen shall be provided to facilitate traffic flow
- Restrict movement of construction vehicles to off-peak hours
- Provision of tow-trucks & emergency response teams
- Promote pedestrian safety

OPERATION

ACTIVITY : Operation of the ART



Impacts

- Alleviate traffic congestion due to mode shift from private transport to public transport
- Localized congestion in vicinity of ART Stations

Pollution Prevention & Mitigation Measures

- Proper design of traffic & pedestrian access leading to & from ART stations to encourage ridership
- Preparation of Traffic Impact Assessment to study access roads, junction upgrade, pedestrian facilities, feeder bus services, pick-up & drop-off bays

POTENTIAL IMPACTS : HAZARD & PUBLIC SAFETY

CONSTRUCTION

ACTIVITIES : Utilities relocation, ART lane construction, Station & depot construction,
RECEPTOR : Taman Desa Ilmu, Jalan Batu Lintang, Chung Hua Middle School, Eden Fields, Kg. Cemerlang, SMK Pending



Impacts

- Accidental damage to utilities causing service disruption
- Vehicular accident due to loading/unloading of construction materials
- Injury / fatality to public & workers from working at heights
- Traffic congestion due to temporary road closure

Pollution Prevention & Mitigation Measures

- Prepare Emergency Response Plan & Site Specific Safety & Health Plan
- Regular mandatory safety inspections & audits shall be conducted
- Adequate warning signs and traffic control at worksites shall be provided at designated areas

OPERATION

ACTIVITY : Operation of the KUTS ART



Impacts

- Public safety risk at stations such as slips, trips & falls during embarking/disembarking, snatch theft, harassment
- Fire/explosion due to leakage of hydrogen at hydrogen storage facility in depots

Pollution Prevention & Mitigation Measures

- Pedestrian walkways & stations to be well lit to ensure safety of passengers
- Ensure regular cleaning of platforms to remove oil residues
- Preparation of Emergency Response Plan
- Proper design & testing of hydrogen storage tanks & equipment which includes leak detectors
- Conduct detailed Quantitative Risk Assessment for hydrogen storage at depots
- Provision of hydrogen gas & flame detectors at refuelling stations

POTENTIAL IMPACTS : NOISE & VIBRATION

CONSTRUCTION

ACTIVITIES : Piling works, movement of construction vehicles, operation of construction equipment such as generator sets & power tools

RECEPTOR : Kg. Melaban, Lodge International School, Kompleks Perumahan TUDM, Kg. Cemerlang, SMK Pending



- Impacts**
- Minimal impact to most sensitive receptors as noise & vibration levels are within DOE's recommended limits
 - Potential areas of concern: receptors < 50 m from construction work sites

- Pollution Prevention & Mitigation Measures**
- Low impact piling methods (e.g.: rotary bored piles & injection piles)
 - Temporary acoustic enclosures & piling shrouds
 - Regular maintenance of construction equipment & vehicles
 - Continuous monitoring during piling activities to confirm compliance to DOE's acceptance limits

OPERATION

ACTIVITY : ART vehicle pass-by, operation of ART stations & depots

RECEPTORS : Lodge International School, Flat Kastam Tabuan Jaya, Kompleks Perumahan TUDM



- Impacts**
- Noise levels from ART pass-by is below DOE's recommended limits at most locations
 - Potential areas of concern : high-rise receptors < 20 m from ART viaduct

- Pollution Prevention & Mitigation Measures**
- Increase of parapet height on ART viaduct
 - Regular maintenance of ART lanes

POTENTIAL IMPACTS : AIR POLLUTION

CONSTRUCTION

ACTIVITIES : Site clearing & earthworks, movement of vehicles over unpaved surfaces, construction of ART lanes, stations & depots

RECEPTOR : Taman Desa Ilmu, Taman Eden Fields, Kg. Cemerlang, Swinburne University



- Impacts**
- Fugitive Dust (PM₁₀) emitted from earthwork activities
 - Dust & gaseous emissions from construction vehicles
 - Sensitive receptors more prone to negative health impacts

- Pollution Prevention & Mitigation Measures**
- Phasing of site clearing to minimize exposed areas
 - Erect hoarding around work sites
 - Regular water spraying of construction sites
 - Stockpiles to be covered
 - Wheel washing of all construction vehicles
 - Construction vehicles carrying loads (earth, sand, etc.) to be covered with tarpaulin

OPERATION

ACTIVIY : Operation of the KUTS ART

- No generation of air pollutants from ART vehicle (electric vehicles powered by hydrogen fuel cells)
- Minimal increase in emissions surrounding ART stations due to road vehicle traffic
- Reduction in greenhouse gas emission expected due to shift from private transport to public transport

CO ₂ e emissions avoided:	2024	2034
	54,714 tCO ₂ e/yr	157,799 tCO ₂ e/yr

POTENTIAL IMPACTS : WATER POLLUTION

CONSTRUCTION

ACTIVITIES : Earthwork activities, construction of ART lanes, stations & depots
RECEPTOR : Batang Samarahan, Sg. Kuap, Sg. Tabuan, Sg. Sibireh, Sg. Semenggo, Sg. Sarawak

Impacts



- Soil erosion & sedimentation from construction site runoff will increase total suspended solid levels in waterways



- Discharge of untreated sewage from portable toilets will increase levels of BOD, COD & NH₃-N in receiving waterways



- Improper discharge/spillage of fuels, oils, lubricants will lead to waterway & soil contamination

Pollution Prevention & Mitigation Measures

- Proper design and implementation of **LD-P2M2** (*sediment basins, silt traps, silt fence, erosion control blankets, sheet pile, cofferdam*)

- Portable toilets to be located away from storm drain waterways
- Sewage from portable toilets will be properly collected & treated offsite

- Provision of skid tanks, oil spill kits, containment bunds for the management of fuel, oils & lubricants
- Scheduled waste to be managed as per Environmental Quality (Scheduled Wastes) Regulations 2005

OPERATION

ACTIVITIES : Operation of ART Stations & Depots
RECEPTOR : Batang Samarahan, Sg. Kuap, Sg. Tabuan, Sg. Sibireh, Sg. Semenggo, Sg. Sarawak

Impacts



- Discharge of treated sewage from Rembus depot, Batu 12 depot, Station IS 1 & Station SM 14 will increase levels of BOD, TSS & NH₃-N in the receiving waterways if not managed properly



- Discharge of wastewater generated from Rembus depot & Batu 12 depot from washing & maintenance activity & sullage from canteens will increase pollution risk in receiving waterway



- Spillage of spent lubricants, chemicals & oil & grease will lead to surface & groundwater contamination

Pollution Prevention & Mitigation Measures

- Utilization of small sewage treatment system (SSTS)
- SSTS discharge from **Rembus depot, Station IS 1 & Station SM 14** will comply with **Standard B** of the Environmental Quality (Sewage) Regulations 2009
- SSTS discharge from **Batu 12 depot** will comply with **Standard A** of the Environmental Quality (Sewage) Regulations 2009

- Utilization of on-site wastewater treatment system (WWTS)
- WWTS discharge from **Rembus depot** will comply with **Standard B** of Environmental Quality (Industrial Effluent) Regulations 2009
- WWTS discharge from **Batu 12 depot** will comply with **Standard A** of Environmental Quality (Industrial Effluent) Regulations 2009, with the exception of BOD & COD which are to comply with more stringent limits
- Installation & maintenance of grease interceptor at canteens in depots

- Scheduled waste to be managed in accordance to Environmental Quality (Scheduled Wastes) Regulations 2005
- Emergency Response Plan (ERP) and contingency plans for oil spill incidents
- Implement fuel, oil and lubricant spillage management such as skid tanks, oil spill kits and containment bunds

POTENTIAL IMPACTS : ECOLOGY

CONSTRUCTION

ACTIVITIES : Land clearing during site preparation
RECEPTOR : Proposed location of Rembus & Batu 12 depots & riparian mangrove along Sg. Kuap

Impacts



- Loss of mangrove (0.7ha) along Sg. Kuap
- Vegetation loss & disturbance
- Human-wildlife conflict

Pollution Prevention & Mitigation Measures

- Demarcate areas to be cleared to reduce excessive disturbance to surrounding landscape
- Phasing of land clearing to reduce fragmentation
- Implement good housekeeping practices to minimize human-wildlife conflict
- Consultation with Sarawak Forestry Corporation & Forest Department Sarawak

OPERATION

ACTIVITY : Operation of KUTS ART

Impacts



- Minimal impacts as ART will operate within road medians

Pollution Prevention & Mitigation Measures

- Revegetation & restoring of exposed areas
- Mangrove replanting at degraded areas

POTENTIAL IMPACTS : WASTE

CONSTRUCTION

ACTIVITIES : Site clearing & construction of ART lanes, stations & depots will generate construction waste & biomass; Generation of scheduled waste from repair & maintenance works
RECEPTOR : Sg. Kuap, Sg. Bitan, Sg. Tabuan, Sg. Sibireh, Sg. Semenggo, Sg. Sarawak

Impacts



- Blockage of drains/rivers by large waste debris which could lead to risk of flooding in flood prone areas
- River pollution due to runoff & leachate from construction sites & accidental spillage of hazardous waste
- Pest proliferation, odour & visual pollution due to improper waste management

Pollution Prevention & Mitigation Measures

- Proper storage & handling of construction materials
- Segregation of waste to facilitate reuse & recycling
- Temporary stockpile away from rivers / waterways
- Phasing of site clearing to avoid accumulation of biomass
- Adequate training on waste handling & separation
- Scheduled waste to be managed as per Environmental Quality (Scheduled Waste) Regulations 2005

OPERATION

ACTIVITIES : Operation of ART stations & depots which will generate solid waste; maintenance activities at depot will generate scheduled waste

Impacts



- Blockage of drains/rivers from waste litter at stations which could lead to localized flooding
- Pest proliferation, odour & visual pollution due to improper waste management at stations & depots
- River/waterway pollution due to accidental spill & improper management of hazardous waste

Pollution Prevention & Mitigation Measures

- Provision of waste & recycling bins at stations & depots
- Proper collection, segregation & disposal of waste
- Scheduled waste to be managed as per Environmental Quality (Scheduled Wastes) Regulations 2005

POTENTIAL IMPACTS : SOCIAL

PRE-CONSTRUCTION



Impacts

- Acquisition of private land
- Affects livelihoods of land owners
- Concerns over compensation & adequacy
- Affects business operations

Mitigation Measures

- Strategic & continuous engagements with affected parties
- Adequate, fair & timely compensation
- Relocation & resettlement assistance

CONSTRUCTION



Impacts

- Noise & dust pollution
- Public safety risks
- Traffic congestion (Jln Wan Alwi, Jln Simpang Tiga, Jln Penrissen)
- Influx of foreign workers causing security concerns
- Creation of job opportunities

Mitigation Measures

- Implementation of mitigation measures for controlling dust & noise pollution, traffic congestion & public safety
- Contractors to monitor & implement best practices for managing construction workers

OPERATION



Benefits

- Ease of travel & convenience, shorter journey time compared to cars/bus
- Reduced risk of road traffic accidents
- Spur development around ART stations
- Generation of jobs & business from emergence of establishments along alignment

PROPOSED ENVIRONMENTAL MONITORING PROGRAMME - CONSTRUCTION

Component	Stations	Parameter	Frequency
	Sediment basin/silt trap discharge 36 water sampling stations	TSS, Turbidity Temp, pH, DO, COD, BOD, TSS, Turbidity, O&G, NH ₃ -N & E.coli	Monthly
	10 air monitoring stations	PM ₁₀ (24 hours monitoring)	Monthly
	27 noise monitoring stations	L _{aeq} , L _{max} , L _{min} , L ₁₀ & L ₉₀ (24 hours monitoring)	Monthly
	26 vibration monitoring stations	Peak Particle Velocity (24 hours monitoring & short term)	Monthly
	Third Party Environmental Audit	As per EIA Conditions of Approval	Once every 4 months

CONTACT US



PROJECT PROPONENT

Sarawak Metro Sdn Bhd
Unit 16-01, Level 16,
Gateway Kuching, No.9,
Jalan Bukit Mata Kuching,
93100 Kuching, Sarawak

Tel: 082-524222 Fax: 082-524224
E-mail: info@mysarawakmetro.com



EIA CONSULTANT

EMS Progress Sdn Bhd – ERE Consulting
Group Sdn Bhd – CGB Consultants Sdn Bhd
Ground Floor, Lot 3092 & 3093,
Block 10, KCLD, Wisma Ng Aik Oh,
2 ½ Mile, Rock Road,
93200 Kuching, Sarawak
Tel: 03-8024 2287 Fax: 03-8024 2320
E-mail: admin@ere.com.my