Executive Summary

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR EAST COAST RAIL LINK (ECRL) SECTION D FROM JALAN KASTAM TO NORTHPORT AND WESTPORT OF PORT KLANG

Project Summary

The East Coast Rail Link (ECRL) is a major infrastructure project aimed at enhancing connectivity between key urban centers on the east and west coasts as well as integrating with existing rail networks in Peninsular Malaysia. The ECRL alignment currently under construction consists of Sections A to C, covering strategic routes across multiple states from Kelantan to Selangor.

The ECRL Section D development is a continuation of the approved ECRL C2 alignment at the existing Jalan Kastam Station and will involve the construction of new standard gauge (SGL) tracks and meter gauge (MGL) bypass within the existing KTMB rail reserve for a total distance of 25.14 km. All proposed tracks are non-electrified and will consist of the following routes:

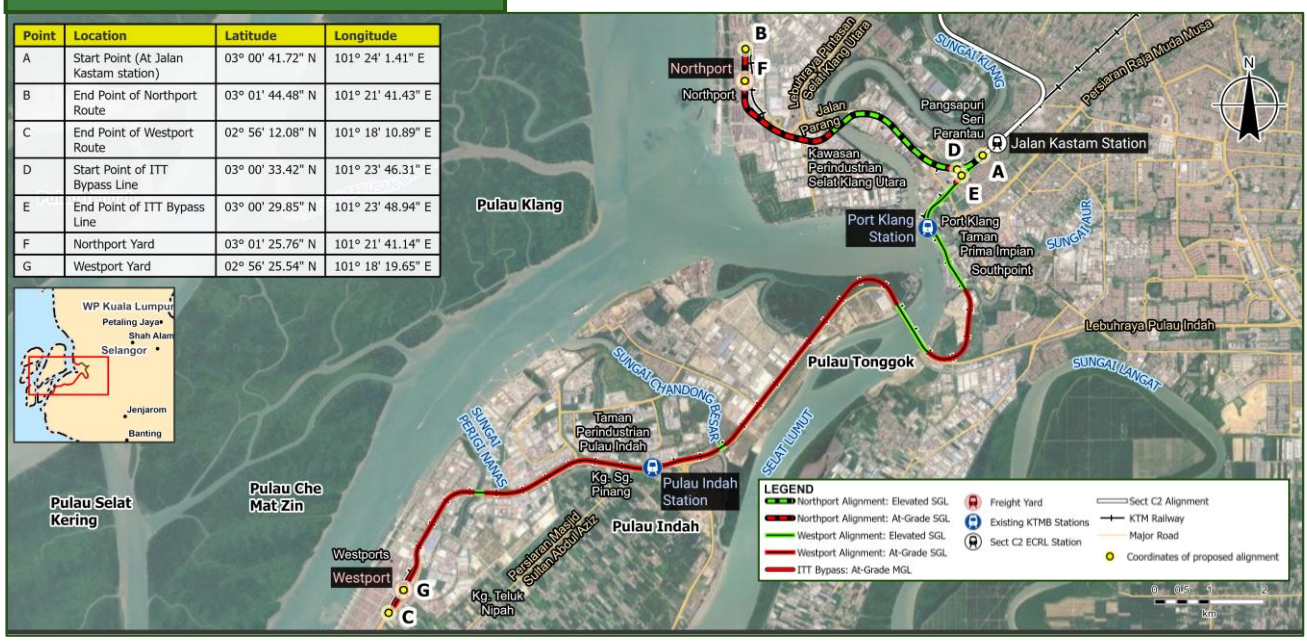
- **Northport Alignment** (Jalan Kastam – Northport) - An SGL track of 6.3 km connecting the Jalan Kastam station to Northport
- **Westport Alignment** (Jalan Kastam – Westport) – An SGL track of 18.5 km connecting the Jalan Kastam station to Westport
- **Inter Terminal Transfer (ITT) Bypass line** – A 0.34 km meter gauge (MGL) track bypass line connecting the existing Northport and Westport KTMB Alignment after the Jalan Kastam Station.

EIA Legal Requirement

The ECRL Section D project is subject to **EIA Second Schedule**: **Activity 16 (a) – Transportation**: Construction of new routes or branch lines for a mass rapid transport project.

Overview of ECRL Section D

Point	Location	Latitude	Longitude
A	Start Point (At Jalan Kastam station)	03° 00' 41.72" N	101° 24' 1.41" E
B	End Point of Northport Route	03° 01' 44.48" N	101° 21' 41.43" E
C	End Point of Westport Route	02° 56' 12.08" N	101° 18' 10.89" E
D	Start Point of ITT Bypass Line	03° 00' 33.42" N	101° 23' 46.31" E
E	End Point of ITT Bypass Line	03° 00' 29.85" N	101° 23' 48.94" E
F	Northport Yard	03° 01' 25.76" N	101° 21' 41.14" E
G	Westport Yard	02° 56' 25.54" N	101° 18' 19.65" E



Project Proponent

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PROJECT DESCRIPTION

KEY FEATURES FOR ECRL SECTION D

Alignment Length

Total length is 25.14 km
- 6.15 km Elevated (24.5 %)
- 18.99 km At-Grade (75.5 %)

Traction

Non electrified tracks; Using diesel locomotives

Freight Service

SGL tracks:
Single diesel locomotive (3500-ton capacity) pulling up to 45 wagons

MGL tracks:
As per existing KTMB operational requirements

Terminal Yards

2 terminal yards with new development of SGL tracks, MGL tracks, RMG Cranes and ECRL system buildings
- Northport Terminal Yard
- Westport Terminal Yard

Operating Hours

Operating Hours
- 2.30 am to 1.00 am next day (22.5 Hours)

Maintenance Window

Between 1.00 am to 2.30 am daily

Operating Speed

Maximum 80 km/hr

Journey Time

Northport Alignment
- 10 minutes

Westport Alignment
- 45 Minutes

PURPOSE OF ECRL SECTION D

IMPROVING FREIGHT TRANSPORT

- Completes the East Coast–West Coast ECRL rail freight corridor.
- Enables KTMB freight trains to bypass KL Sentral, improving efficiency and safety.
- Increases rail freight capacity and logistics efficiency.
- Supports cost-effective transport of bulk cargo and industrial goods.

IMPROVING CONNECTIVITY

- Provides a direct rail link between the East Coast and West Coast.
- Integrates with existing rail networks through interchange stations.
- Improves access to major towns, ports, airports and industrial areas.
- Reduces travel time and enhances regional connectivity.

REGIONAL ECONOMIC GROWTH

- Increases rail freight capacity to Northport and Westport through a dedicated double-track system.
- Improves logistics efficiency.
- Attracts investment by providing faster, more reliable freight transportation.
- Enhances competitiveness of Malaysian industries through lower logistics costs and shorter transit times.

VEHICLE OPERATING COST

- Encourages a modal shift of freight from road to rail.
- Reduces operating costs for logistics operators by lowering dependence on heavy vehicles.
- Decreases heavy vehicle traffic on key roads
- Reduces road congestion and slows road deterioration caused by heavy vehicles.

REDUCTION IN GHG

- Shifts freight transport from road to rail, reducing greenhouse gas emissions.
- Decreases the number of heavy emitting vehicles on the road.
- Lowers CO_2 emissions from the transport sector.
- Supports Malaysia's efforts towards sustainable and low-carbon transportation.

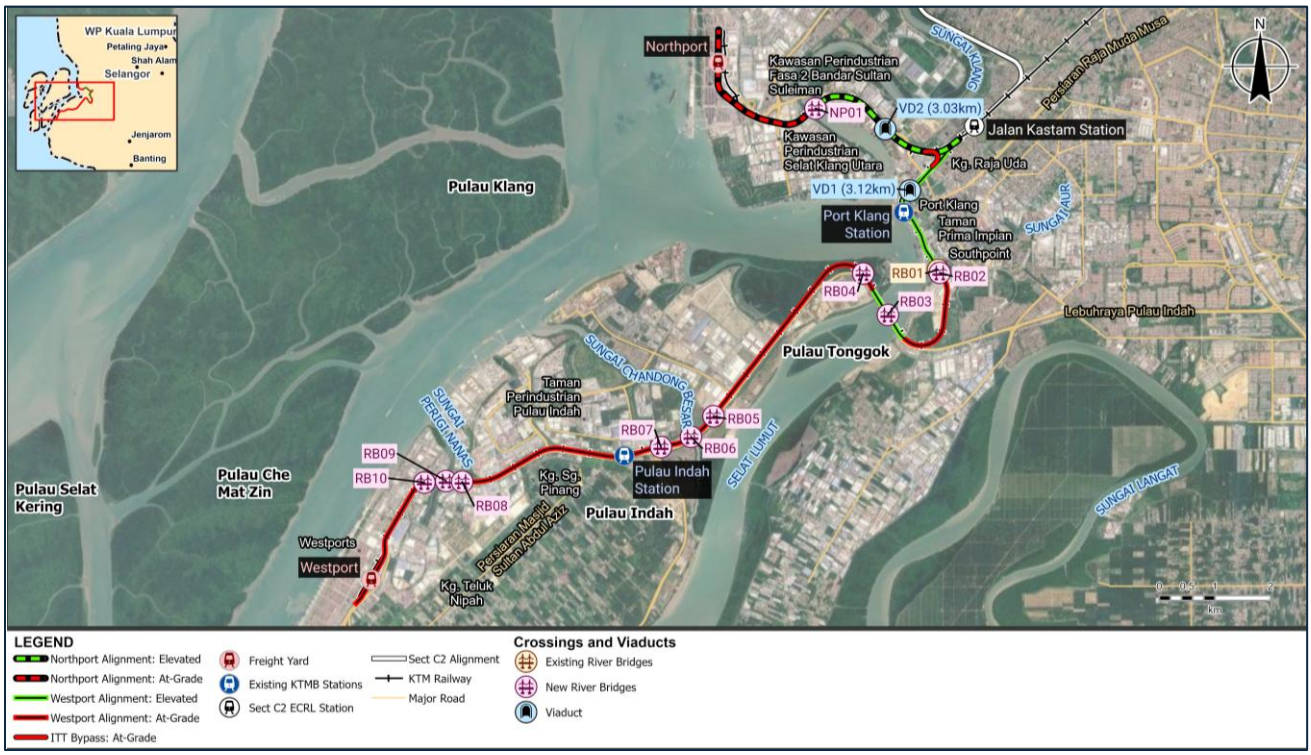
ACCIDENT REDUCTION SAVINGS

- Reduces the number of heavy vehicles on the road network.
- Lowers traffic congestion on major roads.
- Decreases vehicle kilometres travelled annually.
- Reduces the likelihood of road accidents, resulting in improved road safety and accident cost savings.

PROJECT DESCRIPTION

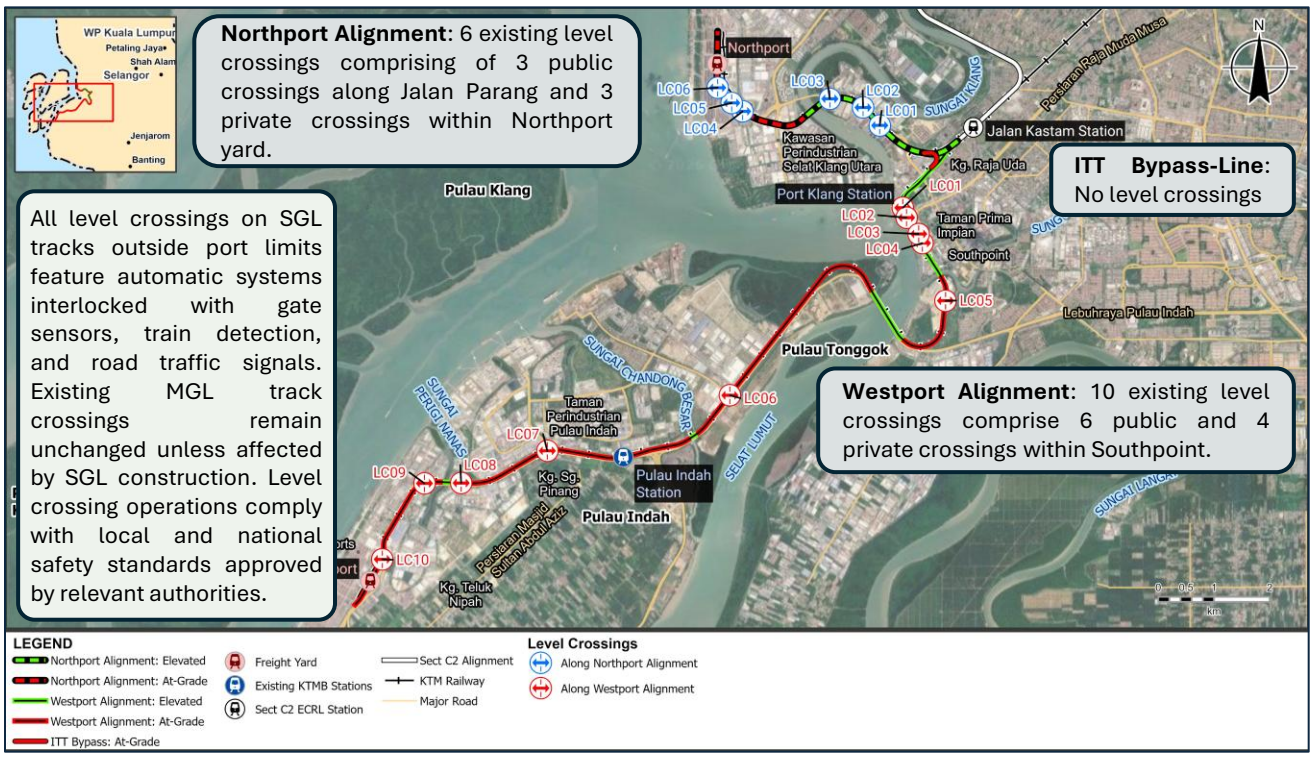
PROJECT COMPONENTS

Bridges and Viaduct



11 land & river crossings and 2 viaducts are planned across both Northport and Westport routes. All structures comply with Chinese codes and Malaysian/British standards, incorporating restraining ballast walls, maintenance walkways, ducts, cabling and drainage systems. There are no bridges or crossings for the ITT bypass line. Key river crossings are at Sg. Klang, Sg. Aur, Selat Lumut, Sg. Chandong Besar and Sg. Perigi Nanas.

Level Crossings



Northport Alignment: 6 existing level crossings comprising of 3 public crossings along Jalan Parang and 3 private crossings within Northport yard.

ITT Bypass-Line: No level crossings

All level crossings on SGL tracks outside port limits feature automatic systems interlocked with gate sensors, train detection, and road traffic signals. Existing MGL track crossings remain unchanged unless affected by SGL construction. Level crossing operations comply with local and national safety standards approved by relevant authorities.

Westport Alignment: 10 existing level crossings comprise 6 public and 4 private crossings within Southpoint.

PROJECT COMPONENTS

Terminal Yards

For both terminal yards, no building demolition will be needed however there will be modification carried out to the empty container yard and laden operation area to accommodate the new development of MG tracks, SG tracks, Rail Mounted Gantry (RMG) Cranes and ECRL system buildings. Rehabilitation of existing tracks will be conducted as needed and its operation within the terminal yard will be retained as per existing arrangement

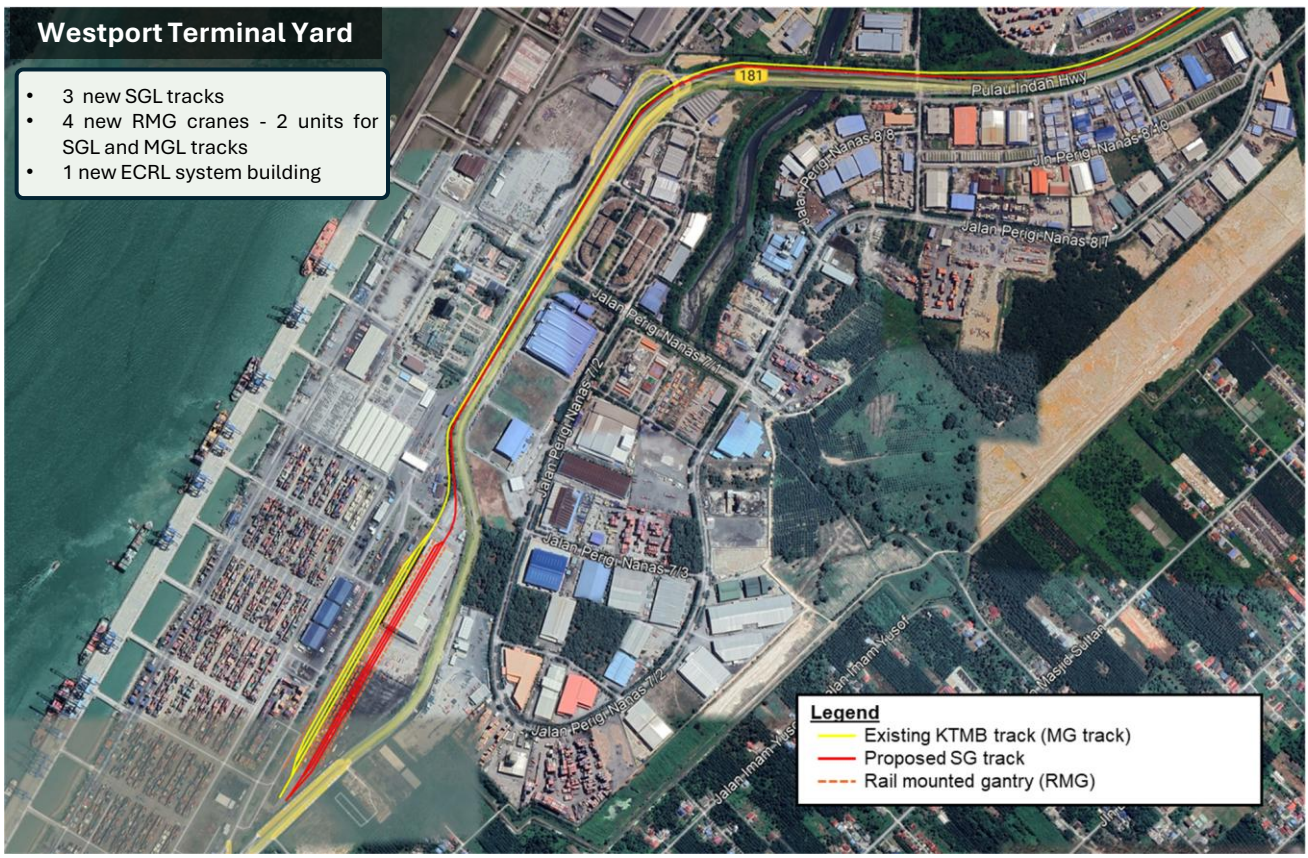
Northport Terminal Yard

- 3 new SGL tracks
- 3 new MGL tracks
- 2 new Rail Mounted Gantry (RMG) cranes
- 1 new ECRL system building



Westport Terminal Yard

- 3 new SGL tracks
- 4 new RMG cranes - 2 units for SGL and MGL tracks
- 1 new ECRL system building



PROJECT DESCRIPTION

PRINCIPAL PROJECT ACTIVITIES

PRE – CONSTRUCTION

- Topographical and As-built Survey
- Utility Detection, Mapping, and Identification
- Utility Protection and Relocation
- Subsurface Investigation and Geotechnical Interpretative Report / Soil investigation
- Building Pre-condition Surveys
- Land acquisition

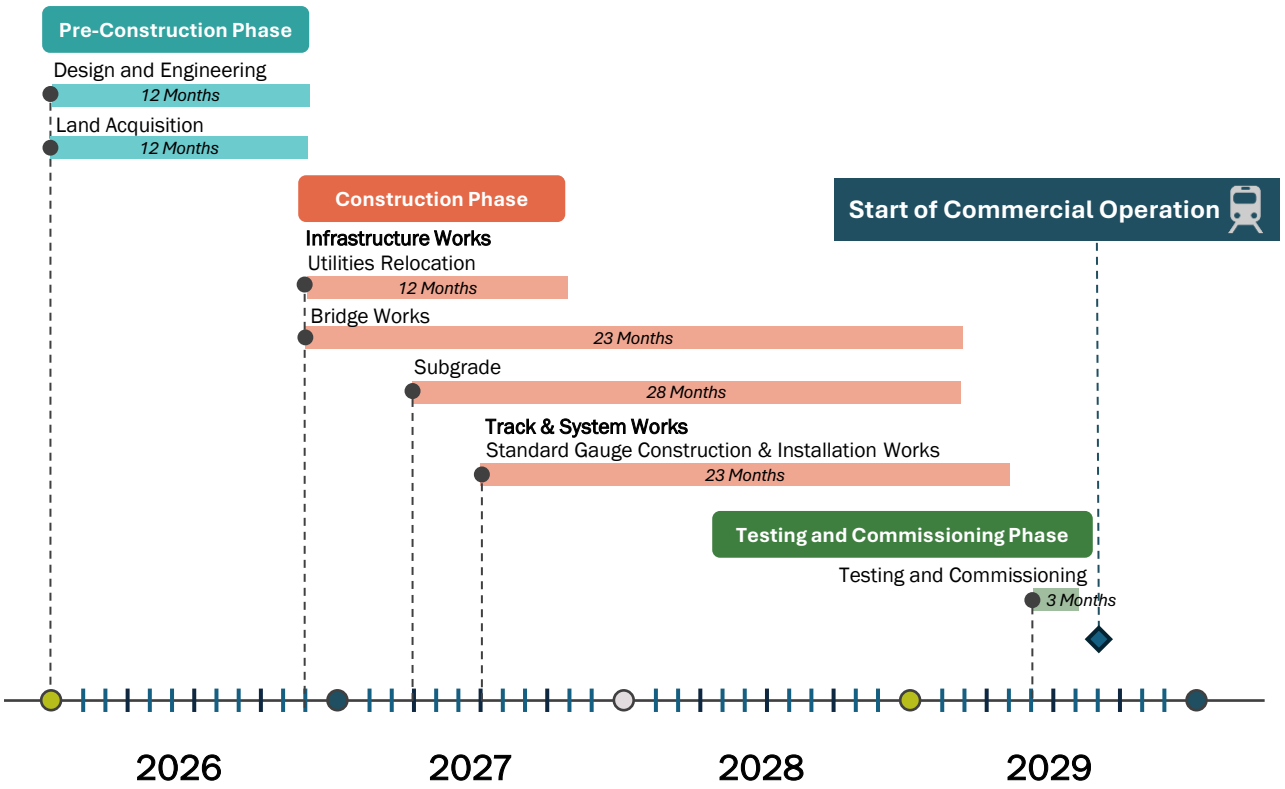
CONSTRUCTION

- Site clearing, structural demolition (if any) and earthworks.
- Land viaduct construction
- River bridge construction
- At grade construction
- System building construction
- Installation of railway tracks and systems
- Construction of temporary facilities (i.e. access road, temporary bridges etc)
- Testing and commissioning

OPERATION

- Train and freight terminal operations

PROJECT IMPLEMENTATION SCHEDULE



TOPOGRAPHY AND TERRAIN

Northport and Westport alignments and ITT Bypass feature a topographically flat ground surface as the entire length of each proposed alignment is within the existing KTMB reserve.

Topography

Northport alignment and ITT bypass line

Elevation: 2 – 12 m above sea level



Westport alignment

Elevation: 2 – 7 m above sea level



Slope Classification

Northport alignment and ITT bypass line

Slope Class: Class I (0–15°)



Westport alignment

Slope Class: Class I (0–15°)



LEGEND

- Northport Alignment: At-Grade
- Northport Alignment: Elevated
- Westport Alignment: At-Grade
- Westport Alignment: Elevated
- ITT Bypass: At-Grade
- Freight Yard
- Sect C2 Station
- Sect C2 Alignment
- Major Road
- KTM Railway

Elevation (m): < 0; 1 - 3; 4 - 6; 7 - 9; 10 - 12; 13 - 15; 16 - 18; 19 - 21; 22 - 24

Slope Class (Degrees): Class 1 (0°-15°); Class 2 (>15°-25°); Class 3 (>25°-35°); Class 4 (>35°)

GEOLOGY

Geology:

Quaternary marine and continental deposits primarily consist of clay, silt, sand, peat, and minor gravel.

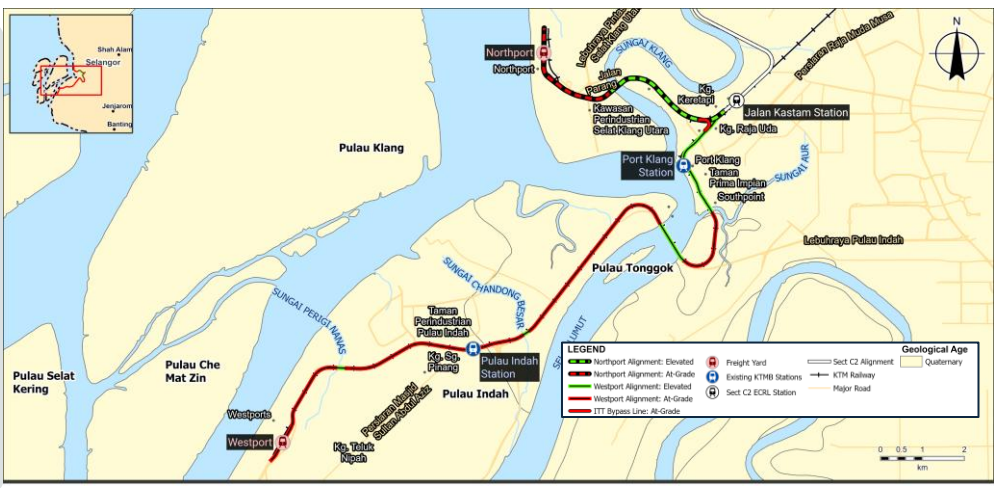
Hydrogeology:

Medium to Very High aquifer potential area

Seismicity:

Modified Mercalli Intensity (MMI): V-VII

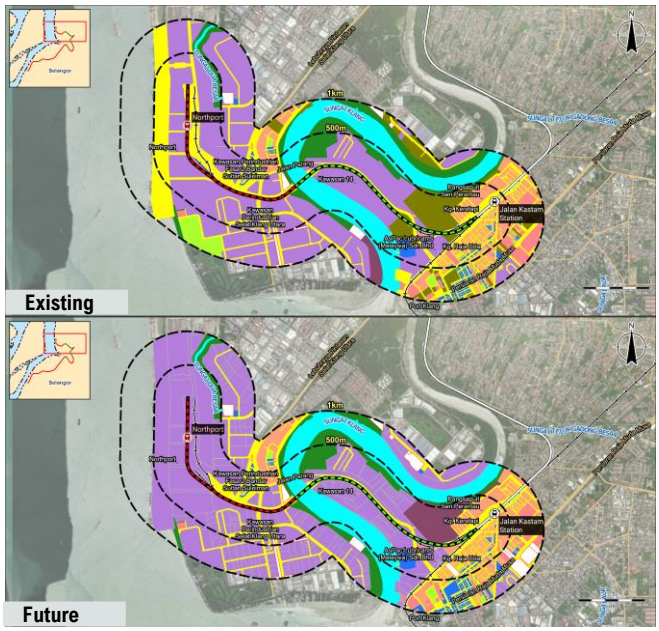
Ground shaking will cause small to large cracks of structures and indoor equipment falling.



LAND USE

The entire ECRL Section D falls within the district of Klang, under the administrative jurisdiction of Majlis Bandaraya Diraja Klang (MBDK). The alignment has been proposed in the Rancangan Tempatan Bandaraya Diraja Klang 2035 (Pengubahan 1), Pelan B2-1.

Northport alignment

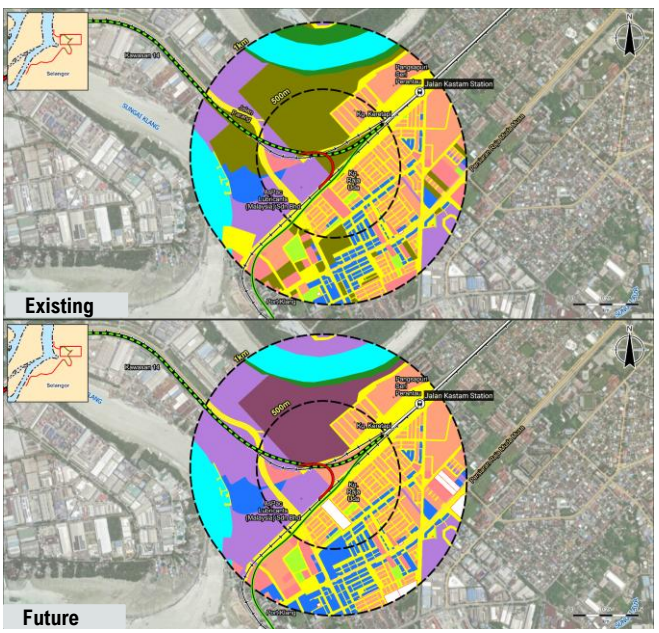


Land Use Category within 1 km	Existing	Future
	%	%
Waterbody	12.54	12.54
Forest	7.36	6.58
Industrial	37.70	49.95
Infrastructure and Utilities	1.09	2.38
Institutional and Public Amenities	2.46	1.64
Commercial	1.71	2.45
Transportation	21.53	13.87
Residential	6.34	7.04
Vacant Land	6.73	0.27
Open Space and Recreational	1.79	0.39
Agriculture	-	-
Coastal	-	-
Mixed Development	0.76	2.89
Total	**100.00**	**100.00**

LEGEND
- Northport Alignment: At-Grade
- Northport Alignment: Elevated
- Freight Yard
- Existing Stations
- Sect C2 Station
- Sect C2 Alignment
- Corridor along the Alignment
- KTM Railway
- Major Road

Zoning Land Use
- Waterbody
- Forest
- Industry
- Commercial
- Mixed Development
- Transportation
- Residential
- Institutional and Public Amenities
- Infrastructure and Utilities
- Open Space and Recreational

ITT Bypass Line



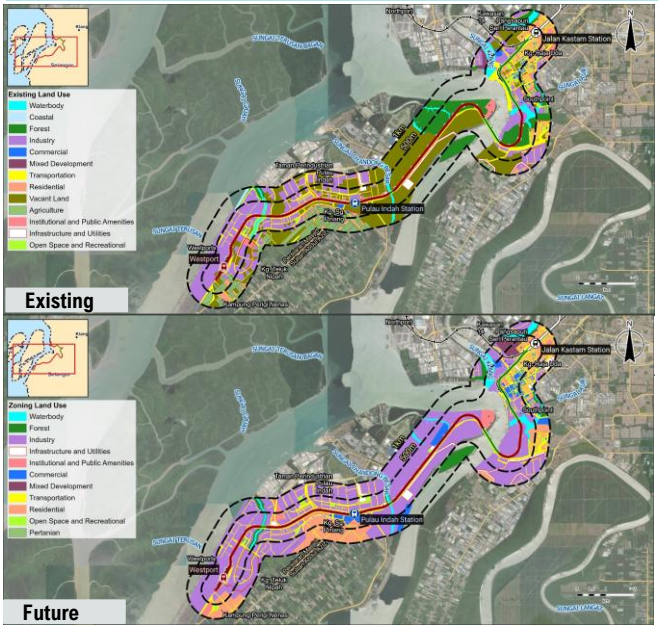
Land Use Category within 1 km	Existing	Future
	%	%
Waterbody	9.89	9.89
Forest	3.45	1.36
Industrial	13.16	20.30
Infrastructure and Utilities	0.10	1.96
Institutional and Public Amenities	5.05	3.84
Commercial	6.54	9.28
Transportation	24.39	23.12
Residential	15.73	17.46
Vacant Land	20.32	0.02
Open Space and Recreational	1.37	1.14
Agriculture	-	-
Coastal	-	-
Mixed Development	-	11.64
Total	**100.00**	**100.00**

LEGEND
- Northport Alignment: At-Grade
- Northport Alignment: Elevated
- Westport Alignment: Elevated
- ITT Bypass Line: At-Grade
- Sect C2 Station
- Sect C2 Alignment
- Corridor along the Alignment
- KTM Railway
- Major Road

Zoning Land Use
- Waterbody
- Forest
- Industry
- Commercial
- Mixed Development
- Transportation
- Residential
- Institutional and Public Amenities
- Infrastructure and Utilities
- Open Space and Recreational

LAND USE

Westport alignment



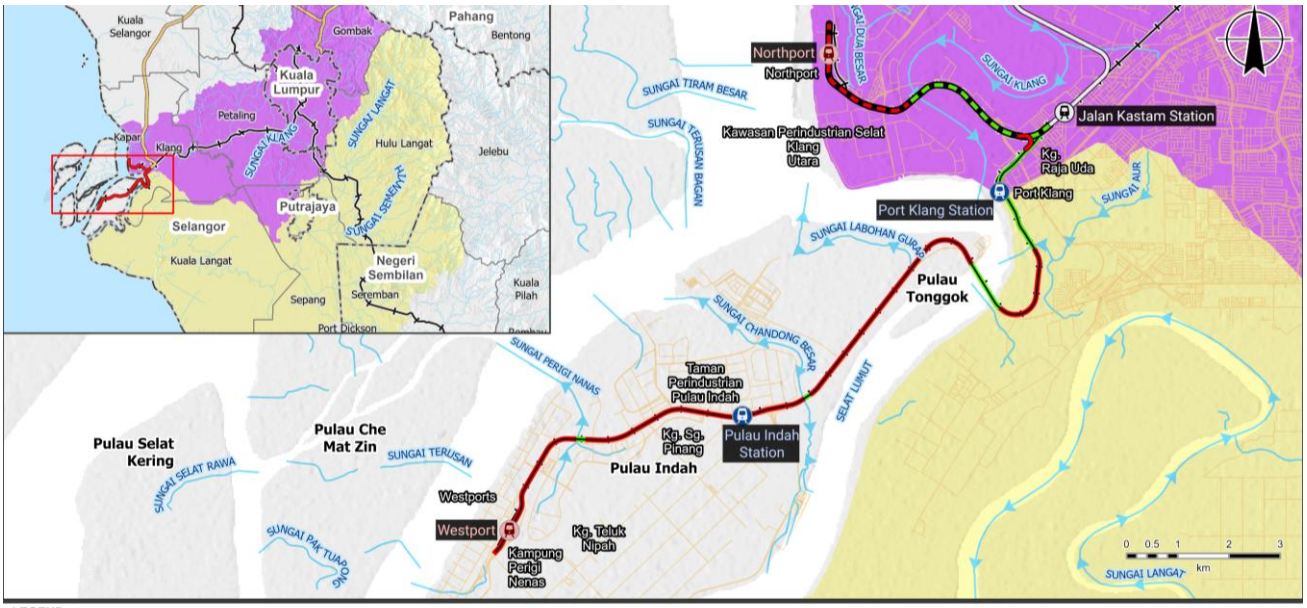
Land Use Category within 1 km	Existing	Future
	%	%
Waterbody	4.19	4.20
Forest	9.87	3.07
Industrial	22.60	53.84
Infrastructure and Utilities	2.38	3.59
Institutional and Public Amenities	1.97	2.57
Commercial	1.10	3.99
Transportation	15.94	14.89
Residential	4.45	0.00
Vacant Land	28.83	11.39
Open Space and Recreational	1.45	0.05
Agriculture	6.58	-
Coastal	0.24	1.13
Mixed Development	0.40	1.27
Total	**100.00**	**100.00**

LEGEND
- Westport Alignment: Elevated
- Westport Alignment: At-Grade
- Freight Yard
- Existing Stations
- Sect C2 Station
- Sect C2 Alignment
- Corridor along the Alignment
- KTM Railway
- Major Road

Zoning Land Use
- Waterbody
- Forest
- Industry
- Commercial
- Mixed Development
- Transportation
- Residential
- Institutional and Public Amenities
- Infrastructure and Utilities
- Open Space and Recreational

HYDROLOGY

The Project is situated within the downstream coastal section of two (2) major river basins, consisting of Sg. Klang and Sg. Langat on the mainland, and on Pulau Indah.

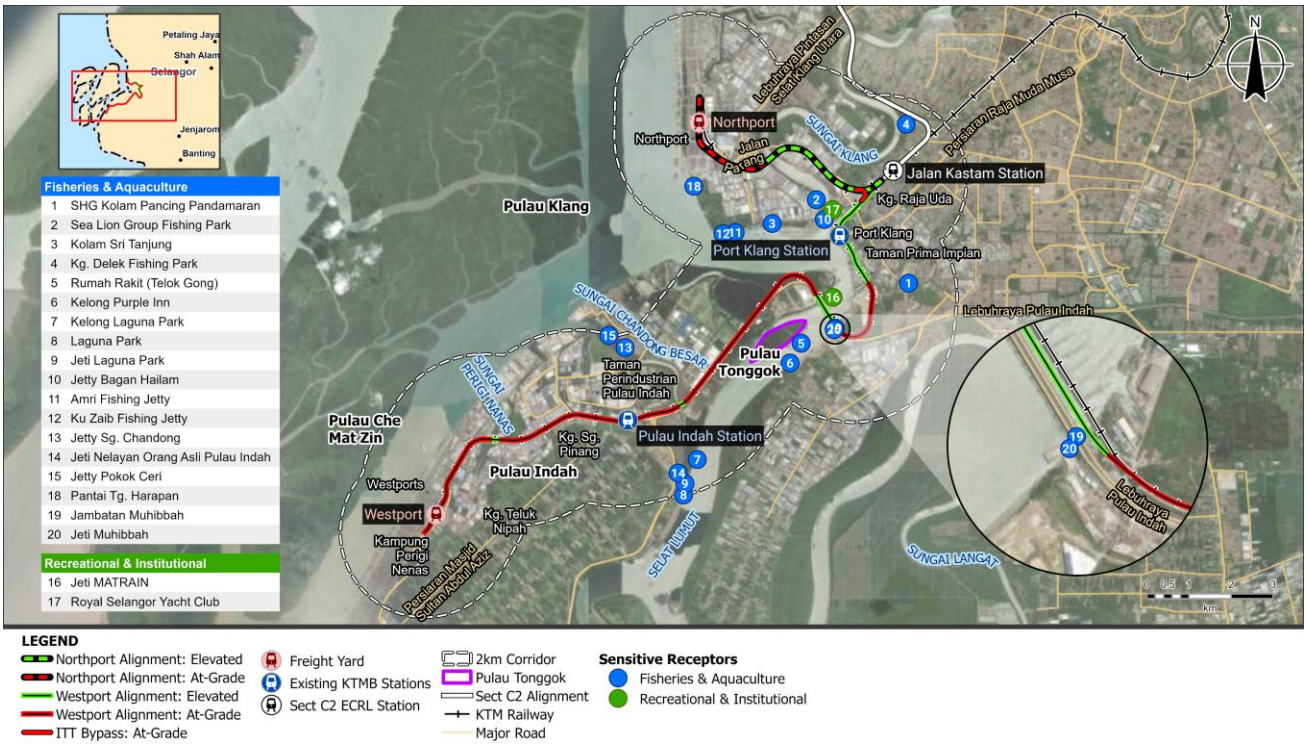


HYDROLOGY

River/ Crossing	Description
Northport alignment (Jalan Kastam – Northport)	
Sg. Klang	• Crossing is located approximately 2.4 km upstream of the Sg. Klang river mouth. • The alignment runs parallel to Sg. Dua Besar as it progresses towards Northport.
Westport alignment (Jalan Kastam – Westport)	
Sg. Aur	• Crossing is located approximately 0.3 km upstream of the Sg. Aur river mouth
Selat Lumut	• Bridge traversing across Selat Lumut that separates Pulau Indah (previously Pulau Lumut) from the mainland
Sg. Labohan Gurap	• The alignment traverses through the upstream catchment of Sg. Labohan Gurap.
Sg Chandong Besar	• Crossing is located approximately 1.9 km from the western inlet of Sg. Chandong Besar
Sg. Perigi Nanas	• Crossing is located approximately 1.1 km upstream of the Sg. Perigi Nanas River mouth.

Water Sensitive Receptors Near the Project

- No potable water supply intake (abstractions) sourcing water from surface water downstream of the Project
- Several near-shore fishing jetties (Jetty Bagan Hailam, Jetty Pokok Ceri and Jetty Sg. Chandong Besar)
- Recreational and institutional facilities (Royal Selangor Yacht Club and Jeti MATRAIN)



HYDROLOGY

Existing Flood Risk Areas

A total of 24 flood risk areas and 8 flood mitigation projects were identified within 3km of the Project site:

Northport alignment:

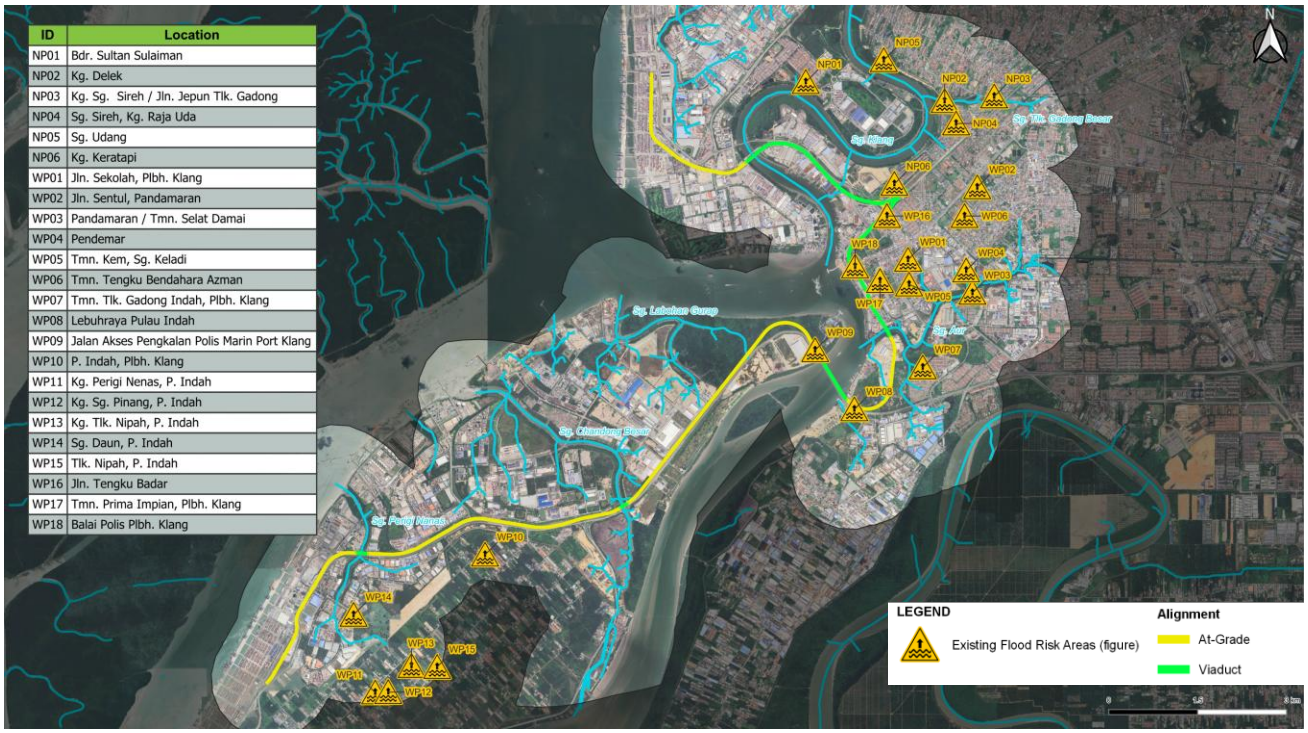
- 6 flood areas
- 2 flood mitigation projects

Westport alignment:

- 18 flood areas
- 6 flood mitigation projects

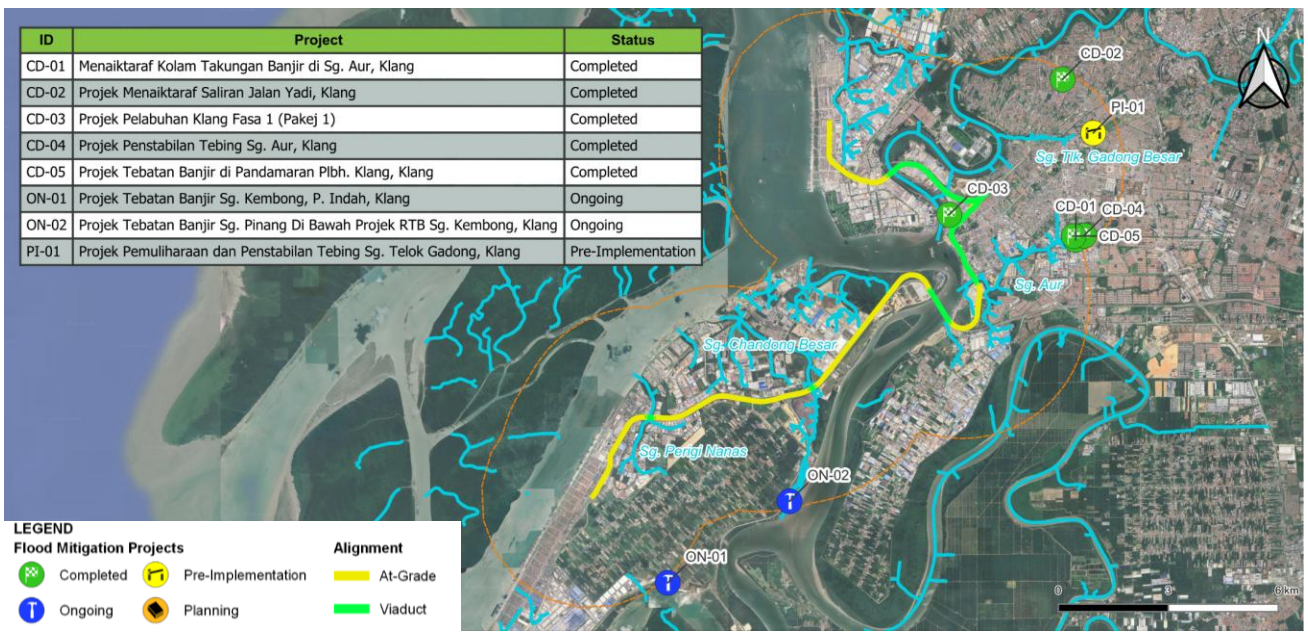
Existing Flood Prone Areas within 3km of Project Alignment

ID	Location
NP01	Bdr. Sultan Sulaiman
NP02	Kg. Delek
NP03	Kg. Sg. Sireh / Jln. Jepun Tlk. Gadong
NP04	Sg. Sireh, Kg. Raja Uda
NP05	Sg. Udang
NP06	Kg. Keratapi
WP01	Jln. Sekolah, Plbh. Klang
WP02	Jln. Sentul, Pandamaran
WP03	Pandamaran / Tmn. Selat Damai
WP04	Pendemar
WP05	Tmn. Kem, Sg. Keladi
WP06	Tmn. Tengku Bendahara Azman
WP07	Tmn. Tlk. Gadong Indah, Plbh. Klang
WP08	Lebuhraya Pulau Indah
WP09	Jalan Akses Pengkalan Polis Marin Port Klang
WP10	P. Indah, Plbh. Klang
WP11	Kg. Perigi Nenas, P. Indah
WP12	Kg. Sg. Pinang, P. Indah
WP13	Kg. Tlk. Nipah, P. Indah
WP14	Sg. Daun, P. Indah
WP15	Tlk. Nipah, P. Indah
WP16	Jln. Tengku Badar
WP17	Tmn. Prima Impian, Plbh. Klang
WP18	Balai Polis Plbh. Klang



Flood Mitigation Projects within 3km of the Project

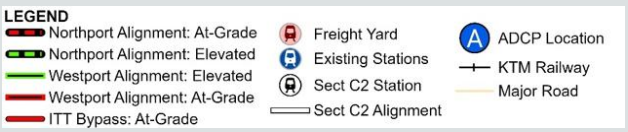
ID	Project	Status
CD-01	Menaiktaraf Kolam Takungan Banjir di Sg. Aur, Klang	Completed
CD-02	Projek Menaiktaraf Saliran Jalan Yadi, Klang	Completed
CD-03	Projek Pelabuhan Klang Fasa 1 (Pakej 1)	Completed
CD-04	Projek Penstabilan Tebing Sg. Aur, Klang	Completed
CD-05	Projek Tebatan Banjir di Pandamaran Plbh. Klang, Klang	Completed
ON-01	Projek Tebatan Banjir Sg. Kembong, P. Indah, Klang	Ongoing
ON-02	Projek Tebatan Banjir Sg. Pinang Di Bawah Projek RTB Sg. Kembong, Klang	Ongoing
PI-01	Projek Pemuliharaan dan Penstabilan Tebing Sg. Telok Gadong, Klang	Pre-Implementation



MARINE HYDRAULICS

Water Level and Currents Measurement

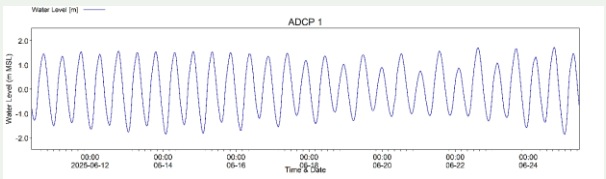
- Measured using Acoustic Doppler Current Profilers (ADCP) at two (2) locations on 10th June until 25th June 2025

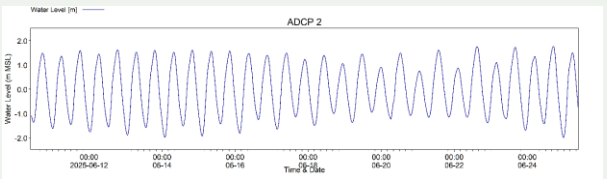




Water Level

- Fluctuated between - 2.0 to + 2.0 m MSL throughout the day

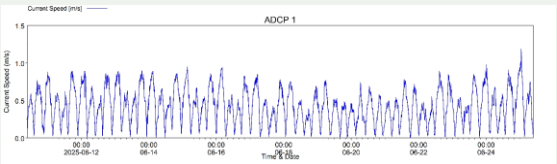


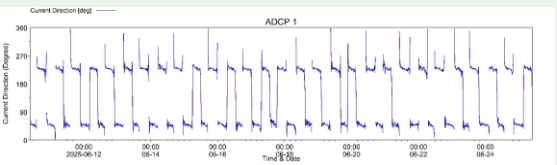


Currents

- During the spring tide period, maximum and mean speeds reached 0.90 m/s and 0.47 m/s, respectively, while during the neap tide period, maximum and mean speeds were 0.77 m/s and 0.34 m/s, respectively.

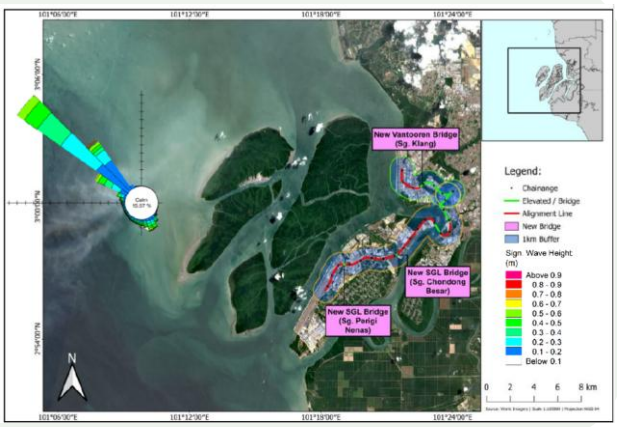
Speed (m/s)	Spring		Neap	
	ADCP1	ADCP2	ADCP1	ADCP2
Max	0.90	0.87	0.77	0.66
Min	0.01	0.01	0.01	0.01
Mean	0.47	0.44	0.34	0.31





Waves

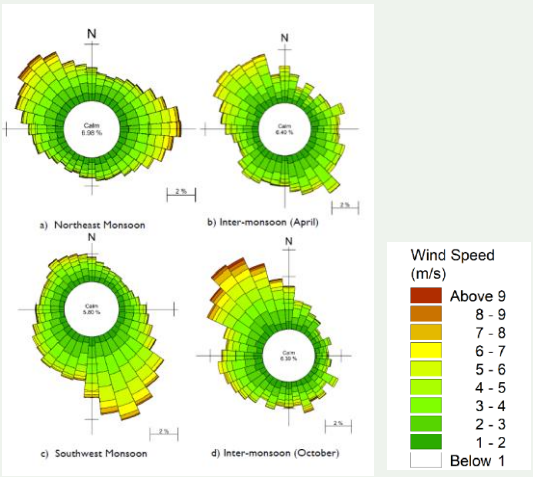
- The wave extraction point and the annual offshore wave were derived from the National Oceanography and Atmospheric Administration (NOAA) WaveWatch III global wave hindcast model, forced by CFSR wind data.
- Waves primarily propagate from the northwest during the Northeast Monsoon, Southwest Monsoon as well as during the inter-monsoonal periods.



MARINE HYDRAULICS

Wind Condition

- Offshore wind data was extracted from the Climate Forecast System Reanalysis (CFSR) wind dataset.
- The most predominant wind directions are northwest, southeast and west.
- During the Northeast Monsoon, the north-westerly wind is dominant.
- The predominant wind direction during the Southwest Monsoon is from the southeast.
- During the inter-monsoon periods, the winds primarily come from the northwest.



Tides

- Tidal information obtained from the Malaysian Tide Tables published by the National Hydrographic Centre, Royal Malaysian Navy.
- The tidal fluctuations are characterised as mixed but mainly semi-diurnal. The maximum, spring and neap tidal ranges for Port Klang are 5.82, 4.11 and 1.37 m respectively.

Tidal Plane	Level (m CD)
Highest Astronomical Tide (HAT)	5.82
Mean High Water Spring (MHWS)	5.09
Mean High Water Neap (MHWN)	3.72
Mean Sea Level (MSL)	3.03
Mean Low Water Neap (MLWN)	2.35
Mean Low Water Spring (MLWS)	0.98
Lowest Astronomical Tide (LAT)	0.00

Total Suspended Solids

- TSS data were obtained from 5 sampling locations at mid-depth during flood and ebb flows covering spring and neap tidal conditions
- The maximum and mean TSS concentrations for the samples collected during spring period were higher, especially at Sungai Chandong Besar (TSS3 and TSS5).
- For neap period, the concentrations were of relatively similar magnitude.
- TSS concentrations at stations TSS3 and TSS5 are higher could be attributed to strong currents within the river mouth and the passage of fishing boats in the vicinity of the sampling locations.



Date	Tide	TSS Concentration (mg/L)				
		TSS 1	TSS 2	TSS 3	TSS 4	TSS 5
Spring Period						
11 June 2025	Flood	81	19	208	16	42
12 June 2025		81	30	82	23	121
13 June 2025		45	48	36	26	182
11 June 2025	Ebb	7	14	38	7	142
12 June 2025		19	21	73	23	129
13 June 2025		14	13	51	20	123
Neap Period						
18 June 2025	Flood	33	31	15	5	26
19 June 2025		18	21	30	3	31
20 June 2025		21	10	34	11	33
18 June 2025	Ebb	25	19	20	7	18
19 June 2025		13	13	16	1	14
20 June 2025		13	7	10	23	13

MARINE HYDRAULICS

Bed Sediment

- Material collected along the shoreline is generally sand and mud.
- Specific gravity: 2.53 - 2.64
- Bulk density: 1.20 – 1.59 Mg/m^3
- Dry density: 0.34 – 1.05 Mg/m^3

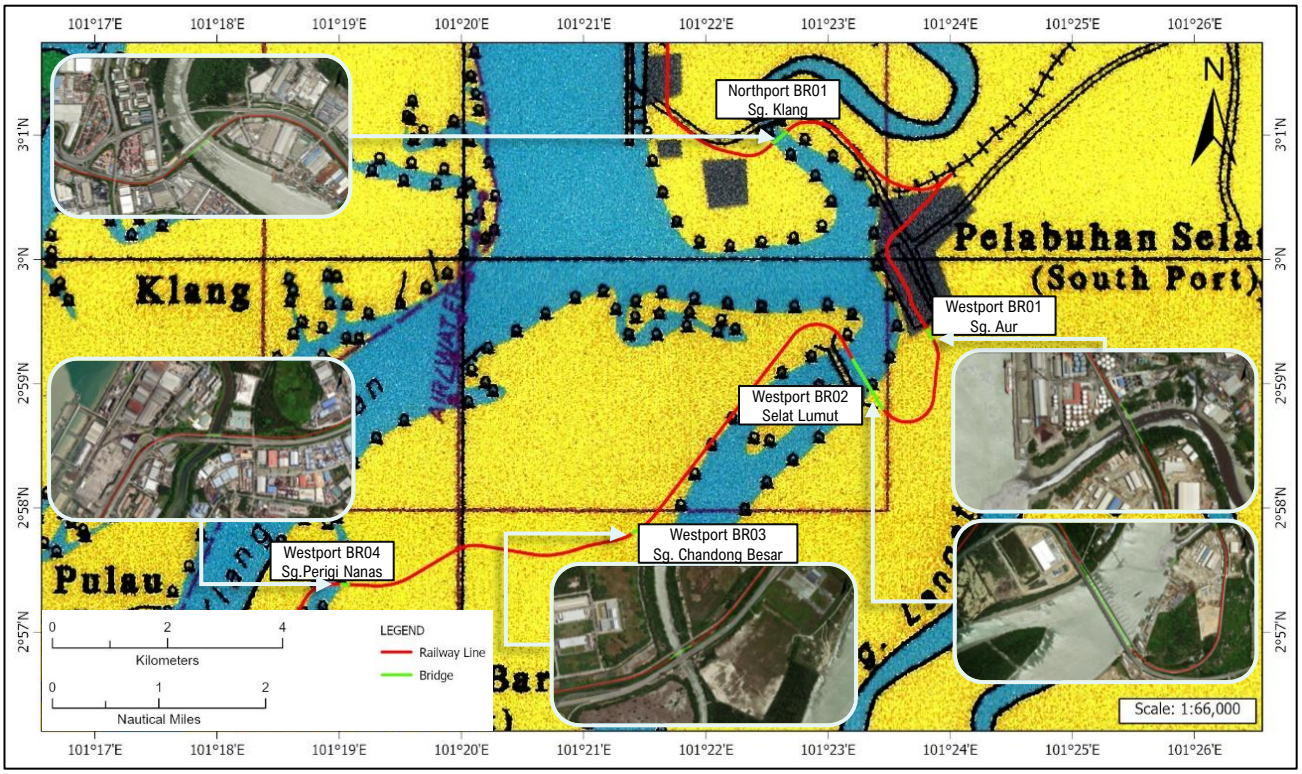


MARINE NAVIGATION SAFETY

Marine Risk Assessment (MRA) for ECRL Section D has been exempted by Malaysia Marine Department as the new bridges will maintain the existing vertical and horizontal clearances, with no significant impact on vessel navigation at all crossings. However, Marine Traffic Navigation Study (MTNS) has been carried out for the purpose of this EIA.

River Crossing Bridge Location

- Five (5) ECRL Bridges crossing (Northport: Sg Klang; Westport: Sg. Aur, Selat Lumut, Sg. Chandong Besar & Sg. Perigi Nanas)

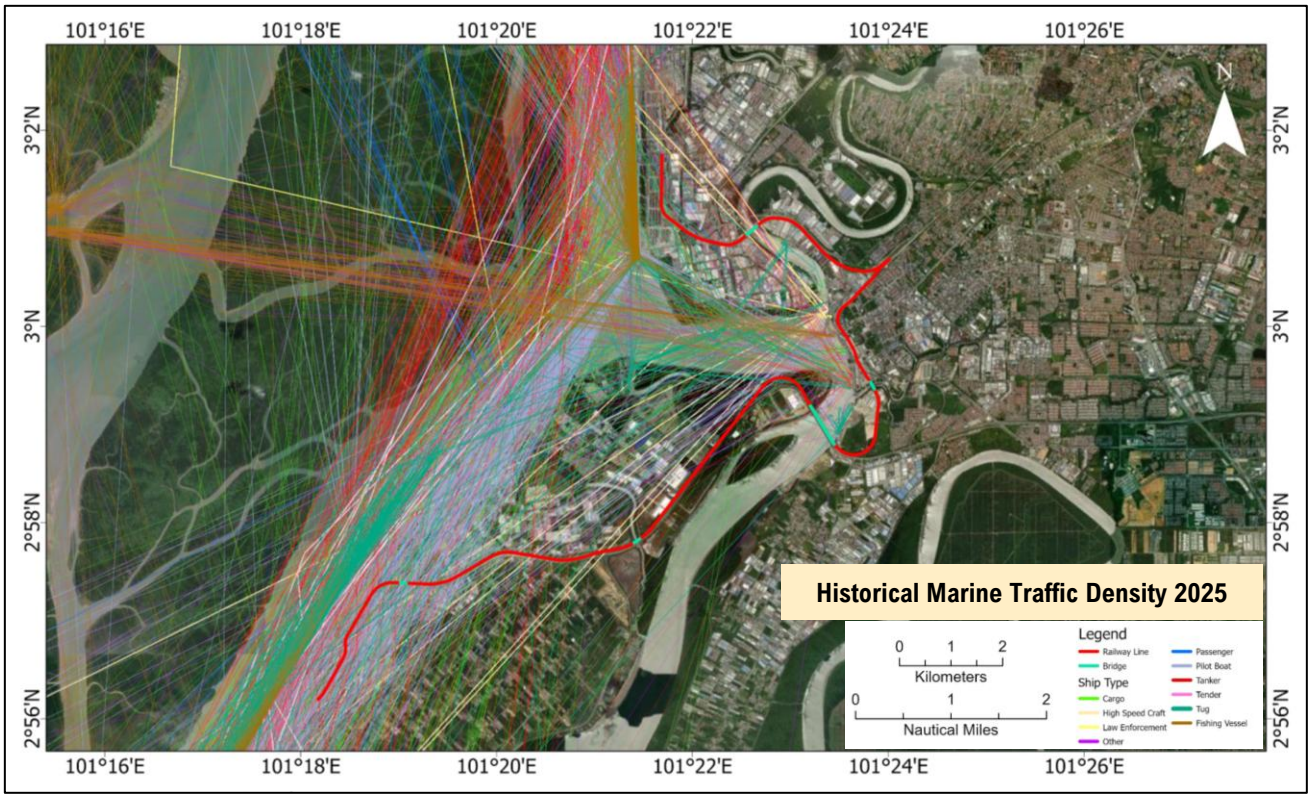


MARINE NAVIGATION SAFETY

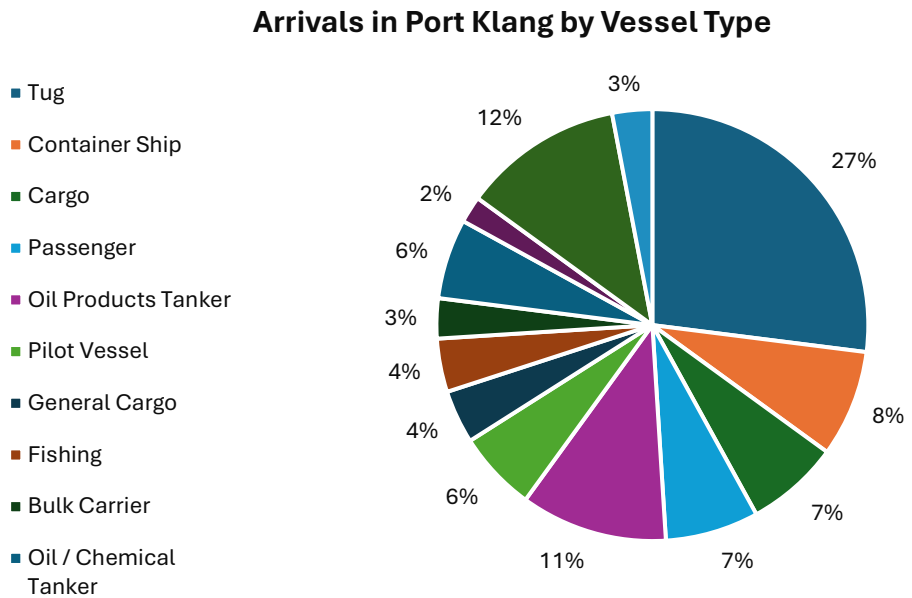
Marine Traffic and Condition

Realtime Automatic Identification System (AIS) Marine Traffic

Real-time AIS marine traffic revealed that traffic density is generally higher along the main navigation routes and port operational areas of Northport, Westport and Southpoint, while the immediate Project area experiences significantly lower vessel activity. The existing road and rail bridges at Selat Lumut and Sg Klang have low vertical clearances, thus only small vessels such as fishing boats and law enforcement crafts are able to pass through.



Traffic Movement for Week 15 (April) 2026

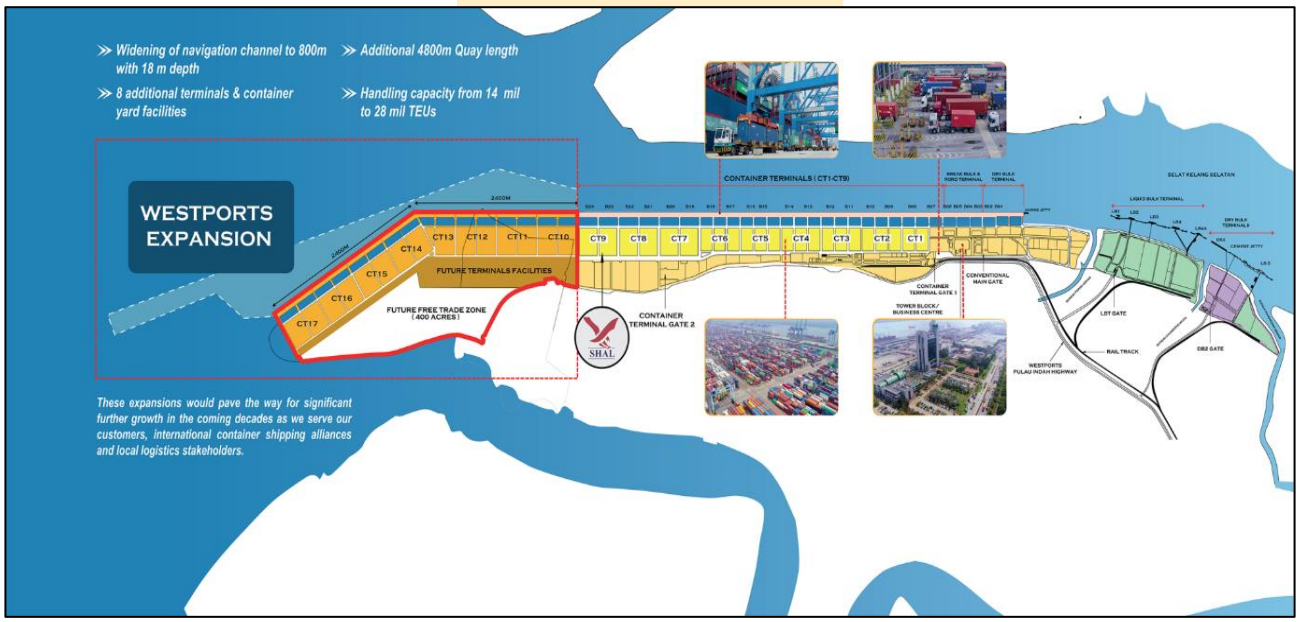


MARINE NAVIGATION SAFETY

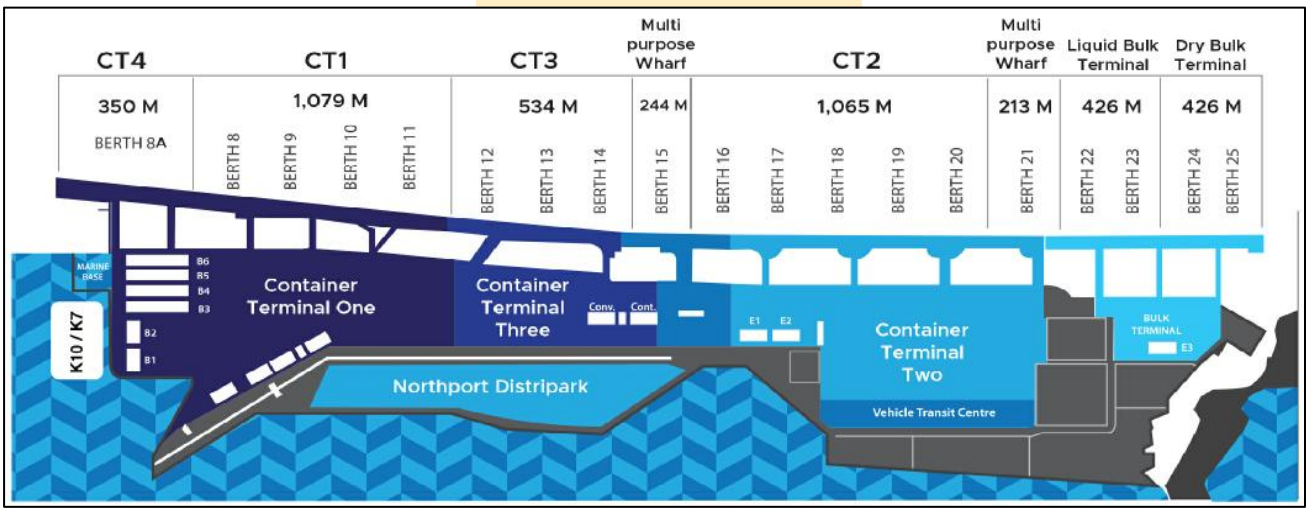
Existing Marine Operations Within Port Limit

- Port Klang is served by three major gateways: Northport, Southpoint, and Westport. There are 19 berths in Northport, 8 in Southpoint and 32 in Westport.

Westports (M) Sdn Bhd



Northport (M) Sdn Bhd



Port Information			
1.	Port Facility Name	Westport, Port Klang, Malaysia	Northport
2.	Operator	Westports (M) Sdn Bhd	Northport (Malaysia) Bhd
3.	Headquarters & Postal Address	P.O. BOX 266 Pelabuhan Barat, Pulau Indah, Pelabuhan Klang, 42009 Selangor, Malaysia	Jalan Pelabuhan, Pelabuhan Utara, 42000 Port Klang, Selangor Darul Ehsan, Malaysia
4.	Port ID No	MYPKG - 0004	MYPKG-0002
5.	Grid References	Latitude 02° 57 N / Longitude 101° 18.5' E	Latitude 03° 01' N / Longitude 101° 22.0' E
6.	Statement of Compliance	6105/PKA/WESTP/2019	6105/PKA/NRTHP/2024

MARINE NAVIGATION SAFETY

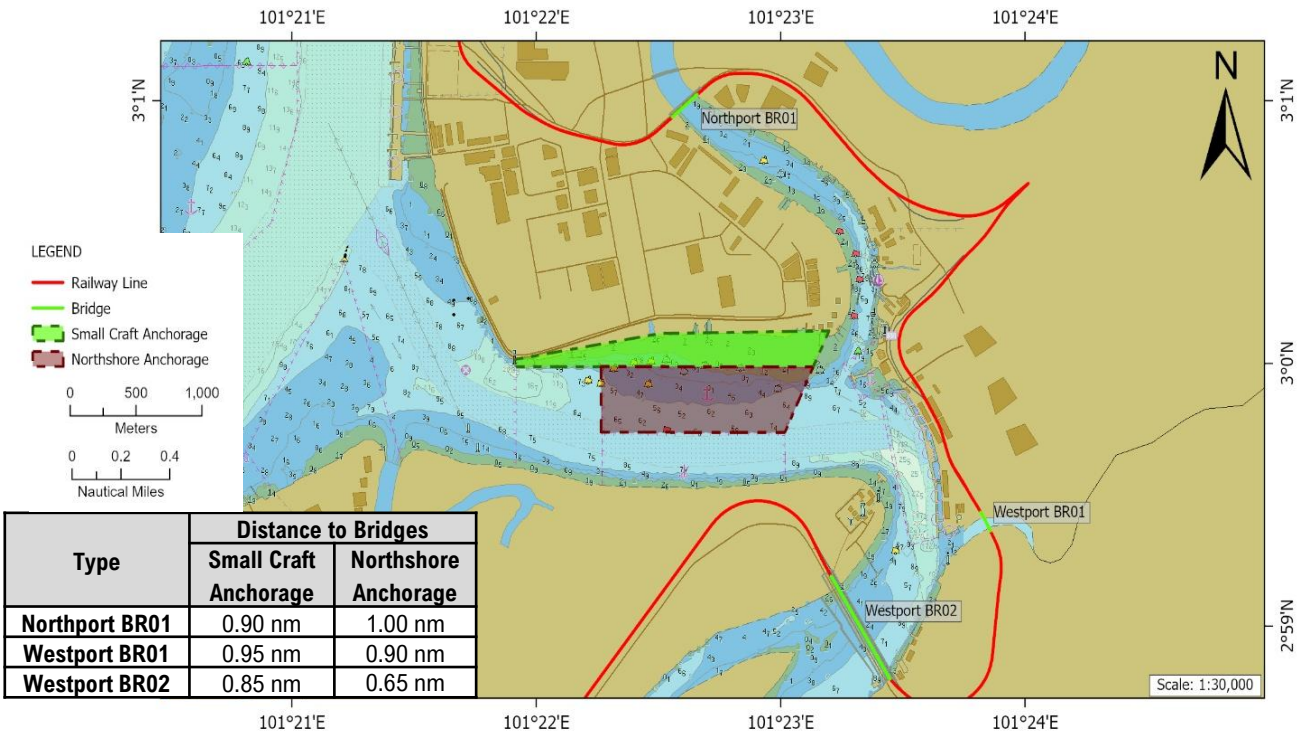
List of Ports and Jetties Within Port Klang Port Limit

- There are twenty-two (22) existing marine activity zones in the area.



Anchorage Area within Port Klang

- There are two (2) anchorage areas within the Port Klang Port Limit.



Type	Distance to Bridges	
	Small Craft Anchorage	Northshore Anchorage
Northport BR01	0.90 nm	1.00 nm
Westport BR01	0.95 nm	0.90 nm
Westport BR02	0.85 nm	0.65 nm

MARINE NAVIGATION SAFETY

Safety Accident Assessment

The data on maritime accidents in the Central Region between 2021 and 2025 were sourced from the Marine Department Malaysia's official website. During this period, 34 accidents were reported. In 2021, 9 accidents were reported, dropping significantly to just 3 accidents in 2022. The numbers increased again in 2023, with 8 accidents, and remained steady in 2024 and 2025, with 7 accidents reported each year.

Statistics of Vessel Accident Cases in Each Peninsular Region, Year 2021 – 2025

Region	2021	2022	2023	2024	2025
Northern	14	3	4	2	1
Southern	6	4	8	8	10
Central	9	3	8	7	7
Eastern	7	11	10	6	11

TERRESTRIAL ECOLOGY

The alignment does not traverse through any Permanent Reserved Forest (PRF). The main areas of ecological interest are mangroves along the alignment. The mangrove areas identified within the 1km scoping radius are at the lower reach of Klang River, northern part of Pulau Indah and fringes near Selat Lumut adjacent to the Pulau Tonggok PRF. Pulau Indah has already lost large areas of mangroves due to degazettement or removal from legal protection of the surrounding forest reserves, subsequent land reclamation and other development activities.

Flora Composition

- A total of six flora species from three families were documented along the transect line based on the findings of flora survey.
- The secondary urban green areas are generally dominated by a mix of invasive alien species, naturalized weeds, and a few native pioneer shrubs and trees.

List of Recorded Flora Species

Family	Common Name	Scientific Name	IUCN Conservation Status[1]	Malaysia Plant Red List (2021)[2]	Global Invasive Species Database
Euphorbiaceae	Mahang Putih	*Macaranga tanarius*	LC	-	-
	Ubi Kayu	*Manihot esculenta*	NE	NE	-
Fabaceae	Ear-leaf Acacia	*Acacia auriculiformis*	LC	-	Invasive
	Petai Belalang	*Leucaena leucocephala*	LC	-	Invasive
	Rain Tree	*Samanea saman*	LC	-	Invasive
Moraceae	*Ficus* sp.		LC	-	-

[1] IUCN Red List
LC – Least Concern

[2] Malaysia Plant Red List (2021)
NE – Not evaluated


Ubi Kayu (*Manihot esculenta*)

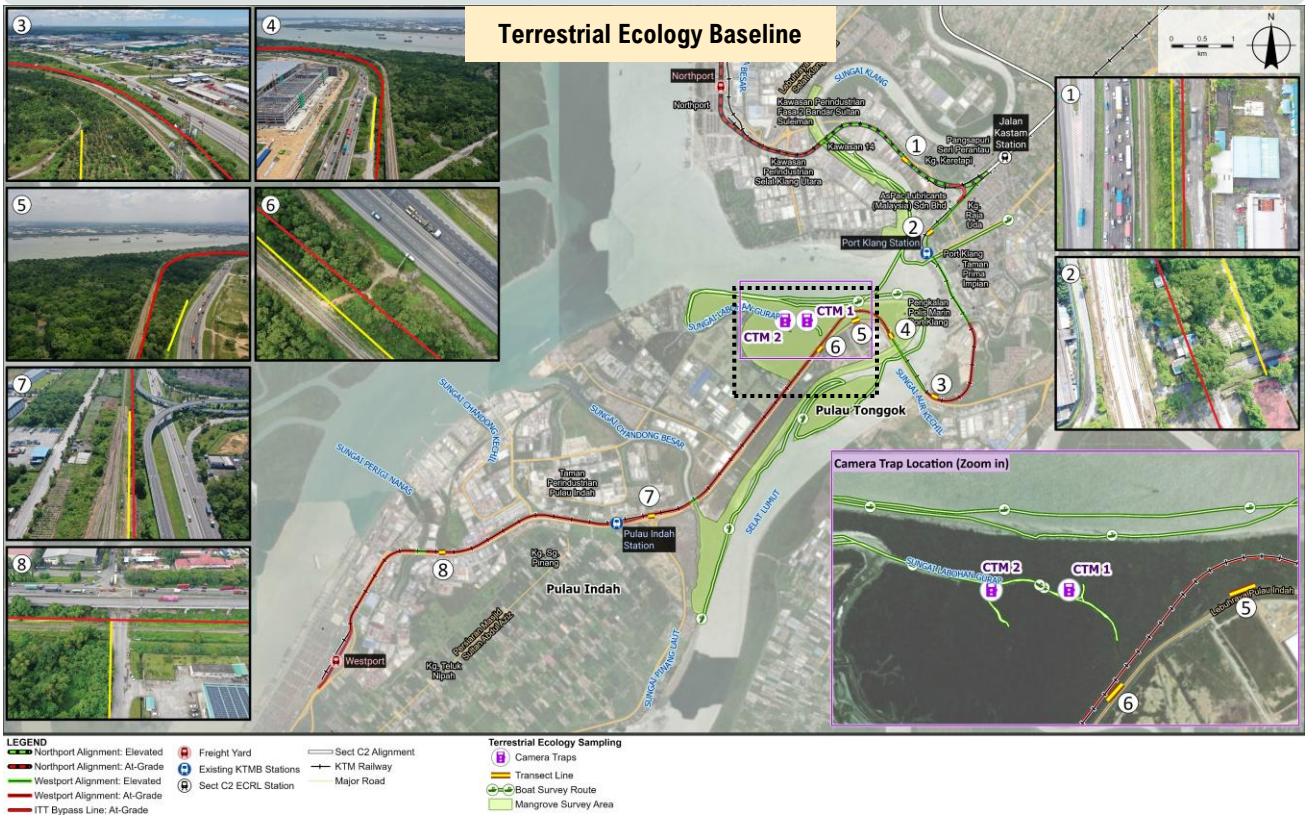

Ear-leaf Acacia (*Acacia auriculiformis*)


Petai Belalang (*Leucaena leucocephala*)

TERRESTRIAL ECOLOGY

Fauna Composition

- Two (2) camera traps deployment for one month, and eight (8) line transect surveys were carried out.
- A total of 56 species from three taxa were recorded during the fauna composition survey which consists of five (5) mammals, 43 avifauna and eight (8) herpetofauna species.
- A total of 62 Human – Wildlife Conflict (HWC) cases were recorded in 2022, followed by 30 cases in 2023 and 96 in 2024. There are only two identified species involved in the 2024 HWC cases: Long-tailed macaque and monitor lizard.



Mammal

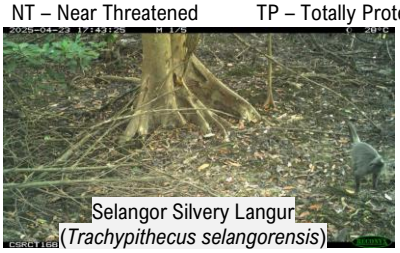
List of Recorded Mammal Species

Family	Common Name	Species	IUCN Conservation Status[1]	Red List of Mammals for PM[3]	Protection Status[2]	Location
Cercopithecidae	Selangor Silvery Langur	*Trachypithecus selangorensis*	NT	-	-	CTM 2
	Long-tailed Macaque	*Macaca fascicularis*	EN	LC	P	CTM 1 &CTM 2
Mustelidae	Smooth-coated Otter	*Lutrogale perspicillata*	VU	LC	TP	Pulau Tonggok
Sciuridae	Plantain Squirrel	*Callosciurus notatus*	LC	LC	-	Transect 2,4,5 & 6
Viverridae	Common Palm Civet	*Paradoxurus musangus*	LC	LC	P	CTM 2

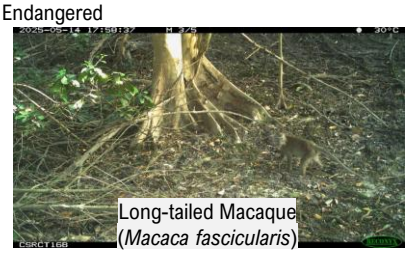
[1] IUCN Red List
LC – Least Concern
NT – Near Threatened

[2] Wildlife Conservation (Amendment) Act 2022 (Act A1646)
P – Protected
TP – Totally Protected

[3] Peninsular Malaysia Red List
VU - Vulnerable
EN – Endangered


Selangor Silvery Langur (*Trachypithecus selangorensis*)


Common Palm Civet (*Paradoxurus musangus*)


Long-tailed Macaque (*Macaca fascicularis*)

TERRESTRIAL ECOLOGY

Avifauna

- A total of 42 avifauna species from 25 families have been documented in this survey.
- All species are classified as Least Concern (LC) in the IUCN Red List, except the Lesser Adjutant (*Leptoptilos javanicus*) that is classified as Near Threatened (NT) and the Javan Myna (*Acridotheres javanicus*) that is classified as Vulnerable (VU).
- Based on the BirdLife International Migratory Status, 12 out of the total species recorded are fully migratory species, whereas the rest are non-migratory species.


Lesser Adjutant (*Leptoptilos javanicus*)


Common Sandpiper (*Actitis hypoleucos*)


Ashy Tailorbird (*Orthotomus ruficeps*)

Herpetofauna

- A total of eight (8) herpetofauna species have been documented in this survey.
- According to the International Union for Conservation of Nature (IUCN), all of the recorded species are classified as Least Concern (LC).
- All of the species are not listed in the Wildlife Conservation Act 716, except for the Asian Water Monitor (*Varanus salvator*) that is listed as Protected (P).

List of Recorded Herpetofauna Species

Family	Common Name	Species	IUCN Conservation Status[1]	Protection Status[2]
Agamidae	Garden Fence Lizard	*Calotes versicolor*	LC	-
Gekkonidae	Common House Gecko	*Hemidactylus frenatus*	LC	-
	Spotted House Gecko	*Gekko monarchus*	LC	-
Scincidae	Mangrove Skink	*Emoia atrocostata*	LC	-
Varanidae	Asian Water Monitor	*Varanus salvator*	LC	P
Bufonidae	Asian Common Toad	*Duttaphrynus melanostictus*	LC	-
Dicroglossidae	Paddy Field Frog	*Fejervarya limnocharis*	LC	-
Microhylidae	Banded Bullfrog	*Kaloula pulchra*	LC	-

1 IUCN Red List
LC – Least Concern

2 Wildlife Conservation Act 716
P – Protected


Garden Fence Lizard (*Calotes versicolor*)


Mangrove Skink (*Emoia atrocostata*)

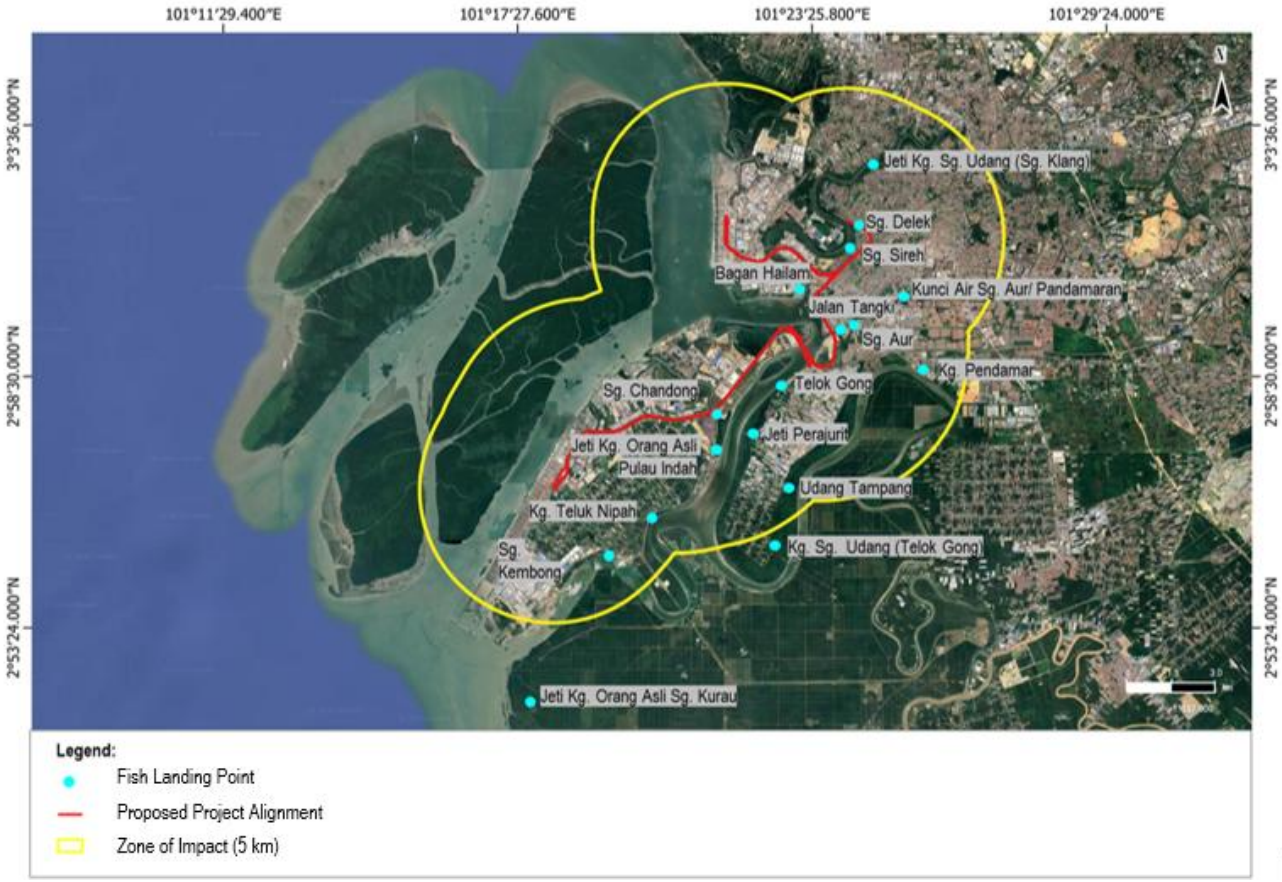

Banded Bullfrog (*Kaloula pulchra*)

FISHERIES

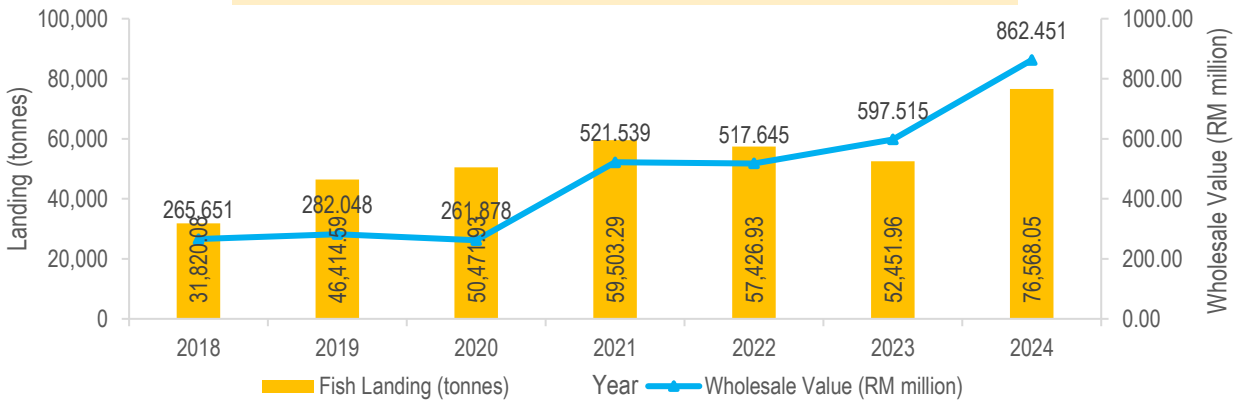
Marine Capture Fisheries at the Study Area

- There were 16 fish landing points within study area of 5 km radius from the proposed project alignment.
- Based on Department of Fisheries Selangor data, In 2024 there were a total of 217 licensed fishermen recorded in the study area.
- Based on the surveys carried out, the total number licensed and unlicensed fishermen at the study area were approximately 776 fishermen.
- The fishermen at the study area operated within Zone A, which is allocated to those operating artisanal fishing gears and extends up to 8 nm from the shoreline.

Fish Landing Points Within the 5 km Zone of Impact

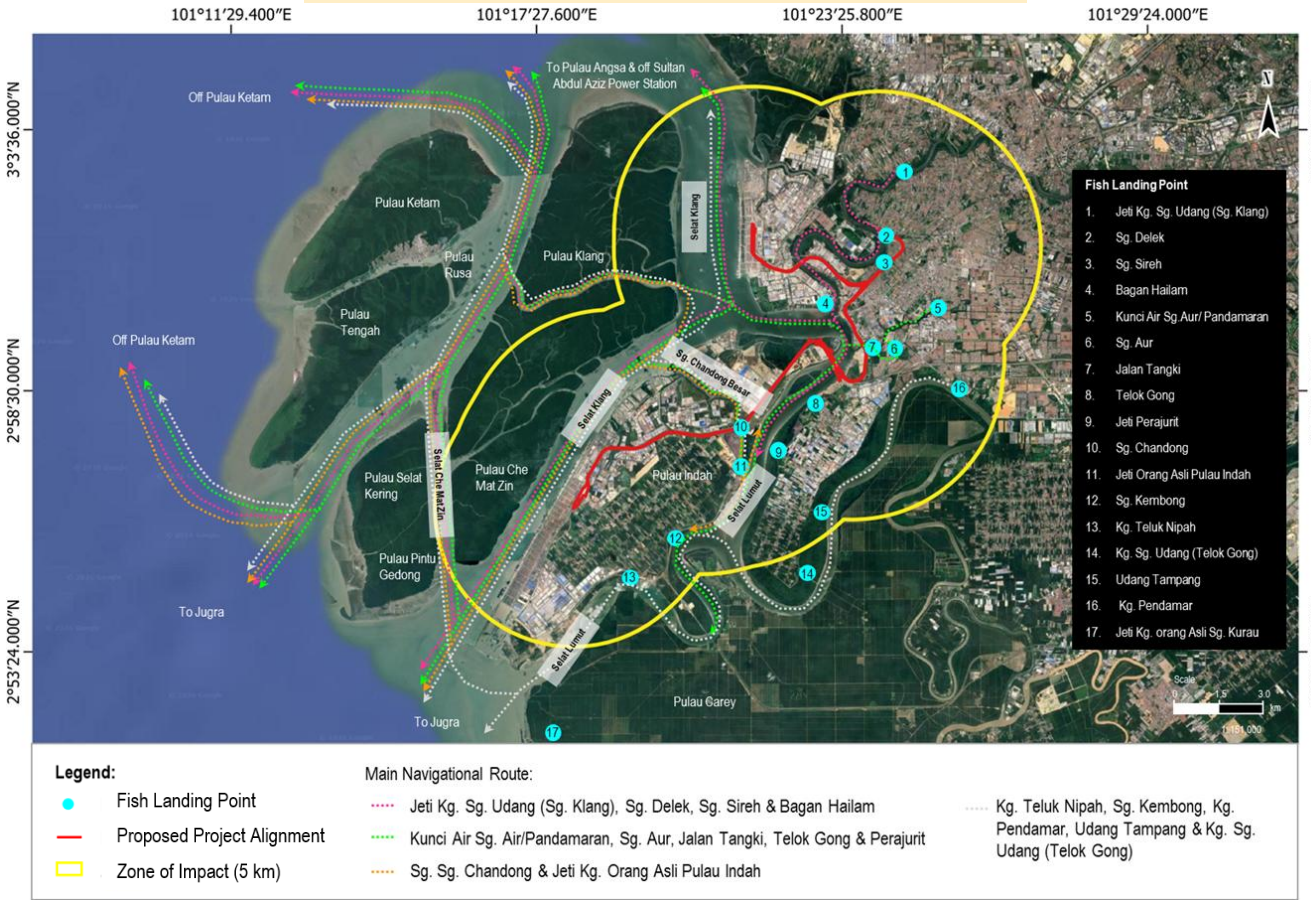


Trend of Fish Landings (Tonnes) in Selangor from 2018 - 2024



FISHERIES

Main Navigational Routes for Fishermen at the Study Area



Catch Profile

- Most common pelagic fish caught were Bawal (*Parastromateus niger*, *Pampus argenteus*, *Pampus chinensis*, *Pampus* spp.), Senangin (*Polynemus* spp., *Eleutheronema tetradactylum*, *Polydactylus sextarius*), Kembong (*Rastrelliger kanagurta*), Tenggiri (*Scomberomorus* spp.), Cincaru (*Megalaspis cordyla*) and Selangat (*Anodontostoma* spp.).
- As for demersal fish, the major species includes Gelama (*Johnius* spp., *Pennahia* spp., *Otolithes* spp.), Siakap (*Lates calcarifer*), Duri (*Arius* spp., *Batrachocephalus* sp., *Ketengus typus*, *Osteogeneiosus* spp.), Kurau/Senohong (*Leptomelanosoma indicus*), Semilang (*Plotosus* spp.), Belanak (*Mugil* spp., *Chelon* spp., *Ellochelon* spp., *Liza* spp., *Valamugil* spp., *Planiliza* spp.), and Pari (*Himantura* spp., *Gymnura* spp., *Dasyatis* spp.).
- Dominant shrimps includes Udang Putih (*Penaeus indicus*, *Penaeus latisulcatus*) and Udang Kulit Keras (*Parapenaeopsis sculptilis*)
- Main crab species caught was Ketam Renjong (*Portunus pelagicus*).
- The main shellfish collected were Lokan (*Geloina expansa*) and Siput Sedut (*Cerithidea obtusa*).

Aquaculture

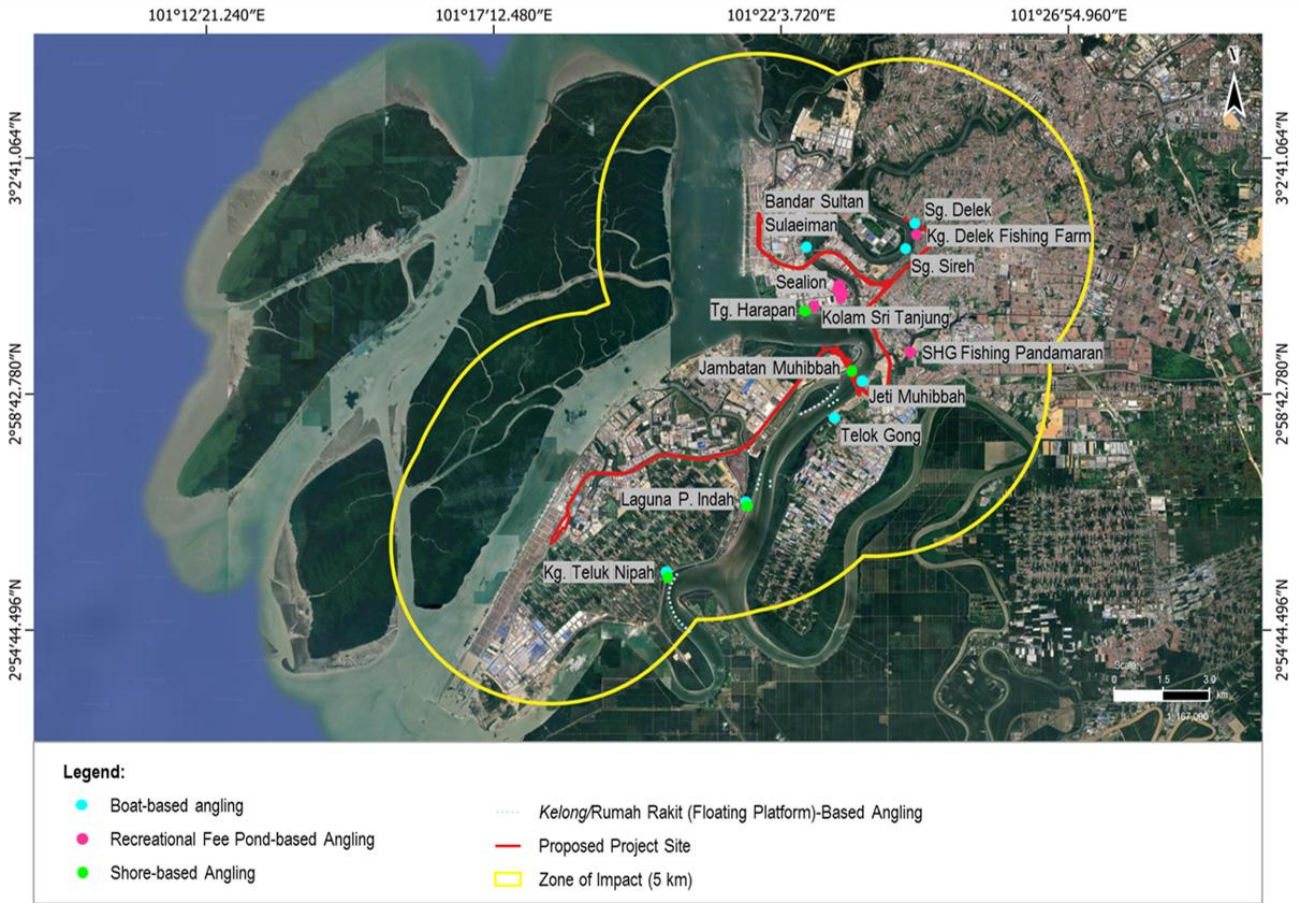
- According to Department of Fisheries Selangor, there were no aquaculture activities undertaken within 5 km radius of the proposed project site

Recreational Fisheries

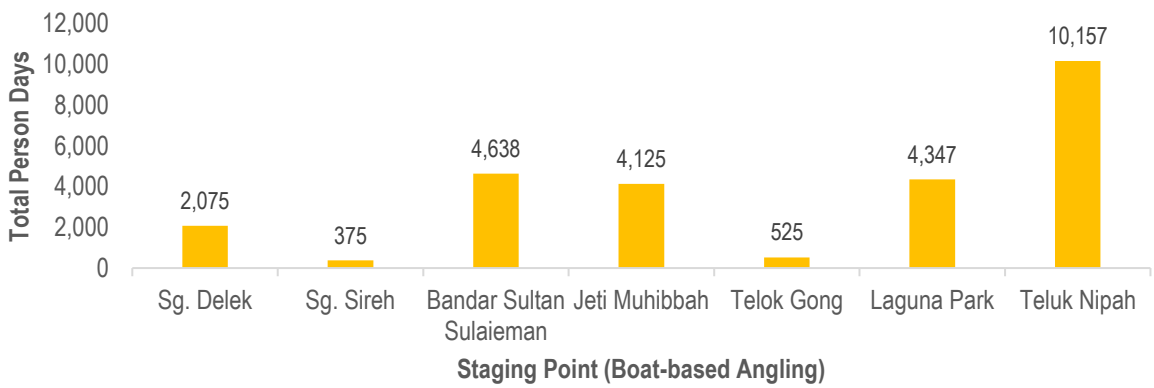
- Recreational fishing activities were carried out at Jambatan Muhibbah, Tg. Harapan, Laguna Park, Teluk Nipah, Sg. Delek, Sg. Sireh, Bandar Sultan Sulaeiman, Telok Gong, recreational fee ponds and Kelong/Rumah Rakit.

FISHERIES

Staging Points for Boat-Based Angling, Shore-Based Angling Hotspots, Recreational Fee Pond-based Angling and Kelong/Rumah Rakit-Based Angling at the Study Area



Fishing Effort (Total Person Days) for Boat-Based Angling at the Study Area



Recreational Fee Pond-based Angling

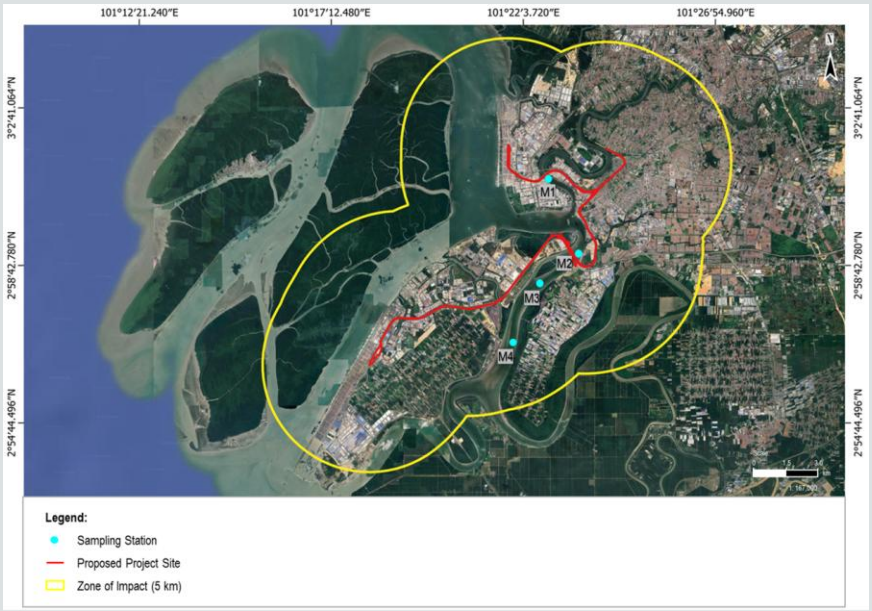
- There were four (4) recreational fee pond operators recorded within 5 km radius of the proposed project site i.e., Sealion, Kolam Sri Tanjung, Kg. Delek Fishing Park, and SHG Fishing Pandamaran.
- The fish released were Siakap (*Lates calcarifer*), Kerapu (*Epinephelus* sp.), Kerapu Naga (*Epinephelus lanceolatus*), Kerapu Harimau (*Epinephelus fuscoguttatus*), Jenahak (*Lutjanus* spp.), Siakap Merah (*Lutjanus argentimaculatus*), Merah (*Lutjanus malabaricus*), Bawal (*Pampus* spp.), Giant Trevally (*Caranx ignobilis*), Kaci (*Plectorhinchus* spp., *Diagramma pictum*), and Senangin Taiwan (*Sciaenops acellatus*).
- The main species released for shrimp was Udang Harimau (*Penaeus monodon*).

MARINE ECOLOGY AND HABITAT

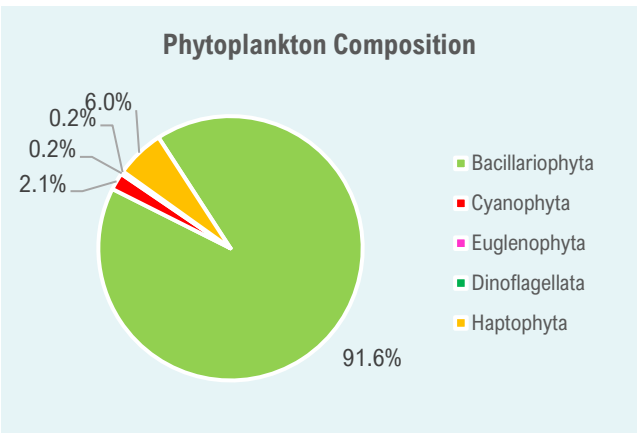
Sampling Locations for Plankton, Macrobenthos and Fish Fauna

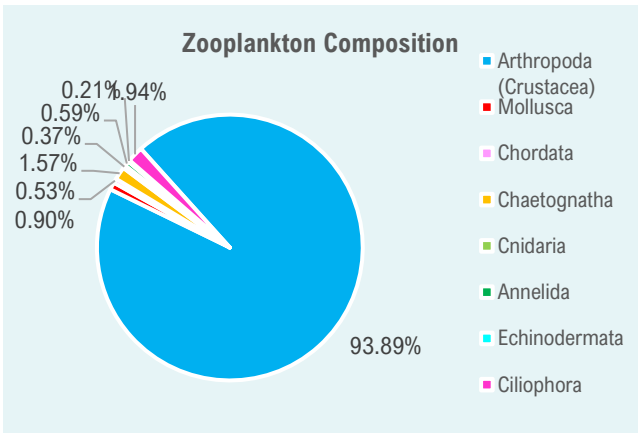
- Phytoplankton: 4 locations
- Zooplankton: 4 locations
- Macrobenthos: 4 locations
- Fish Fauna: 4 locations
- Mangrove: 3 locations (Sungai Klang, northern part of Pulau Indah and Pulau Tonggok)

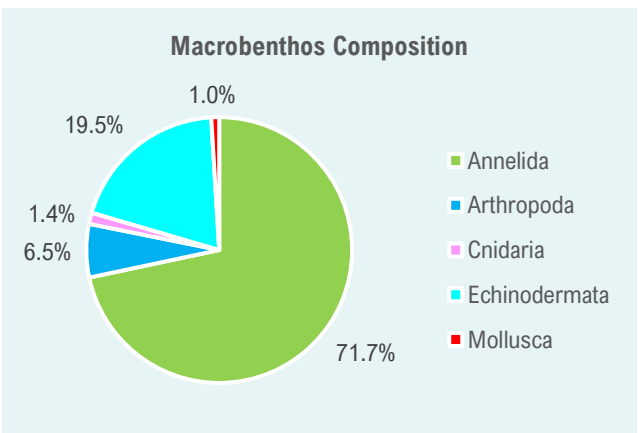
Station	Description
M1	Sg. Klang under Jambatan KTMB Pelabuhan Utara.
M2	Selat Lumut under Jambatan Muhibbah (Pulau Indah Highway).
M3	Selat Lumut off Telok Gong and Pulau Tonggok.
M4	Selat Lumut off Sg. Chandong Besar rivermouth

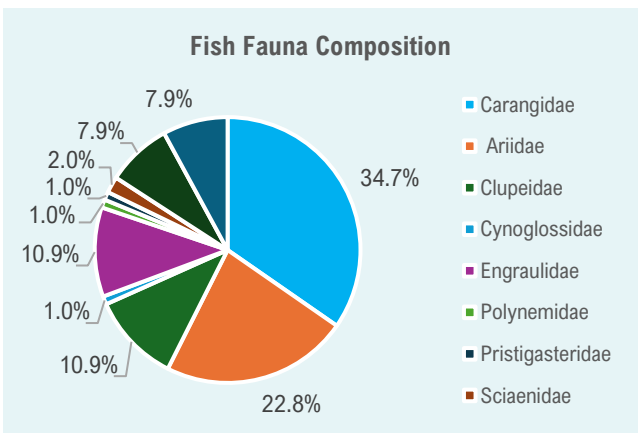


Findings of Plankton, Macrobenthos and Fish Fauna









MARINE ECOLOGY AND HABITAT

Mangrove



- A total of 43 species belonging to 27 families were documented within the mangrove population at the lower reaches of Sungai Klang, northern part of Pulau Indah and Pulau Tonggok.
- Out of the total species, 19 of them are true mangroves (e.g: *Avicennia alba, Lumnitzera racemosa, Sonneratia caseolaris, Rhizophora apiculate*) and 24 species (*Terminalia catappa, Morinda citrifolia*) are mangrove associates.
- Majority of the species recorded are categorized as Least Concern (LC) and few as Not Evaluated (NE) under the IUCN Red List of Threatened Species.

Mangrove Biomass



- The assessment indicates the mangrove area affected by the proposed development is 2.61 ha.
- The total above ground biomass (BTA) within the proposed alignment was estimated at 305.91 t, while below ground biomass (BTB) was estimated at 137.86 t.
- The removal of mangrove vegetation within the proposed ECRL Section D corridor would therefore result in the loss of approximately 194.48 Mg of stored carbon.

Marine Mammals



Dolphins

- Interviews with fishermen indicated that dolphins were commonly sighted in groups ranging from two to 20 individuals.
- The commonly reported species includes the Indo-pacific humpback dolphin (*S. chinensis*), Irrawaddy dolphin (*O. brevirostris*) and Indo-pacific finless porpoise (*N. phocaenoides*).
- Three dolphins strandings or death incidents were recorded in Klang waters, which involved an Indo-Pacific finless porpoise (*N. phocaenoides*) in 2019 (Pantai Serdang, Kapar) and 2020 (Pantai Acheh, Pulau Indah), as well as an Irrawaddy dolphin (*O. brevirostris*) in 2021 (Westports (M) Sdn. Bhd., Klang).

BASELINE ENVIRONMENTAL QUALITY

The baseline environmental monitoring involved the monitoring of air quality, noise, vibration, water quality, marine water quality and sediment sampling with the sampling dates listed as follows:

Baseline Monitoring Dates

Parameter	Monitoring Date	Monitoring Lab
Water quality	23rd April 2025 26th – 27th August 2025	ES Laboratory (M) Sdn Bhd
Marine water quality	24th April 2025 28th August 2025	
Sediment sampling	26th May 2025	
Air quality	22nd – 24th April 2025	
Noise & Vibration	26th – 28th May 2025 10th – 11th July 2025	Institute Of Noise & Vibration Universiti Teknologi Malaysia

BASELINE ENVIRONMENTAL QUALITY

Surface Water Quality

8 monitoring points

- Water samples were collected at 8 locations during low and high tide conditions.
- Parameter: pH, Temperature, Dissolved Oxygen, Dissolved Oxygen Saturation, Chemical Oxygen Demand, Biochemical Oxygen Demand, Total Suspended Solids, Oil & Grease, Ammoniacal Nitrogen, Total Coliforms, Faecal Coliforms, Turbidity, Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Mercury, Manganese, Nickel, Zinc, Salinity, Flowrate.
- Results were compared with the limits of Class III of NWQS and Class E1 of MMWQS when salinity is above 10 ppt

Baseline Monitoring Locations (River Water Quality) at the Northport Alignment and ITT Bypass Line



Northport Results

- WQI (Low tide): 74 – 76 (**Class III, Slightly Polluted**)
- MMWQI (High tide): 37 – 41 (**Poor**)

Nutrient concentrations (NH_3-N, NH_3, PO_4, NO_3) and certain heavy metals (Hg, Al, As^{3+}, Cu, Zn) exceeded respective NWQS or MMWQS limits due to upstream nutrient input and tidal processes; and metal enrichment near downstream river mouth

Baseline Monitoring Locations (River Water Quality) at the Westport Alignment



Westport Results

- MMWQI (Low & High Tide) : 34 – 61 (**Poor - Moderate**)

Low DO due to nutrient enrichment and reduced oxygen solubility. Elevated nutrients (NH_3, PO_4, NO_3) concentration due to combination of upstream urban runoff, limited freshwater and tidal recirculation. High heavy metal due to localised metal enrichment.

BASELINE ENVIRONMENTAL QUALITY

Marine Water Quality

6 monitoring points

- Six (6) sampling at three (3) depths during two (2) tidal conditions for a total of 36 collected samples..
- 22 analysed parameters
- Results were compared with the Class 3 limits of the Malaysia Marine Water Quality Standard (MMWQS), which is classified for Industrial, Commercial Activities & Coastal Settlements.

Baseline Monitoring Locations (Marine Water Quality)



Results

- MMWQI (Low Tide): **32 (Poor) – 89 (Good)**
- MMWQI (High Tide): **45 (Poor) – 90 (Excellent)**

Low DO levels and consistently high FC and NO_3 concentrations across all depths point due to continuous input of organic and nutrient-rich waste, likely from upstream domestic and municipal discharges

Seabed Sediment Sampling

4 monitoring points

- Four (4) seabed sampling for 18 analysed paramters
- Results were compared against the United States National Oceanic and Atmospheric Administration Screening Quick Reference Tables (US NOAA SQuiRTs) for Inorganics in Marine Sediment.

Baseline Monitoring Locations (Sediment Quality)



Results

- Sediments consist of sand, silt, clay, and minor gravel.
- Concentrations of all parameters measured were found below the AET level except for barium at SD4, reflecting possible localised inputs and depositional conditions, and manganese at SD3, suggesting localised Mn accumulation at this sand-dominated station.

EXISTING ENVIRONMENT

BASELINE ENVIRONMENTAL QUALITY

Air Quality

5 monitoring points

- Six (6) air pollutants and wind profile were measured for a time frame between 8-hours and 24-hours at each station
- Results compared with Malaysian Ambient Air Quality Standards (MAAQS) 2020.

Results

- Concentration of all air pollutants (PM_{10}, $PM_{2.5}$, NO_2, CO, SO2 and O_3) were below their respective limits set under the Malaysian Ambient Air Quality Standard 2020.

Noise

6 monitoring points

- Parameters: L_{Aeq}, L_{10}, L_{90} and L_{max} noise levels
- Measured baseline noise levels and assessment against the Second Schedule of the Environmental Noise Limits and Control, Third Edition

Results

- N01, N02, NO3, N04 during day and night **comply** to DOE Recommended Limits.
- N05 and NO6 **exceed** DOE Recommended Limits during day and night due to receptors nearer to main access road to Kg. Sg Pinang and Kg Perigi Nenas from Pulau Indah Highway.

Vibration

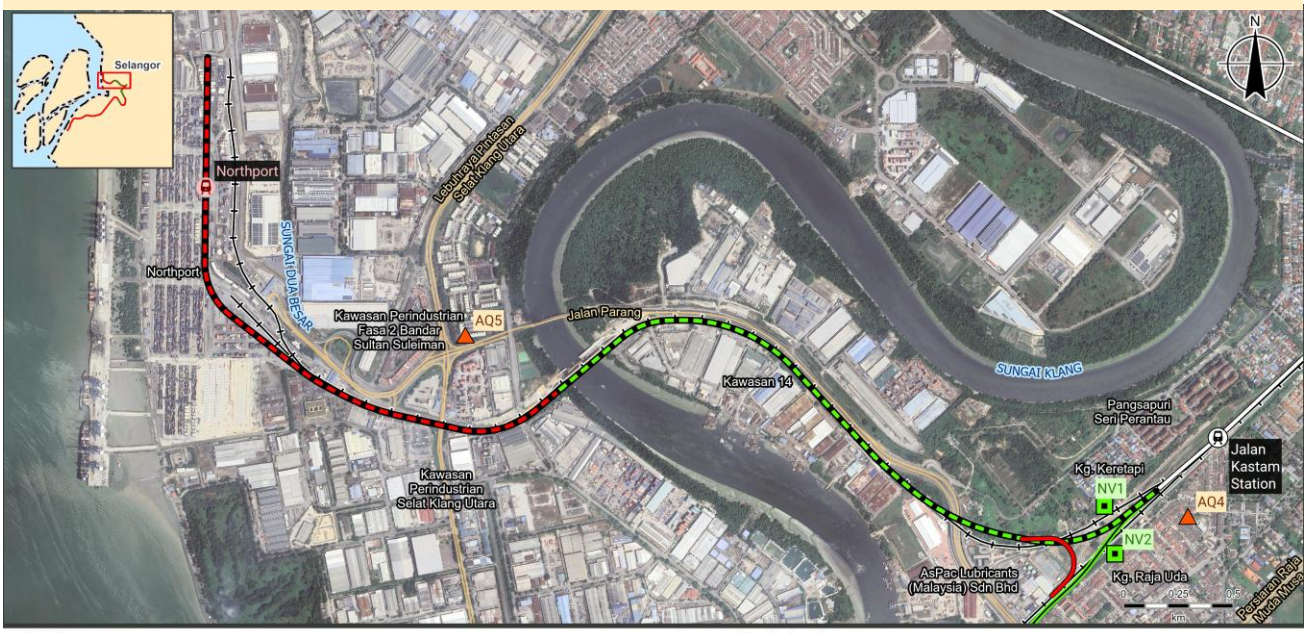
5 monitoring points

- Measured baseline vibration levels and assessment for human response and annoyance for steady state vibrations were carried out in accordance with the Second Schedule of the Environmental Vibration Limits and Control, Third Edition.

Results

- All V01 (night), V02, V04 and V05 (day and night) comply to DOE Recommended Limits
- V01 (day), V03 (day and night) V06 (day) exceedance due to road traffic and human activities

Baseline Monitoring Location for Air, Noise and Vibration at Northport Line



BASELINE ENVIRONMENTAL QUALITY

Baseline Monitoring Location for Air, Noise and Vibration at Westport Line



WASTE MANAGEMENT

Management and disposal of municipal solid waste for the Klang district fall under the jurisdiction of Majlis Bandaraya Diraja Klang (MBDK) and governed in accordance with the provisions of the Local Government Act 1976 [Act 171] as follows:

Waste Management Structure in Selangor

Item	Selangor
Governing Law **Applicable Act**	• Solid Waste and Public Cleansing Act 672 (2007) • Solid Waste and Public Cleansing Management Corporation Act 673 (2007)
Agency / Authorities **Administer, manage and enforce the law**	Majlis Bandaraya Diraja Klang (MBDK)
Concessionaires **Responsible for waste collection, disposal and public cleansing activity**	KDEB Waste Management Sdn Bhd

Landfill

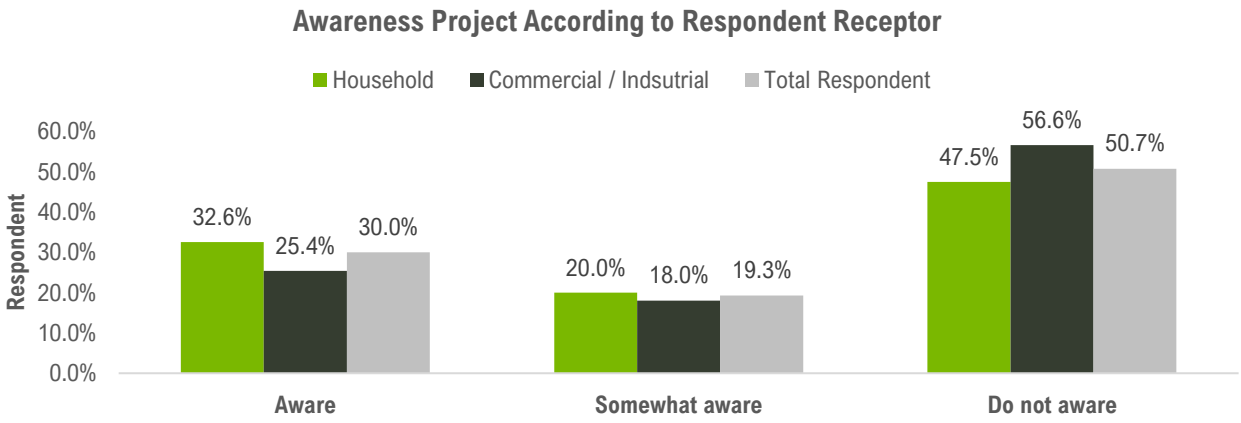
- The Jeram Sanitary Landfill, located within 18.5 km radius of the alignment, has been identified as the nearest landfill.
- Dengkil Inert Waste Landfill (31.7 km from project alignment) and Kuang Inert Waste Landfill (32.4 km from project alignment) are proposed for disposal of construction and demolition waste.

SOCIOECONOMY

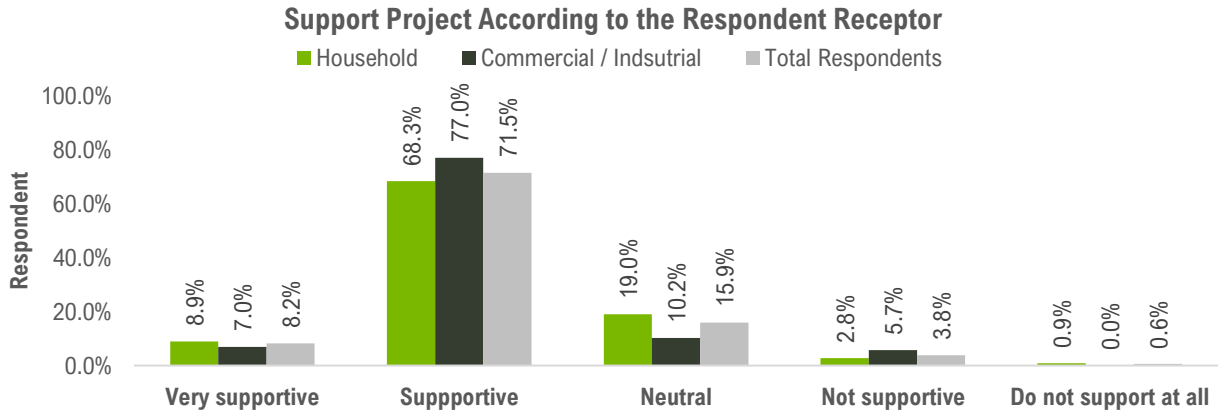
Findings of Perception Survey

680 Respondents have been surveyed

436 Households + **244** Commercial/Industrial



Overall low level of project awareness due to worker respondents did not perceive a significant need for improvements to the current transportation system surrounding Port Klang.
From the household perspective, low awareness level by the project's specific operational scope, whereby the rail freight transportation component in Port Klang is intended primarily to support the ECRL Section D alignment.



The high level of supportiveness as the project will reduce the number of heavy vehicles on existing roads, thereby contributing to lower traffic congestion and improving overall road safety for road users while supporting future economic growth and regional development.

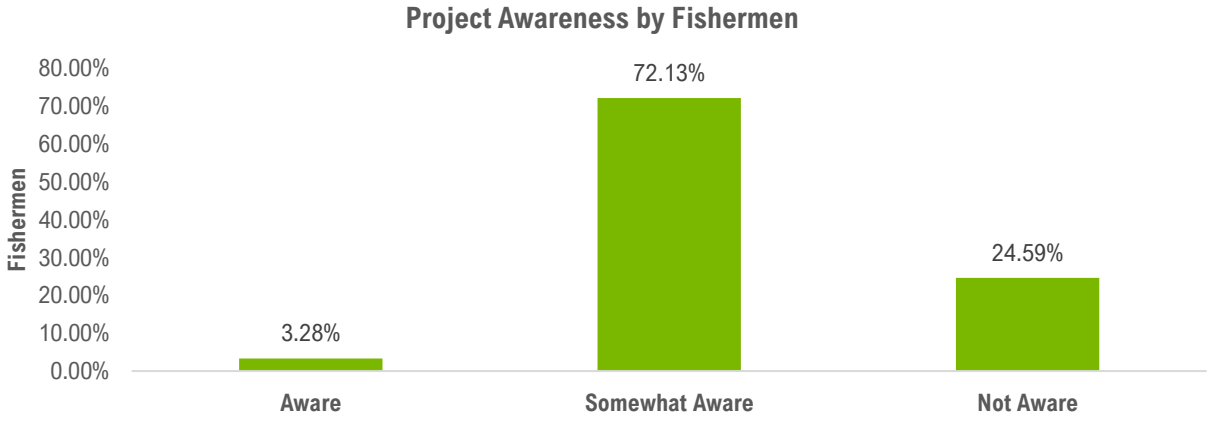
Perception of ECRL Section D Benefits:
- Enhanced Public Mobility
- Reduction of Road Accidents

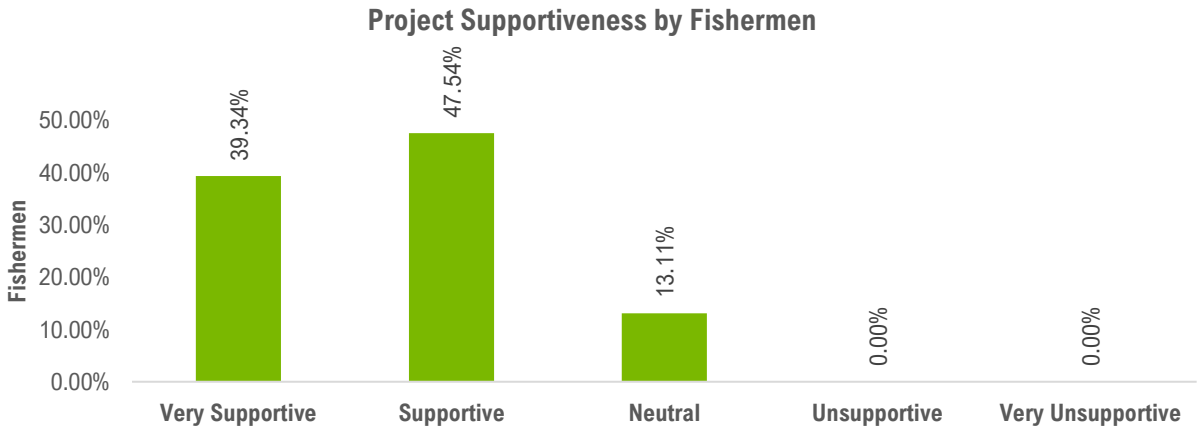
Perception of Negative Impacts
- Issues of Acquisition/Relocation of Properties
- Aesthetic Concerns and Visibility
- Environmental Impact and Structure
- Health, Safety and Social Risks,
- Traffic and Daily Life Disruptions

SOCIOECONOMY

Fisheries Engagement

61 Fishermen have been engaged





Fishermen who are supportive of the project focus heavily on its long-term benefits for the public and the nation's progress. They view the project as a vital public amenity that will drive economic growth and benefit future generations. Additionally, they favour the project because it will significantly reduce the number of container lorries on the roads, thereby easing traffic congestion and indirectly enhancing the road safety.

A significant portion of the fishermen community expresses conditional support, operating under the principle that small-scale and traditional fishermen must not be marginalized by the development.

Neutral feedback is primarily characterized by a perception of project inevitability, with stakeholders noting that as a state-backed public infrastructure initiative, development will proceed irrespective of individual stances, but it has no direct correlation or operational impact on their current activities.

Perception of ECRL Section D Benefits:

- Enhanced logistics efficiency
- Improved road safety & reduced congestion
- Reduced air pollution
- Catalyst for local economic growth
- Improved regional connectivity

Perception of Negative Impacts:

- Obstructed boat navigation and safety risks
- Reduced fish catch
- Safety zones permanently restricting acces
- Damage to boat engines and gear
- Insufficient information regarding project

EXISTING ENVIRONMENT

SOCIOECONOMY

Stakeholder Engagement

Engagement Overview

- Conducted between May 2025 and August 2026 through Focus Group Discussions (FGD), Case Interviews and stakeholder meetings.
- Engaged government agencies, local authorities, community representatives, industrial/commercial operators, educational institutions and religious organisations.



Benefits Perceived

Improved Logistics Connectivity

Direct East Coast–Port Klang rail link strengthens freight movement.

Regional Economic Growth

Supports industrial development and investment in the Klang–Pulau Indah corridor.

Employment Opportunities

Local jobs for contractors, SMEs and supporting industries.

Improved Infrastructure

Enhances connectivity, complementing regional development plans.

Skills & Community Development

Enhances connectivity, complementing regional development plans.

Engagement Conducted



Overall Level of Support

- Majority of stakeholders supported the project, recognising its strategic economic and transportation benefits.
- Several expressed conditional support, subject to effective mitigation, livelihood protection, traffic management and continued engagement.
- A small number remained neutral, pending implementation of proposed mitigation measures.
- Limited opposition was recorded, primarily relating to a religious and heritage site.

Key Concerns Raised

Pre-Construction	Construction	Operation
• Land acquisition & compensation • Livelihood protection • Protection of sensitive receptors	• Traffic congestion & road safety • Dust, noise & vibration • Flood risk and drainage • Heritage & cultural asset protection	• Railway operational safety • Public safety • Long-term environmental quality • River navigation & fishing activities • Biodiversity & pollution control

PUBLIC HEALTH

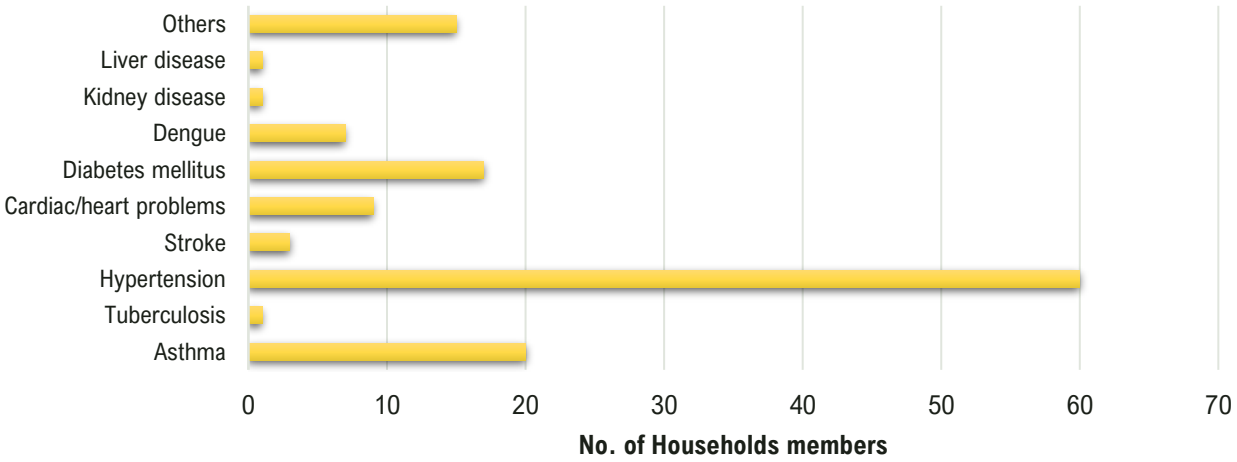
Public Health Survey

400 Household

1,826 Household members

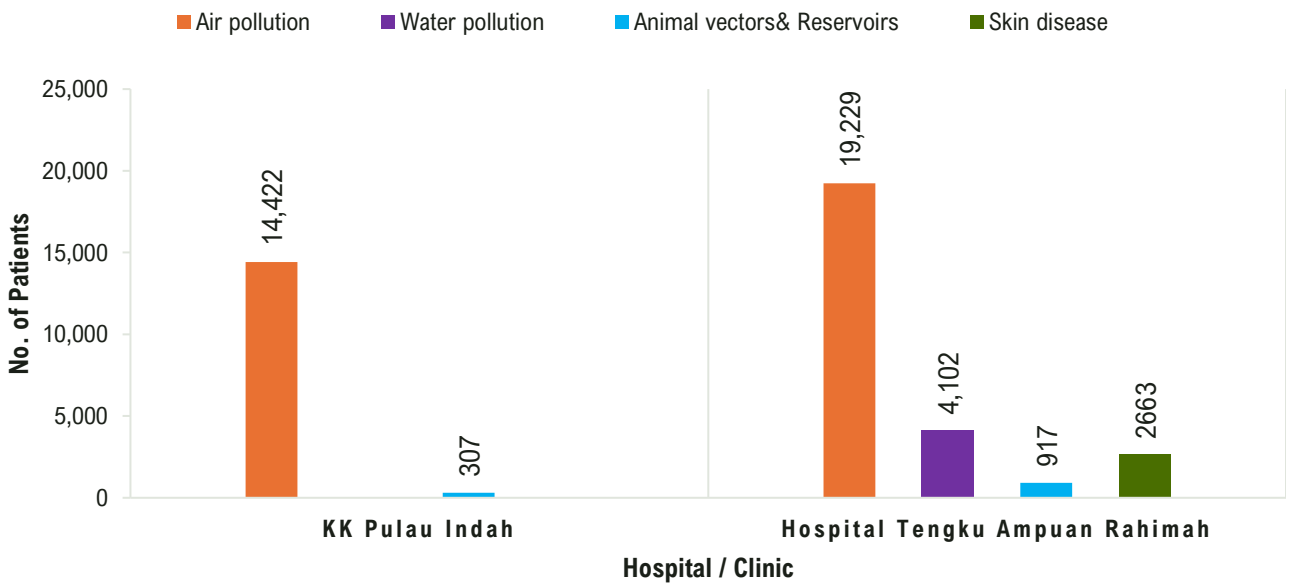
Community Health Status

Household members diagnosed with selected diseases by doctors within the last year



Morbidity Status

Total Annual Number Of Disease Cases Related To Various Causes



LAND TRAFFIC

Surveys were conducted during the morning peak period (07:30 to 08:30) and evening peak period (17:30 to 18:30), when traffic volumes are typically at their highest. Manual counts were performed at 15-minute intervals and categorised into four vehicle types: car/van, motorcycle, light truck and heavy truck/bus.

Existing Road & Junction Performance (2026)

Screen line Survey



Critical areas during peak hour (AM/PM)

Traffic condition indicated by Level of Service (LOS)

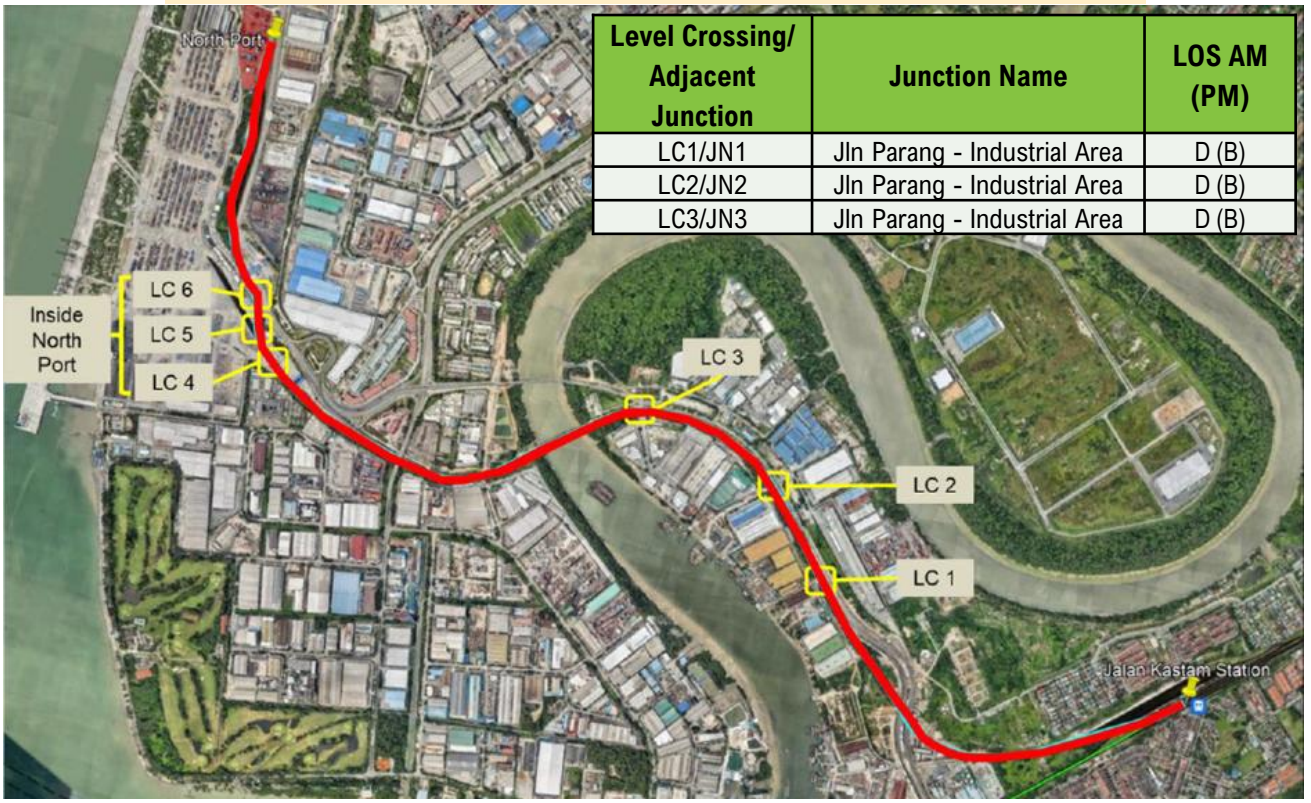
LOS A : Free-flow
LOS B : Stable flow
LOS C : Restricted flow
LOS D : High-density flow
LOS E : Unstable flow
LOS F : Forced flow

SL	ROAD	Level of Service	
		AM Peak	PM Peak
SL1 Jalan Parang	Northbound	E	D
	Southbound	C	D
SL2 Pulau Indah Highway	Eastbound	B	B
	Westbound	D	C
SL3 Jalan Limbungan	Northbound	D	C
	Southbound	C	D

LAND TRAFFIC

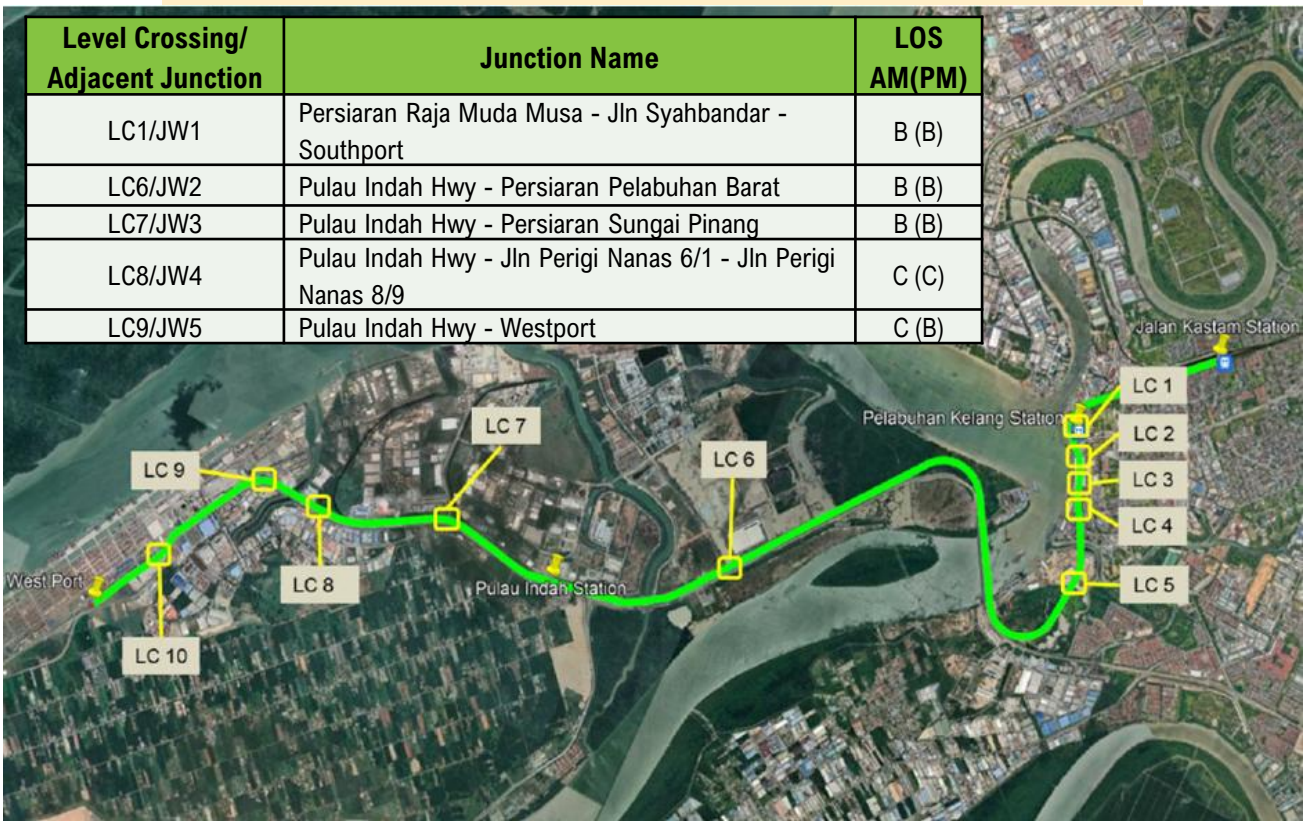
Junction Survey (Jalan Kastam – Northport)

Level Crossing/ Adjacent Junction	Junction Name	LOS AM (PM)
LC1/JN1	Jln Parang - Industrial Area	D (B)
LC2/JN2	Jln Parang - Industrial Area	D (B)
LC3/JN3	Jln Parang - Industrial Area	D (B)



Junction Survey (Jalan Kastam – Westport)

Level Crossing/ Adjacent Junction	Junction Name	LOS AM(PM)
LC1/JW1	Persiaran Raja Muda Musa - Jln Syahbandar - Southport	B (B)
LC6/JW2	Pulau Indah Hwy - Persiaran Pelabuhan Barat	B (B)
LC7/JW3	Pulau Indah Hwy - Persiaran Sungai Pinang	B (B)
LC8/JW4	Pulau Indah Hwy - Jln Perigi Nanas 6/1 - Jln Perigi Nanas 8/9	C (C)
LC9/JW5	Pulau Indah Hwy - Westport	C (B)



CULTURAL HERITAGE

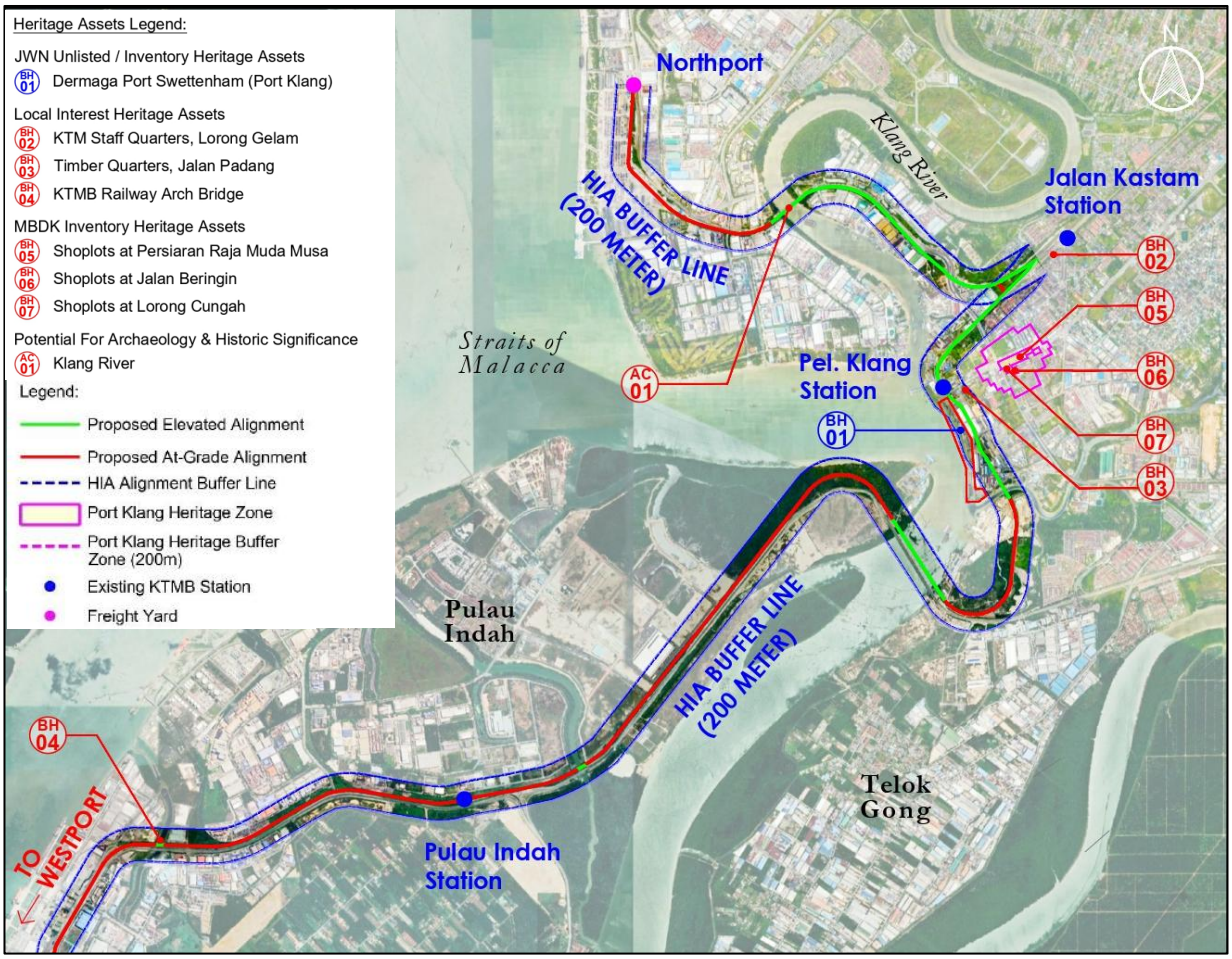
A Heritage Impact Assessment (HIA) was carried out by CGB Consultants Sdn Bhd with an objective of identifying heritage assets that are located within 200 m along from the alignment.

Findings:

- There are **no listed National Heritage assets, listed Heritage assets, JWN Heritage Inventory assets in process of gazetting, local authorities list asset, or listed archaeology sites** that are located within 200m from ECRL Section D.
- There are some unlisted and local interest heritage assets within 200 m from the ECRL Section D alignment:

Asset No.	Heritage Asset	Approx. Distance from ROW	Listing Type	Asset Type	Visual External Assessment
BH01	Dermaga Port Swettenham (Port Klang)	70 m	Unlisted JWN	Commercial	Fair
BH02	KTM Staff Quarters, Lorong Gelam	150 m	Local Interest	Residential	Fair
BH03	Timber Quarters, Jalan Padang	120 m	Local Interest	Residential	Fair
BH04	KTMB Railway Arch Bridge	Within ECRL ROW	Local Interest	Infrastructure	Fair
AC01	Klang River (Alignment Jalan Kastam Station to Northport)	Within ECRL alignment	Local Interest	Potential Archaeology Sites	-

Unlisted & Local Interest Heritage Sites



POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Pre-Construction

Land Acquisition

Potential Receptors	Potential Impacts	Significance
• Nearby temples, i.e. Om Sri Maha Muniandy Karuppusamy Temple, a portion of Sri Balasubramania Swamy Temple, and Sri Maha Muniswarar Temple.	• Risk of objection from surrounding community • Disruption to religious activities and festivals • Reduced accessibility to places of worship • Safety concerns for devotees • Structural impacts on temple and facilities	**Moderate**

Proposed Mitigations

- Affected parties will be given due notice, information and assistance in order to make alternative plans and minimise inconveniences.
- Fair valuation of land or properties will be made and continuous engagement carried out so that queries on land acquisition can be addressed.
- Establishing a Dedicated and Skilled Communication Team
- Structured Consultation and Grievance Management Mechanism
- Commitment to Continuous Engagement

Utilities Relocation

Potential Receptors	Potential Impacts	Significance
• Construction workers • Road users • Nearby residents and businesses • Utility service providers • Nearby rivers and drainage systems	• Damage to sewer pipelines causing discharge into nearby waterways. • Damage to utility services (electricity, telecommunications, water, gas), resulting in service disruptions or leaks. • Increased risk of vehicular accidents due to temporary road closures and diversions.	**Moderate**

Proposed Mitigations

- Notify the public and utility providers before construction and utility relocation works.
- Conduct utility detection and joint inspections with utility representatives before relocation.
- Appoint competent personnel to supervise works near transmission lines and ensure appropriate emergency and fire safety measures are in place.
- Properly seal abandoned utility pipes after relocation to prevent ground settlement or sinkholes.
- Train workers in emergency response and first aid procedures.
- Install appropriate signage and implement traffic diversions where required.

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Soil Erosion and Sedimentation

Construction Phase

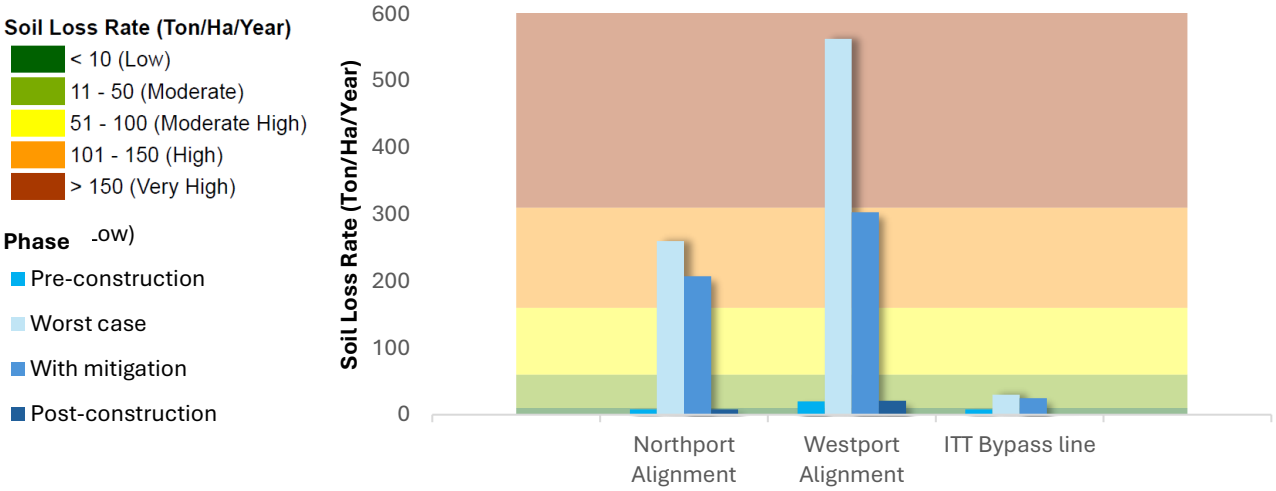
Potential Receptors	Potential Impacts	Significance
• Drainage, roads and intersections along Project alignment • Sg. Klang, Sg. Aur, Selat Lumut, Sg. Labohan Gurap, Sg. Chandong Besar, Sg. Perigi Nanas	• Localised soil instability and erosion. • Increased sediment-laden runoff and sediment deposition. • Reduced drainage and waterway capacity. • Deterioration of receiving water quality. • Muddy roads creating safety hazards. • Potential impacts on aquatic ecosystems due to sedimentation.	**High**

Mitigation Measures

- Minimize exposed soil by limiting earthworks to designated areas, carrying out works in stages.
- Schedule earthworks during favorable weather conditions and suspend works during heavy rainfall.
- Implementing erosion and sediment control measures (P2M2).
- Protect exposed slopes and disturbed areas using erosion control blankets (ECB, hydroseeding/turfing, and prompt revegetation upon completion of earthworks.
- Install and maintain temporary earth drains, silt fences, silt traps, sediment basin.
- Install silt curtains and cofferdams for construction near water bodies to control sediment-laden runoff before discharge into waterways.
- Stabilize construction area through compaction and gravel layer.
- Provide wheel-washing facilities to prevent mud and sediment from being tracked onto public roads.
- Conduct regular inspection and maintenance of all erosion and sediment control measures, particularly after rainfall events, and implement immediate repairs where necessary.

Assessment Findings

Overall Estimated Annual Soil Loss

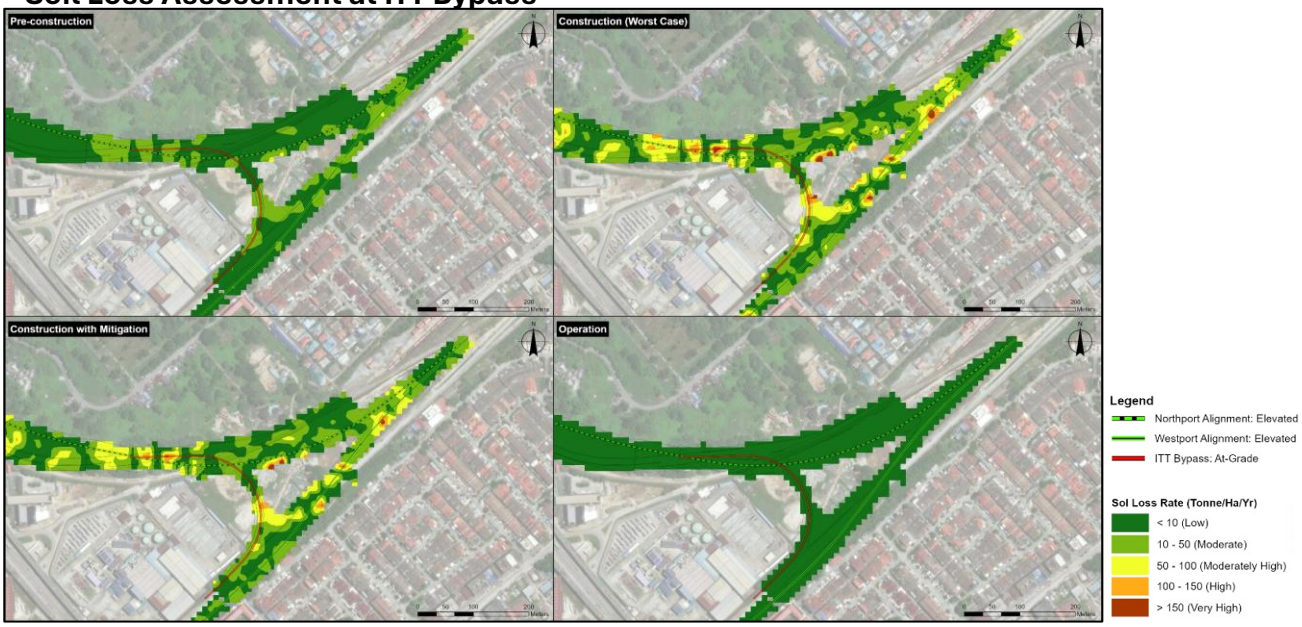


The erosion risk for all alignments will increase during construction stage even with mitigation measures. However, the risk returns to original erosion risk after construction is completed.

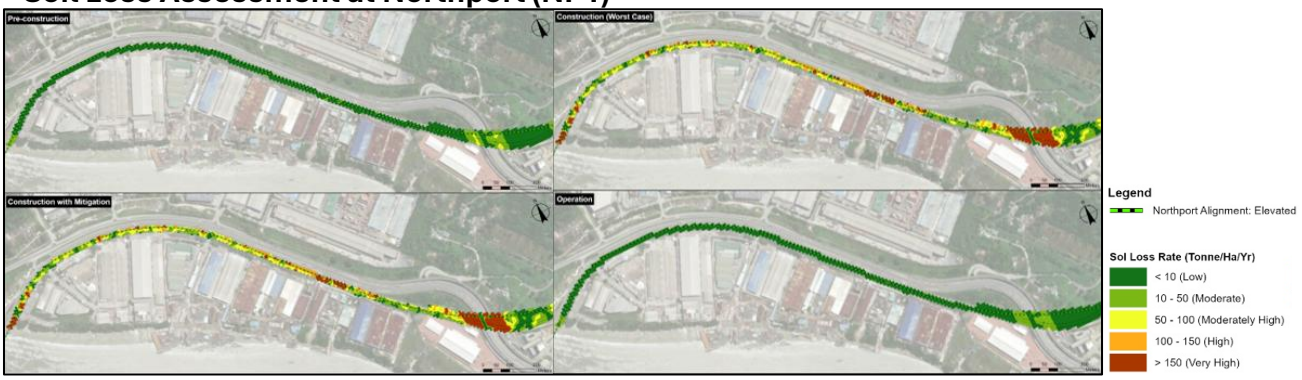
Soil Erosion and Sedimentation

Construction Phase

Soil Loss Assessment at ITT Bypass



Soil Loss Assessment at Northport (NP1)



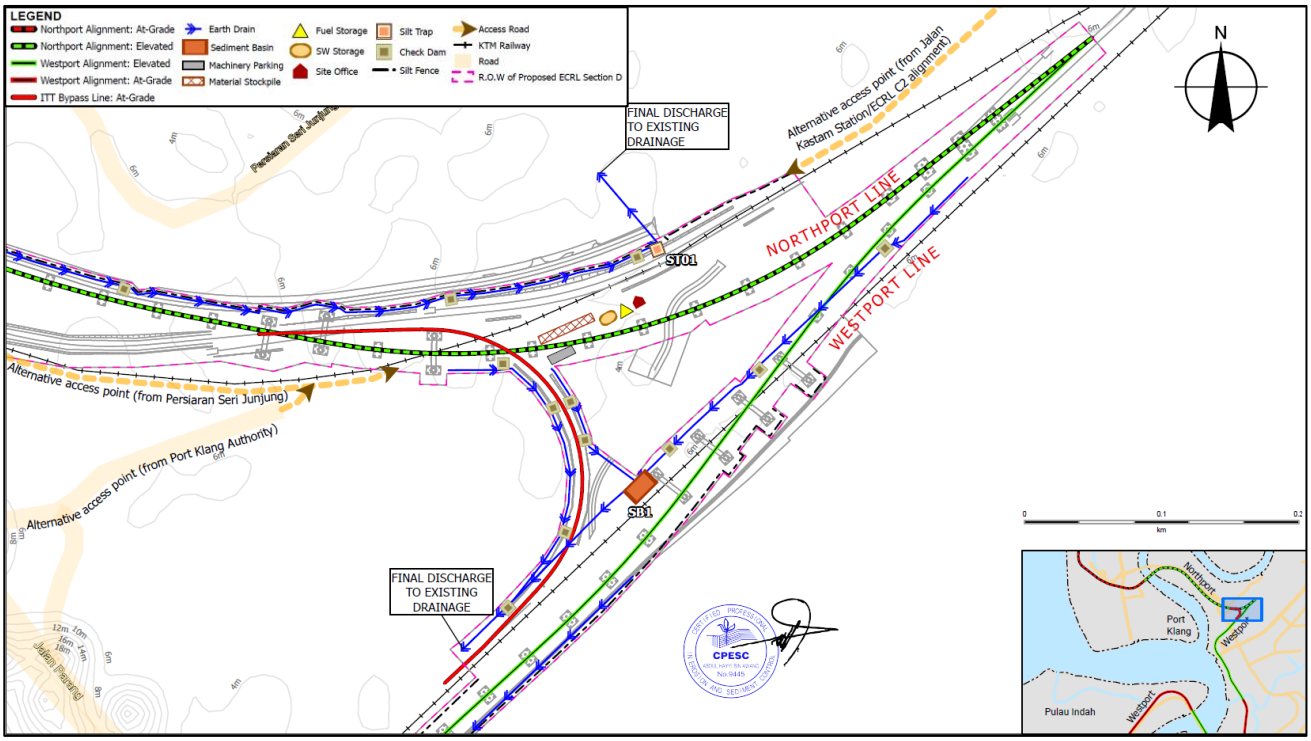
Soil Loss Assessment at Westport (WP2)



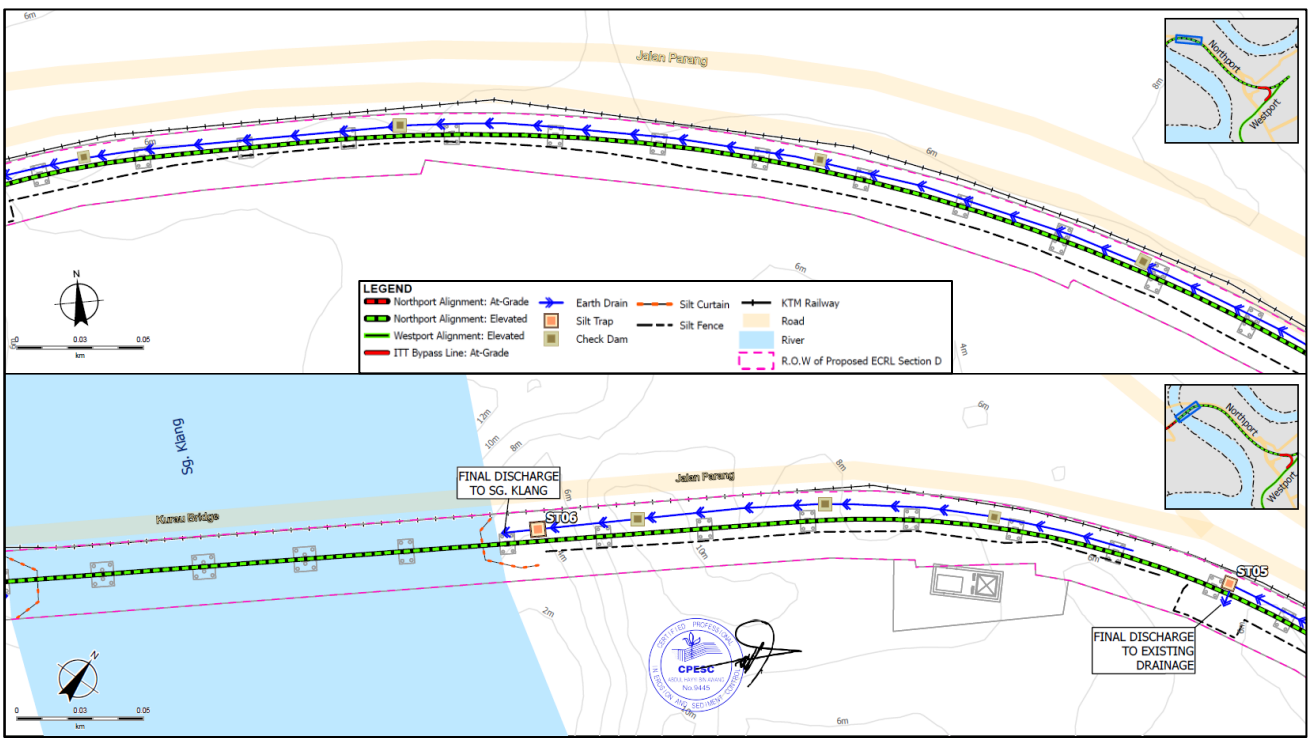
Soil Erosion and Sedimentation

Construction Phase

Example of Land Disturbing Pollution Prevention and Mitigation Measures (LD-P2M2) at ITT Bypass



Example of LD-P2M2 at Northport near Sg. Klang

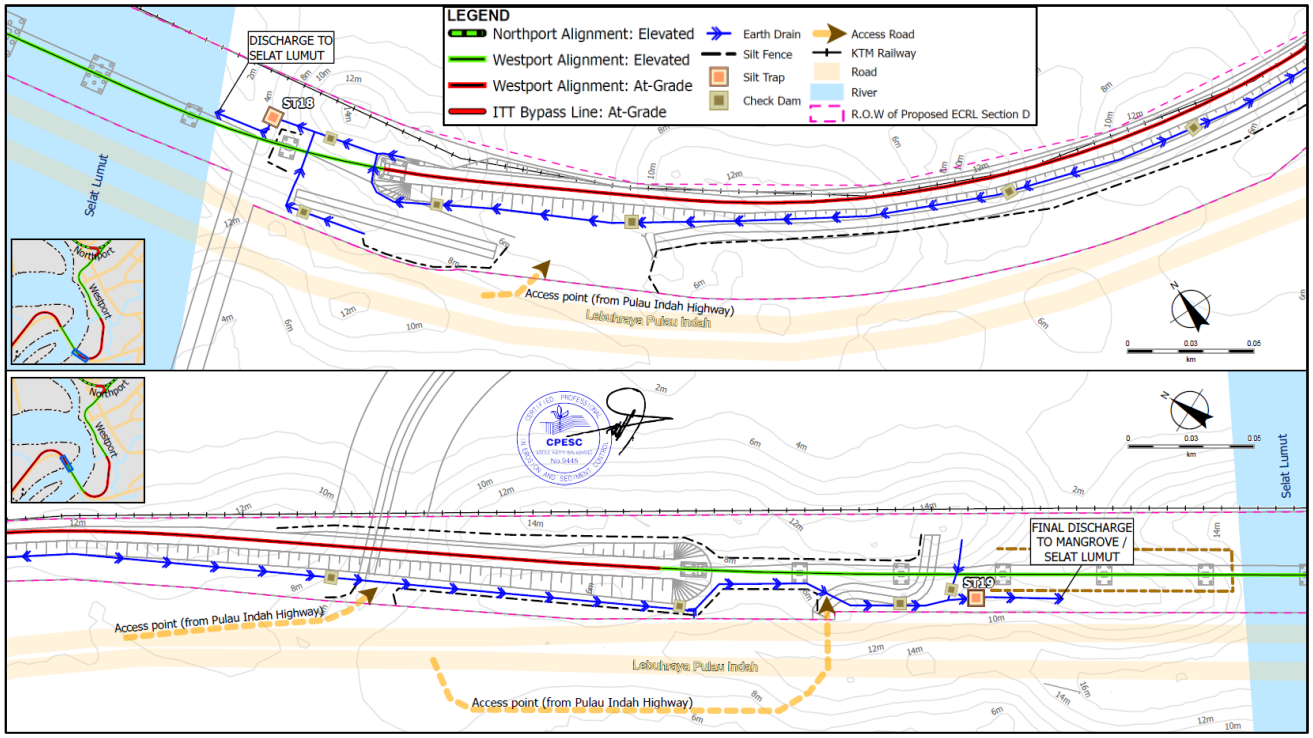


POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Soil Erosion and Sedimentation

Construction Phase

Example of LD-P2M2 at Westport near Selat Lumut





Example of Silt Fence Installation near or within Waterbodies



Example of Sediment Basin/Silt Trap



Example of Wheel Washing Facility



Example of Check Dam

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Geology and Geotechnical

Potential Receptors	• Buildings and structures along the elevated viaduct piers from Northport Alignment and Westport Alignment including bridges at river crossing • The at-grade KTMB railway line

Construction Phase

Potential Impacts	Significance
• Potential ground settlement affecting at-grade tracks and nearby structures. • Foundation settlement during piling for elevated viaducts. • Excavation-induced groundwater drawdown and slope instability. • Risk of settlement or liquefaction affecting structure during seismic events. • Potential structural instability during earthquakes.	**Low**

Proposed Mitigations

Measures to Minimise Ground Settlement

- Conduct site-specific engineering geological investigations to support foundation design.
- Apply ground improvement measures (e.g. removal and replacement of unsuitable soils, surcharging and compaction) to improve soil strength and bearing capacity before at-grade construction.
- Adopt appropriate foundation systems (e.g. piles, raft or spread foundations) and implement careful construction sequencing.
- Carry out continuous settlement monitoring during and after construction.
- Protect riverbanks from using suitable erosion control measures (e.g. gabion mattresses) to prevent scouring and maintain structural stability.

Measures to Minimise Excessive Groundwater Seepage

- Monitor groundwater levels during earthworks, where required, to prevent embankment instability.

Measures to Minimise Seismic Risk

- Conduct detailed geological and investigations to identify seismic hazards and avoid fault zones where practicable.
- Ensure proper ground compaction and piling to minimise settlement and liquefaction risks.
- Monitor ground vibration during construction.
- Design and construct structures in accordance with the Malaysian National Annex to Eurocode 8 (EC8).

Operational Phase

Potential Impacts	Significance
• Ground settlement affecting the rail alignment and nearby structures due to train loading on soft soils. • Potential foundation settlement from changes is groundwater conditions. • Risk of settlement or liquefaction during seismic events. • Potential structural instability during earthquakes.	**Low**

Proposed Mitigations

- **Settlement**: Conduct ground settlement monitoring
- **Regional seismicity**: Conduct routine and post-earthquake inspections of bridges and sea crossing structures. Implement scheduled bridge inspections in accordance with national and international guidelines. Ensure inspections are carried out by trained and experienced personnel.

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Surface Water Quality

Construction Phase

Potential Receptors	Potential Impacts	Significance
• Drainage located along the Project alignment • Sg. Klang, Sg. Aur, Selat Lumut, Sg. Labohan Gurap, Sg. Chandong Besar, Sg. Perigi Nanas	• Elevated total suspended solids (TSS) levels in receiving waterways due to sediment-laden runoff from exposed soil surfaces and disturbed ground • Minor elevated organic and inorganic pollutants in receiving waterways due to spillage and / or leakage of untreated sewage from improper management of portable toilets on site • Minor spillage and/ or leakage of fuels, oils, lubricants or scheduled waste which can lead to discharges of various hazardous substances into the waterways.	**Low**

Assessment Findings

A mixing model was used to assess downstream water quality under normal (with mitigation) and worst-case (without mitigation) scenarios, considering both individual and cumulative silt trap discharges. The key findings are summarized below:

- Without mitigation, no change in the predicted TSS level at Sg. Klang, Selat Lumut and Sg. Labohan Gurap. Slight increase in TSS level at Sg. Aur, Sg. Chandong Besar and Sg. Perigi Nanas.
- With implementation of mitigation measures, no changes between baseline and predicted TSS level. The water quality remains within the limits of NWQS and MMWQS classification.

Proposed Mitigations

- Implementation of soil erosion and sediment control.
- Regular inspection and maintenance of sediment control facilities.
- Proper storage and handling of oil, petroleum products, and chemicals as per the Environmental Quality (Scheduled Wastes) Regulations 2005.
- Emergency Response Plan (ERP) for water pollution incidents.
- Project Proponent shall comply with all applicable requirements of the Lembaga Urus Air Selangor (LUAS) under the relevant provisions of the LUAS Enactment 1999 and its subsidiary regulations.
- Sewage management shall follow the Occupational Safety and Health Act 1994 (Act 514) and the Environmental Quality Act 1974 to ensure protection of water quality and public health.

Example of Skid Tank with Bunding and Roofing



Example of Portable Toilet



Example of Drip Tray



POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Surface Water Quality

Operational Phase

Potential Receptors	Potential Impacts	Significance
• Drainage located along the Project alignment • Sg. Klang, Sg. Aur, Selat Lumut, Sg. Labohan Gurap, Sg. Chandong Besar, Sg. Perigi Nanas	• Minor spillage and/or leakage of fuels, oils, lubricants, chemicals or transported cargo during railway and yard operations • Contaminated surface runoff from railway tracks, container yard and operational areas containing hydrocarbons, heavy metals, particulates or organic matter, into nearby waterways • Potential minor increase in organic and nutrient loading in receiving waterways due to treated discharge from on-site Small Sewage Treatment System (SSTS)	**Low**

Assessment Findings

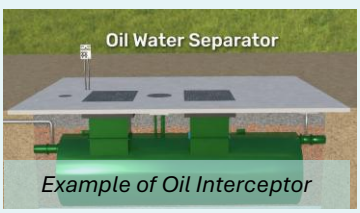
A mixing model was applied to assess the impact of sewage discharge from the SSTS on changes in TSS, BOD and NH_3-N concentrations. Two scenarios were conducted, Scenario 1 – Treated Sewage and Scenario 2 – Raw Sewage. The key findings are summarized below:

- Discharge of treated sewage is predicted to have minimal impact, with BOD, NH_3-N and TSS remaining within baseline water quality classes.
- For raw sewage discharge, BOD, NH_3-N and TSS are predicted to remain within baseline water quality classes due to the high flow of Sg. Perigi Nanas.
- The likelihood of raw sewage discharge is very low with proper operation and implementation of best management practices.

Proposed Mitigations

Prevention of spillage and leakage of oil, lubricants, chemicals, and cargo materials:

- Regular preventive maintenance of all locomotives and yard equipment
- Carry out refuelling and servicing in designated areas with spill containment measures (e.g. impermeable flooring, oil interceptors)
- Personnel will be trained in spill prevention, containment, and reporting procedures.
- Dispose of waste oil and contaminated materials through licensed contractors in accordance with the Environmental Quality (Scheduled Wastes) Regulations 2005.



Example of Oil Interceptor

Regulatory non-compliance relating to water resources management and discharges:

- Comply with all applicable requirements of the relevant regulatory authorities throughout the operational phase

Contaminated surface runoff from tracks, yard, and loading areas:

- Maintain good housekeeping to minimize contaminant build-up.
- Periodic inspection and maintenance of drainage infrastructure to ensure continued effectiveness of measures.
- Install and maintain appropriate runoff treatment measures (e.g. oil interceptors and sediment traps), prior to discharge.

Discharge of treated sewage from SSTS:

- Operation of the SSTS will comply with Standard B of the Environmental Quality (Sewage) Regulations 2009.
- Carry out regular desludging and maintenance .
- Effluent quality monitoring will be conducted in accordance with regulatory requirements to ensure compliance prior to discharge.
- Any system malfunction will be promptly rectified, and contingency measures will be implemented to prevent discharge of non-compliant effluent.

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Marine Water Quality

Construction Phase

Potential Receptors	Potential Impacts	Significance
• Selat Lumut	• Elevated TSS and turbidity in from piling and seabed disturbance works • Potential release of sediment-bound contaminants from disturbance of contaminated seabed. • Minor spillage and/or leakage of fuels, oils, chemicals or construction materials from equipment	**Low**

Assessment Findings

Numerical simulations using MIKE 21 Mud Transport (MT) were conducted to predict the spatial and temporal distribution of suspended sediments resulting from piling activities. Key findings are as below:

- Without mitigation measure: Sediment dispersion is generally localised within the immediate vicinity of the piling sites. Exceedance of suspended sediment thresholds occurs for less than 5% of the time
- With mitigation measure: Sediment dispersion is further reduced and largely contained within the silt curtains and immediate piling area. Exceedance of thresholds remaining below 5% of the time.

In conclusion, with appropriate mitigation, the construction activities at Selat Lumut are expected to be localised, temporary, and well within the receiving system's flushing and dilution capacity.

Proposed Mitigations

Accidental spills and leakages of fuel, lubricants, and construction materials:

- Maintain equipment regularly to prevent leaks and defects.
- Refuelling and handling of hazardous materials in designated areas with secondary containment (e.g. drip trays, bunded storage).
- Provide oil spill kits with absorbent pads at strategic location immediate spill containment
- Implement emergency response and contingency plans with all personal appropriately trained. The plan will include spill containment procedures, notification protocols, and proper documentation and reporting.
- Use of environmentally acceptable materials (e.g. low-toxicity coatings, controlled concrete works) will be adopted where practicable.

Release of sediment bound contaminants:

- Sediment disturbance will be minimised through controlled piling methods and careful installation of temporary working platforms.
- Silt curtains will be employed as containment measures that serve to limit the spread of resuspended sediments and associated contaminants.
- Duration of in-water works will be minimised to reduce prolonged exposure of disturbed sediments.
- Works will be undertaken in defined and confined areas to reduce unnecessary seabed disturbance.

Sediment resuspension from piling works:

- Deployment of silt curtains around active piling areas
- Stages piling and foundation works to limit sediment disturbance
- Works during low-flow or slack-tide conditions.
- Visual inspections of water clarity and works will be adjusted if sediment plumes extend beyond the acceptable mixing zone.

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Marine Water Quality

Operational Phase

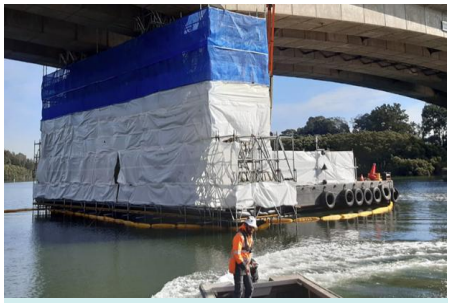
Potential Receptors	Potential Impacts	Significance
• Selat Lumut	• Alteration of hydrodynamics are inherent to the permanent structure and localised reduction in flushing • Accidental discharges and maintenance-related spills • Potential localized increase in suspended solids and turbidity from maintenance activities	**Low**

Assessment Findings

Based on the hydrodynamic and water quality modelling using MIKE 21 Hydrodynamic (HD) model, the operational impacts of the proposed Selat Lumut crossing on marine water and sediment quality are expected to be minimal. Hydrodynamic conditions remain largely unchanged, and strong natural flushing ensures effective dispersion and dilution of suspended solids and potential contaminants, preventing their accumulation within the receiving environment. As a result, no significant deterioration in water quality or sediment quality is anticipated during operation. Potential impacts are limited to minor, localised, and short-term effects associated with maintenance activities.

Proposed Mitigations

- The proposed bridge crossings will be located within the existing KTM railway corridor where other bridge structures are already present.
- If localised water quality deterioration or sediment accumulation is observed, appropriate maintenance actions (e.g. removal of debris or sediments) will be undertaken.
- All maintenance activities over water (e.g. inspection, painting, repair works) will follow standard environmental management procedures to prevent discharge of contaminants.
- Use of drip trays, containment sheets, or other appropriate controls will be implemented during maintenance works to prevent materials from entering marine waters.
- Hazardous materials (e.g. paints, solvents, antifouling agents) will be handled, stored, and applied in a controlled manner to minimise risk of spillage.
- Spill kits will be made available during maintenance activities, and personnel will be trained in spill response procedures.
- Any accidental spills will be contained and cleaned up immediately in accordance with established emergency response procedures.



Example of containment measures for bridge maintenance works over water



Example of Oil & Fuel Spill Kit

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Flood Risk

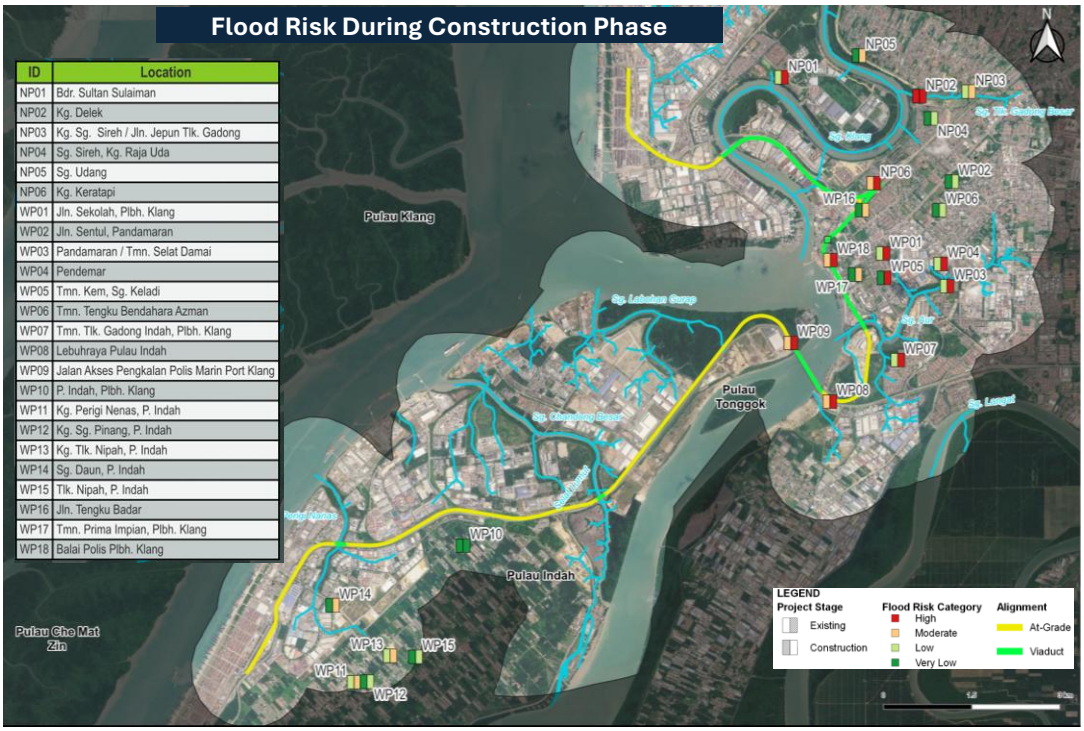
Construction Phase

Potential Impacts	Significance
Potential flood risk due to: • Sedimentation from exposed soil reduce carrying capacity of drains and rivers. • Improperly stored/disposed construction materials may enter the river and cause blockages, reducing river flow	**Moderate**

Assessment Findings

Flood Risk During Construction Phase

ID	Location
NP01	Bdr. Sultan Sulaiman
NP02	Kg. Delek
NP03	Kg. Sg. Sireh / Jln. Jepun Tlk. Gadong
NP04	Sg. Sireh, Kg. Raja Uda
NP05	Sg. Udang
NP06	Kg. Keratapi
WP01	Jln. Sekolah, Plbh. Klang
WP02	Jln. Sentul, Pandamaran
WP03	Pandamaran / Tmn. Selat Damai
WP04	Pendemar
WP05	Tmn. Kem, Sg. Keladi
WP06	Tmn. Tengku Bendahara Azman
WP07	Tmn. Tlk. Gadong Indah, Plbh. Klang
WP08	Lebuhraya Pulau Indah
WP09	Jalan Akses Pengkalan Polis Marin Port Klang
WP10	P. Indah, Plbh. Klang
WP11	Kg. Perigi Nenas, P. Indah
WP12	Kg. Sg. Pinang, P. Indah
WP13	Kg. Tlk. Nipah, P. Indah
WP14	Sg. Daun, P. Indah
WP15	Tlk. Nipah, P. Indah
WP16	Jln. Tengku Badar
WP17	Tmn. Prima Impian, Plbh. Klang
WP18	Balai Polis Plbh. Klang



Flood risk areas identified using weighted multi-criteria analysis.

At the Project construction stage, 24 flood risk areas identified and classified with the following flood risk rating.

- High – 1 area
- Moderate – 4 areas
- Low – 8 areas
- Very Low – 11 areas

Proposed Mitigations

Flood Preventative Measures

Site Inspection, Monitoring & Maintenance

- Maintain all erosion and drainage control measures based on routine site inspections.
- Construction managers and subcontractors shall carry out maintenance under the supervision of the Environment Officer (EO).
- Record all inspection, assessment, and maintenance activities in inspection logs.

Best Management Practices (BMPs)

- Carry out earthworks in stages and minimised during heavy rainfall
- Slope protection (e.g: temporary covers, turfing, sheet pile)
- Runoff control (e.g: silt fence, temporary drainage, stormwater channels, silt trap/sediment basin)

Flood Contingency Measures

Emergency Response Procedures

- Implement and regularly review the Emergency Response and Preparedness (ERP) plan for flood events.
- Notify relevant response teams and authorities, and secure stockpiles to minimise flood impacts.

Emergency Communication Flow

- Follow the established emergency communication flow during flood and flash flood events.
- Record all flood incidents, including rainfall, site conditions, and BMP performance.
- Document corrective actions taken and any additional BMPs required.

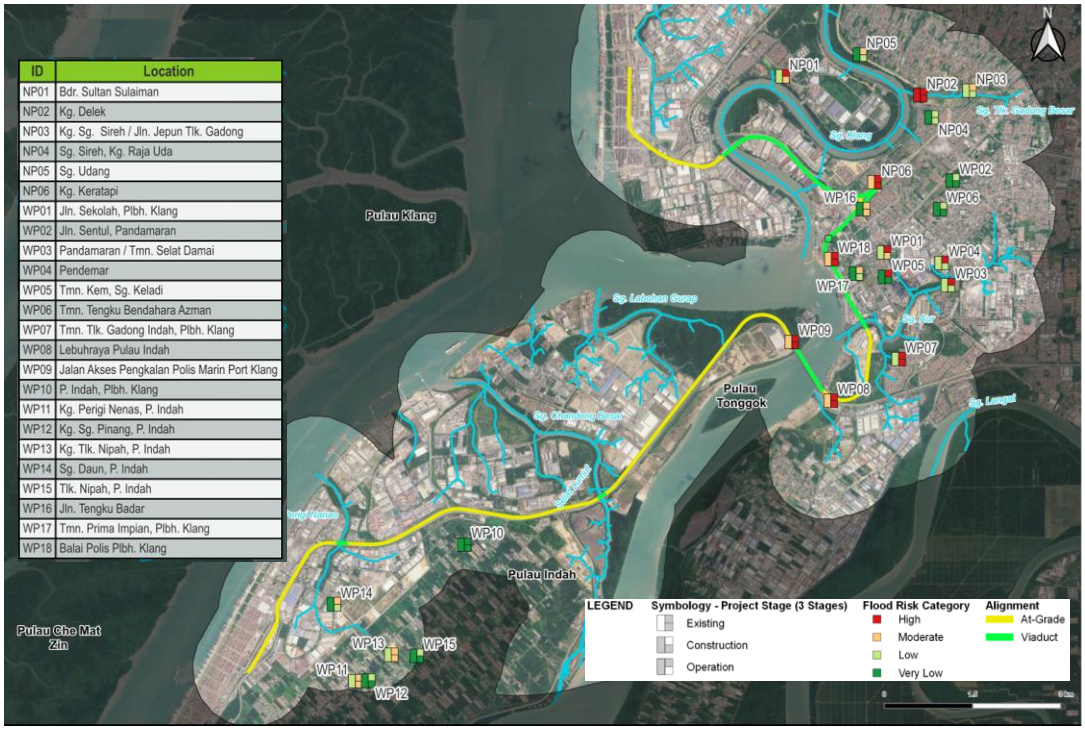
POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Flood Risk

Operation Phase

Potential Impacts	Significance
• Minimal impact of surface permeability as ballast from at-grade sections allows infiltration of surface run off. • Embankments may disrupt surface water flow which may reduce water drainage and increase risk of flooding. • The concrete viaduct structure increase impermeable surface areas which would channel rainwater into the nearest existing drainage or river. • Bridge protection structures on the riverbanks may change existing water flow due to narrowing of the river channel. • Piers from long river crossings may reduce river flow and increase chances of debris getting stuck and causing blockages	**Low**

Assessment Findings



Flood risk during operation generally higher than existing but lower than construction stage.

- High – 6 areas
- Moderate – 5 areas
- Low – 7 areas
- Very Low – 6 areas

Proposed Mitigations

Hydrology and Hydraulic Design

- Design the drainage system in accordance with JPS requirements and Urban Storm Water Management Manual for Malaysia (MSMA 2nd Edition) to minimise flooding, ponding, and sedimentation.
- Carry out hydrodynamic modelling at the Preliminary and Detailed Design Stage which will be submitted to JPS HQ and JPS Selangor for approval. The hydrology and hydraulic analysis will consider design for 100-year ARI for the alignment in general as stated in the *Kajian Pelan Induk Rancangan Tebatan Banjir Lembangan Sungai Klang* (December 2023).
- Refine drainage and bridge designs through continuous consultation with JPS, considering sea level rise and relevant hydrological design guidelines of the Department of Irrigation and Drainage (JPS) and the Marine Department of Malaysia.

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Noise

Construction Phase

Potential Receptors	Potential Impacts	Significance

• SJK (C) Tshing Nian	• Potential increased in noise levels from:
	  ○ earth-moving equipment (dozers, tractors)
	  ○ heavy vehicles (lorries)
	  ○ diesel generator sets
	  ○ piling works.
		Low

• Kampung Raja Uda • Sri Balasubramania Swamy Temple • Pejabat Jabatan Laut Wilayah Tengah • Port Klang Police Quarters		Moderate

Assessment Findings

Based on the noise modelling, the following are the key findings:

- Lmax without mitigation are still within the DOE limits (90dBA during daytime, 85dBA during evening and night-time) at all the receptors.
- Kampung Raja Uda, Sri Balasubramania Swamy Temple, Pejabat Jabatan Laut Wilayah Tengah,and the Port Klang Police Quarters which are located approximately 10–35 m from the proposed alignment are anticipated to experience moderate impacts.
- SJK (C) Tshing Nian, located approximately 25 m from the proposed alignment, is anticipated to experience low impacts.

Proposed Mitigations

- Use of low noise low impact equipment and construction piles handling process.
- Use of low noise diesel generator sets (typically generators housed within an acoustic enclosure with air intake and exhaust fitted with silencers/ mufflers), and earth moving equipment fitted with silencers.
- Excavation works and other noisy activities should be confined to daytime hours to minimise the noise impact.
- Noise from heavy vehicles (for materials delivery and removal) could be managed by work scheduling to avoid quiet periods of the day, with no vehicles' movement during nights and weekends.
- Construction work sites in close proximity of built-up areas may require temporary acoustic noise barriers or high perimeter hoarding along the work site perimeter boundary.
- Noise monitoring to comply with recommended noise limits as stipulated in DOE's Guidelines for Environmental Noise Limits and Control (2019), Annex A, Sixth Schedule



Example of Temporary Acoustic Barrier at Construction Site

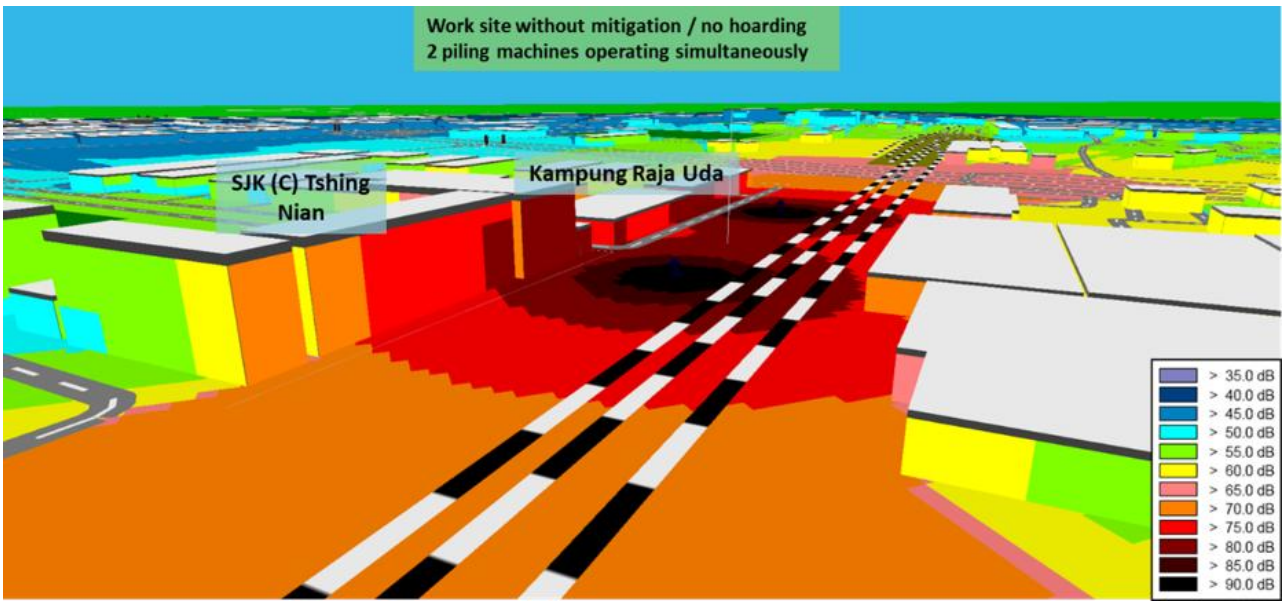


Example of Perimeter High Hoarding at Batching Plant in Construction Site

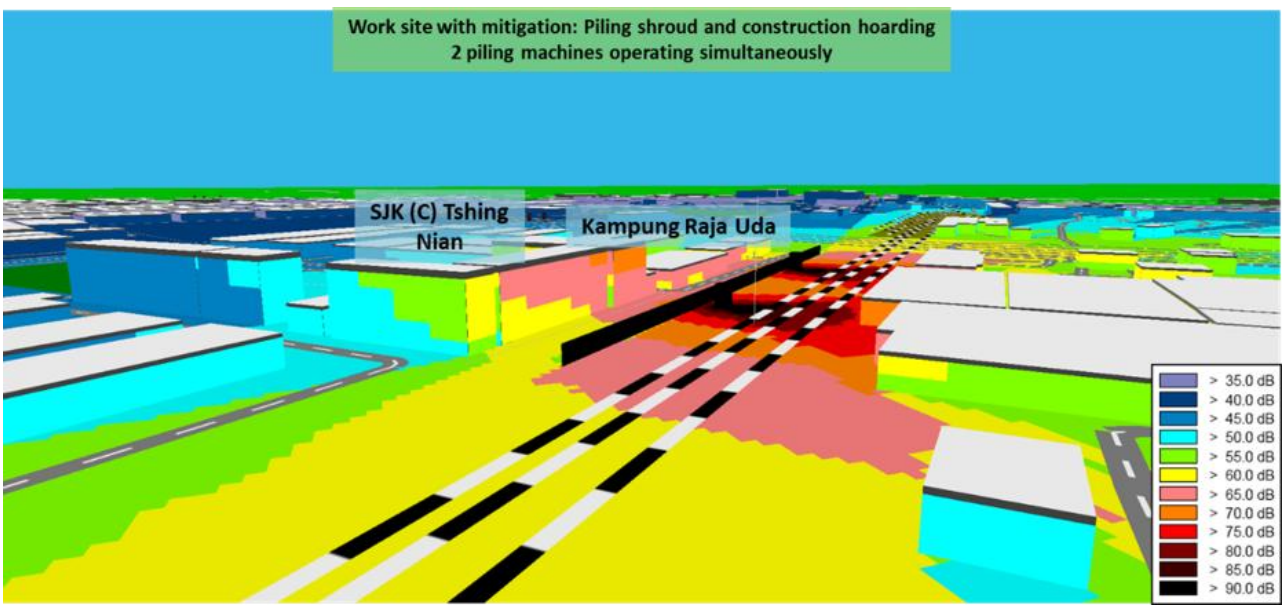
Noise

Assessment Findings

Noise Contour During Construction Phase



Noise Model (Lmax) for Piling Without Mitigation adjacent to Kampung Raja Uda and SJKC Tshing Nian

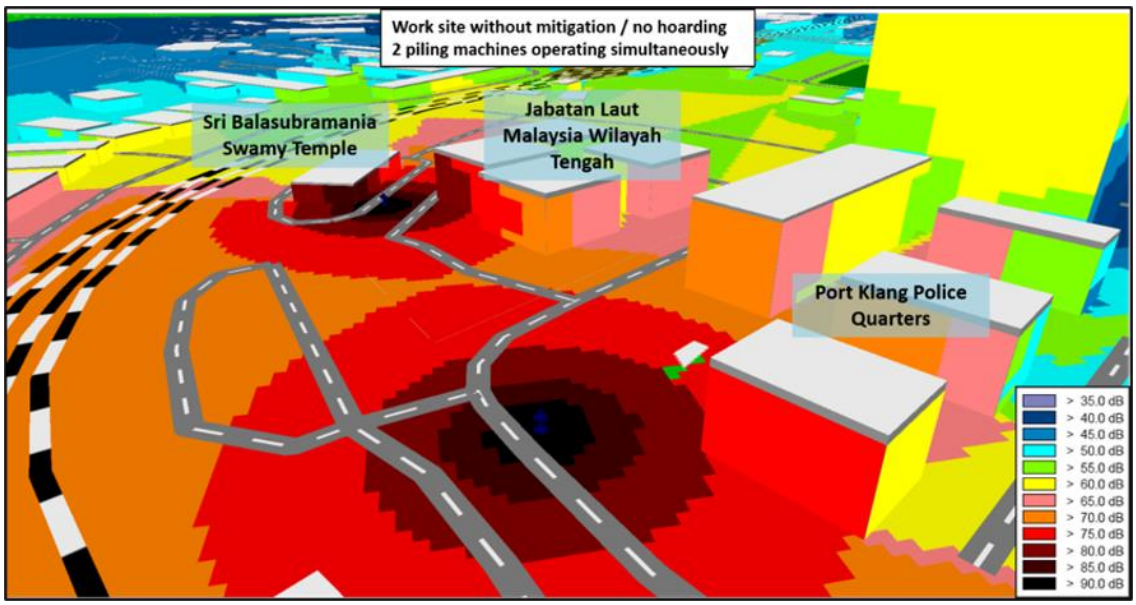


Noise Model (Lmax) for Piling with Mitigation (Piling Shroud and Construction Hoarding) adjacent to Kampung Raja Uda and SJKC Tshing Nian

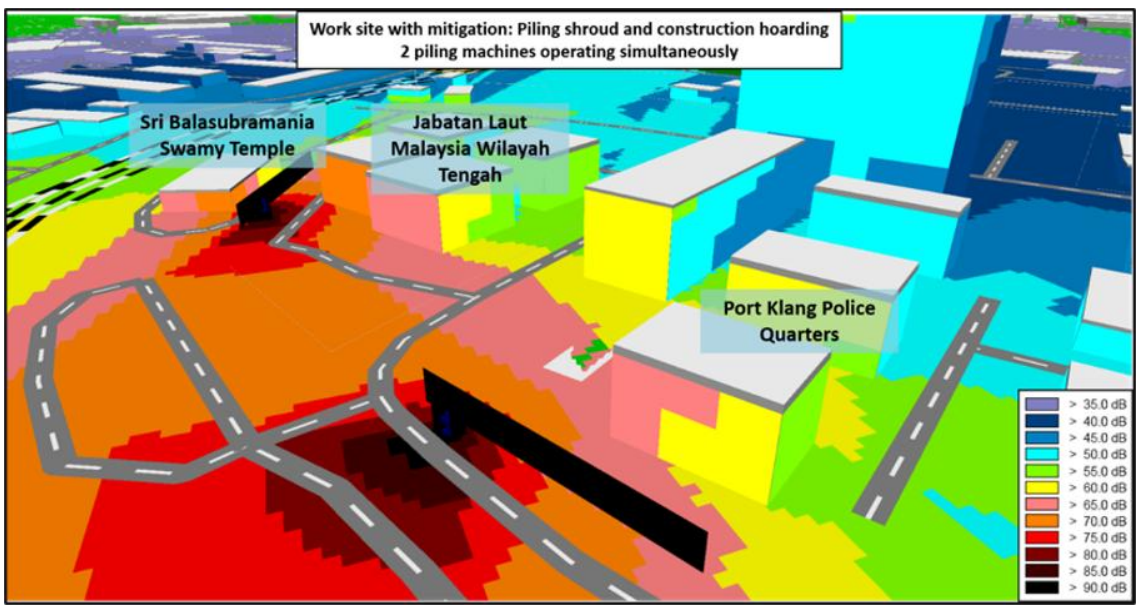
Noise

Assessment Findings

Noise Contour During Construction Phase



Noise Model (Lmax) for Piling Without Mitigation adjacent to Sri Balasubramania Swamy Temple and Port Klang Police Quarters



Noise Model (Lmax) for Piling with Mitigation (Piling Shroud and Construction Hoarding) adjacent to Sri Balasubramania Swamy Temple and Port Klang Police Quarters

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Noise

Operational Phase

Potential Receptors	Potential Impacts	Significance
• SJK (C) Tshing Nian	• Noise levels when train pass-bys the sensitive receptors	Moderate
• Kampung Raja Uda • Sri Balasubramania Swamy Temple • Port Klang Police Quarters		Little

- Jabatan Laut Wilayah Tengah is considered as receptor during construction phase but not an operational noise receptor.
- The building (receptor) is for all intent and purpose is not a "residential" land use (with potential concerns of sleeping disturbance), this site is not deemed a noise-sensitive receptor in the same context as residential dwellings for which night-time disturbance is a noise concern.

Assessment Findings

Based on the noise modelling, the following are the key findings:

- SJK(C) Tshing Nian with prevailing low ambient noise levels is anticipated to have medium residual impact at day and night with mitigation.
- Houses at Kampung Raja Uda, Sri Balasubramania Swamy Temple and Port Klang Police Quarters are expected to have little residual noise impact with mitigation.

The noise modelling demonstrated effective noise reduction to receptors located in proximity to the railway corridor with implementation of noise barriers.

Proposed Mitigations

- Based on the findings of noise modelling, the most effective mitigation measures proposed to be adopted for the ECRL will consist of the following:
  - Noise barriers (3 m to 5 m heights) at ECRL ROW; or
  - Noise barriers/ high walls at receptor boundary.

Proposed Locations of Noise Barriers & Shielding

Receptors	Description	Overall Impact	Estimated Distance from Centreline
SJK (C) Tshing Nian	School	Medium	25
Kampung Raja Uda	Terrace Houses	Little	20
Sri Balasubramania Swamy Temple	Worship Place	Little	10
Port Klang Police Quarters	Quarters	Little	20



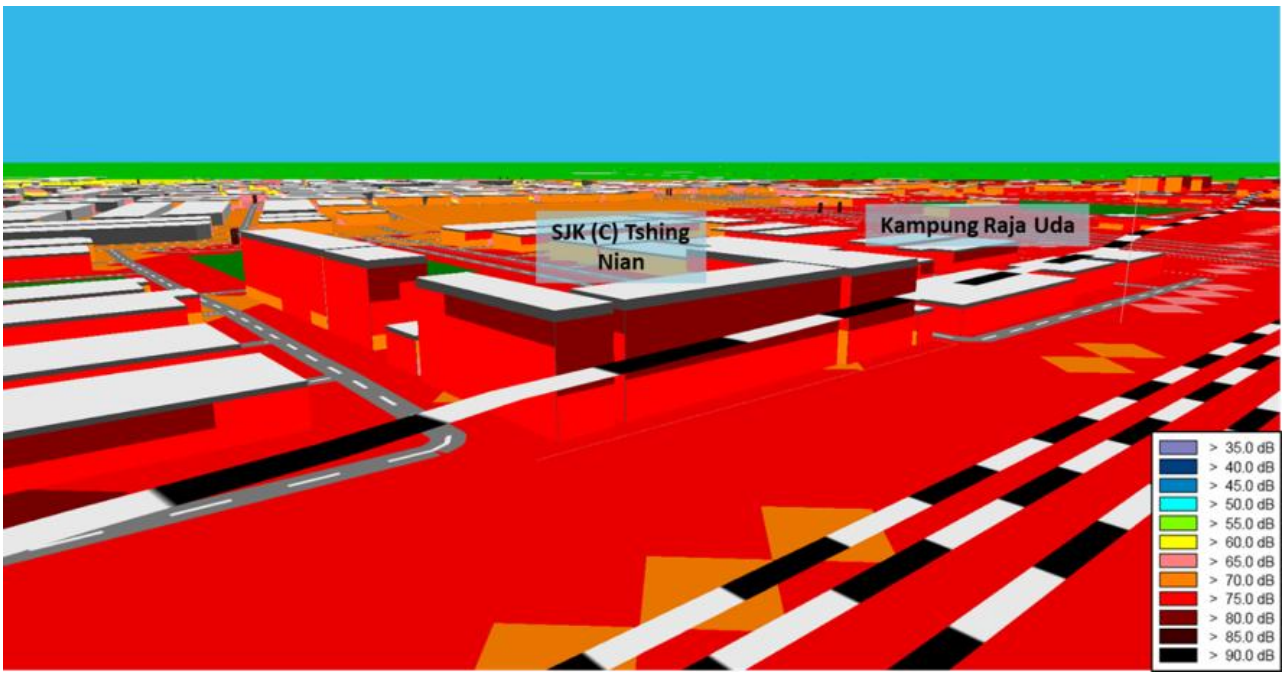


Example of Noise Barriers on Viaducts in ECRL Section B and Section C1A in Pahang

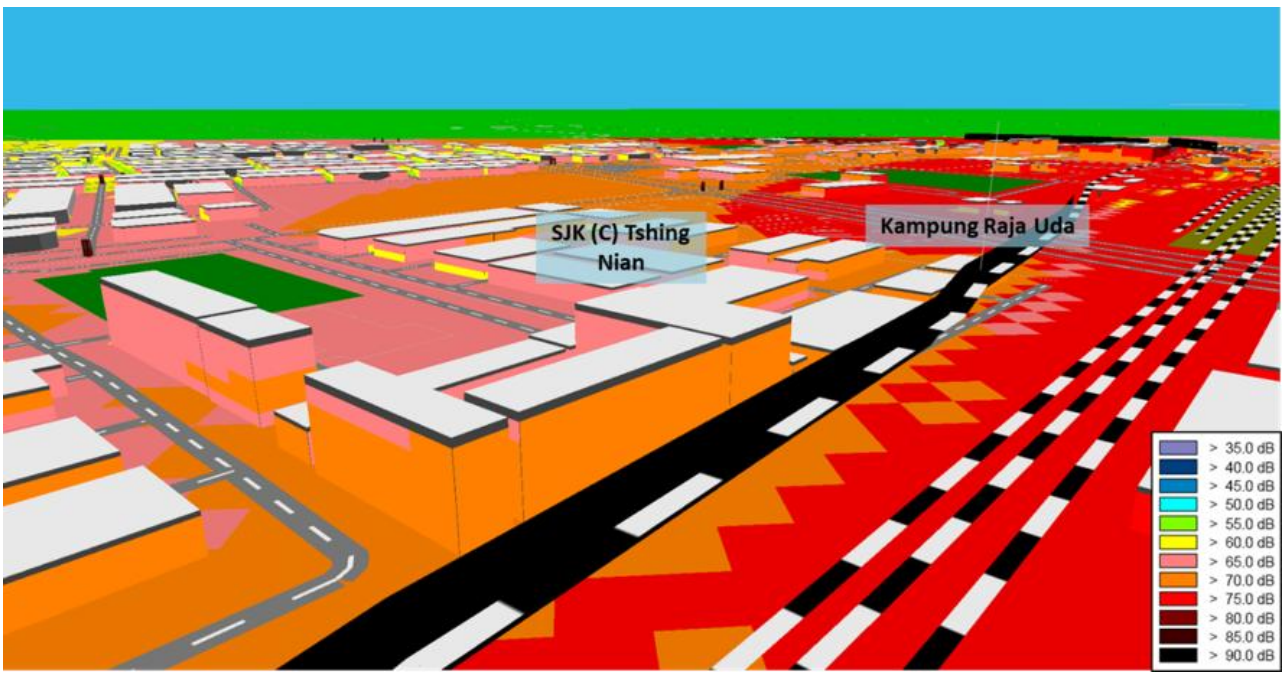
Noise

Assessment Findings

Noise Contour During Operational Phase



Noise Model at Kampung Raja Uda with train at 80 km/hr without mitigation

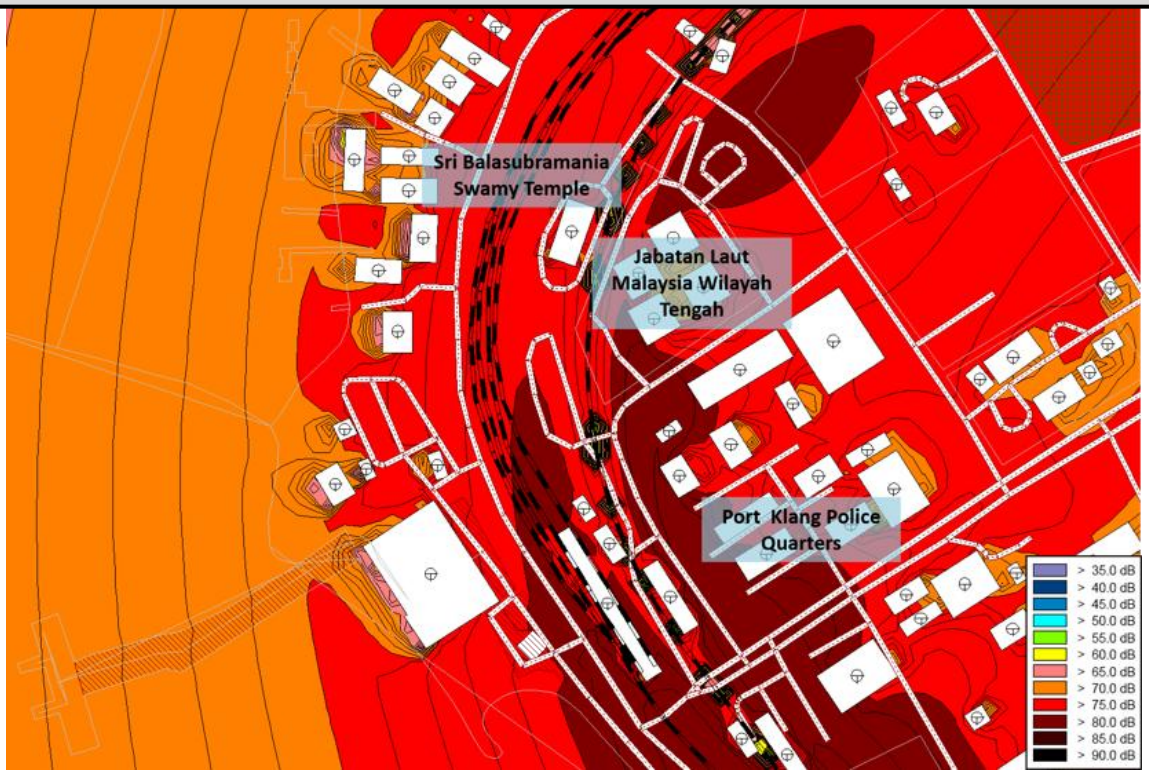


Noise Model at Kampung Raja Uda train at 80 km/hr with mitigation (noise barrier)

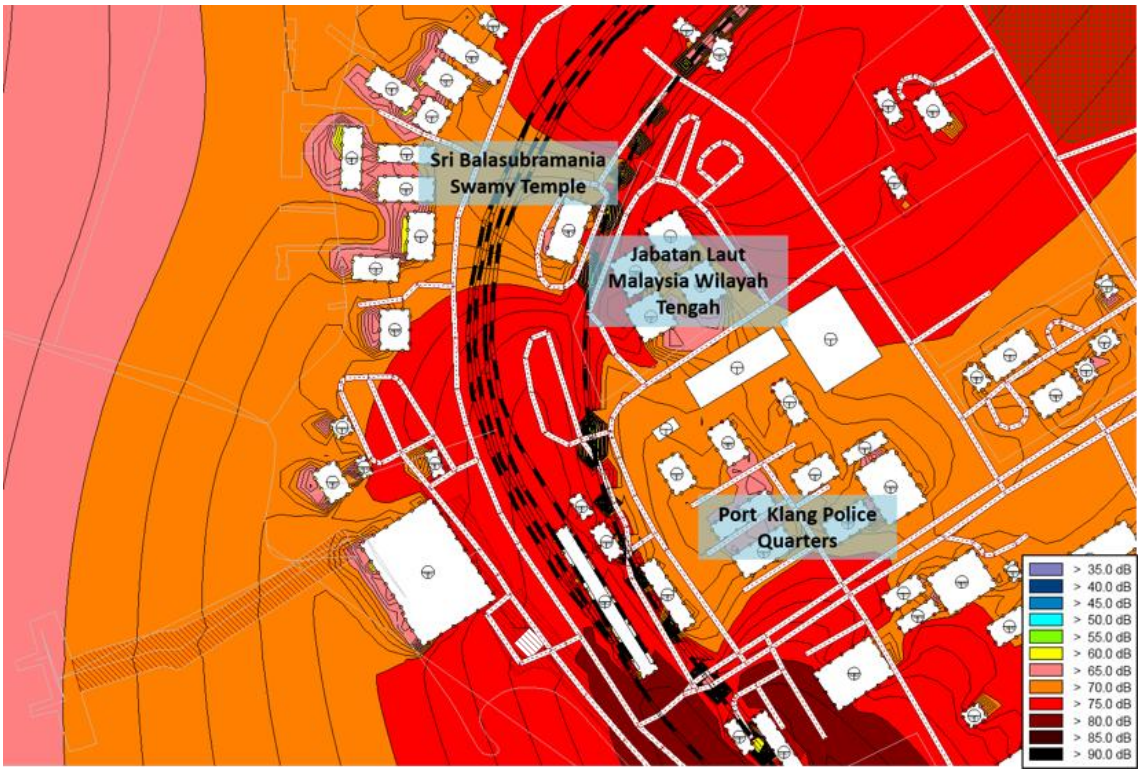
Noise

Assessment Findings

Noise Contour During Operational Phase



Noise Map at Lorong Limbungan, Klang, with train at 80 km/hr without mitigation



Noise Map at Lorong Limbungan, Klang with train at 80 km/hr with mitigation (noise barrier)

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Vibration

Construction Phase

Potential Receptors	Potential Impacts	Significance
• SJK (C) Tshing Nian • Kampung Raja Uda • Sri Balasubramania Swamy Temple • Port Klang Police Quarters	Potential impacts from piling activities may result in: • Damage to buildings • Damage to utilities (e.g. Water supply and gas pipelines, sewers, etc.) • Human comfort • Vibration sensitive equipment	**Moderate**

Assessment Findings

- Piling vibrations are expected within safe limits for cosmetic damage even at 10m from piling.
- The bore pilling vibrations for receptors up to 50m are expected to be highly perceivable to human.
- Reversed circulation drilling piling methods have significantly lower ground vibrations; and imperceptible above ambient actives (0.4mm/s) to receptors at 20m or more away from RCD piling.

Proposed Mitigations

- Vibrations from piling to sensitive receptors could be minimised using low impact energy methods (typically bore piling).
- Continuous vibration monitoring during piling activities in residential and other built-up areas.



Example of Partial closure for piling machine



Example of Partial movable light weight enclosure for movable equipment

Operation Phase

Potential Impacts	Assessment Findings
Trains induced vibrations (ground borne vibrations) from locomotive operations may impact human comfort response (annoyance and structure borne noise)	The key findings for ground-borne vibration propagation analysis: • **Without Mitigation:** Receptors 25m away were estimated to have vibrations Curve 2 with good condition wheels/tracks, and in the order of Curve 4 with worn wheels/tracks without railways vibration mitigation. • **With Mitigation:** On the railway tracks, vibration levels were shown to be within recommended limits (Curve 1) with good wheels/tracks and below Curve 2 with worn wheels/rails conditions at 25 m distance for passenger trains. Receptors at 25m away were estimated to have vibrations Curve 4 with good condition wheels/tracks, and in the order of Curve 8 with worn wheels/tracks without railways vibration mitigation.

Proposed Mitigations

- The use of ballast tracks instead of track slab inherently result in a lower vibration.
- Vibration reductions by under-sleeper pads and resilient track fasteners.



Example of Under-Sleeper Pads Used on Ballasted Tracks and Concrete Sleepers

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Terrestrial Ecology

Construction Phase

Potential Receptors

- Avifauna (e.g: Raptors, waterbirds, shorebirds) utilizing the mangrove fringe and coastline perimeter.
- Fauna species (e.g: Selangor Silvery Langur) navigating the fragmented mangrove environment.
- Long-tailed Macaque and Selangor Silvery Langur in the isolated mangrove patches within the industrial area.

Potential Impacts

- Degradation of mangrove habitat may reduce foraging and nesting sites, while construction activity along the KTMB reserve corridor may further disturb habitat.
- Heightened vehicular activity from heavy construction machinery along the KTMB reserve corridor may disrupt established movement patterns, increasing the possibility wildlife roadkill.



Example Picture of Long-Tailed Macaque Foraging for Food from Trash

- Increased human presence and improper waste management during construction may attract wildlife, which leads to Human-Wildlife Conflict (HWC)

Significance

Low

Assessment Findings

Summary of RIAM criteria scoring for impact to flora and fauna during construction

Impact	Before Mitigation Measures	After Mitigation Measures
Vegetation Loss and Habitat Disturbances	Slight Negative Impact	Slight Negative Impact
Wildlife Roadkill	Minor Negative Impact	Slight Negative Impact
Human-Wildlife Conflicts (HWC)	Minor Negative Impact	Minor Negative Impact

Direction for Vegetation Removal



Proposed Mitigations

Mitigation Action for Habitat Loss and Disturbances

- Phasing of land clearance, beginning from the existing road available to Northport and Westport, then moving toward the more sensitive mangrove area.
- Vegetation clearing activities for access road shall be minimized to only within ROW.

Mitigation Action for Minimizing Human-wildlife Conflicts

- Provision of temporary barriers
- Translocation of conservation significant species such as Selangor Silvery Langur (*Trachypithecus selangorensis*)
- Proper housekeeping in construction areas to minimize attracting nuisance species
- Awareness and education programs on the importance of biodiversity conservation and legislations on wildlife in Malaysia, especially the Wildlife Conservation Act 2010 (amendment 2022).

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Terrestrial Ecology

Operation Phase

Potential Receptors

- Avifauna (e.g: Raptors, waterbirds, shorebirds) utilizing the mangrove fringe and coastline perimeter.
- Fauna species (e.g: Selangor Silvery Langur) navigating the fragmented mangrove environment.
- Long-tailed Macaque and Selangor Silvery Langur in the isolated mangrove patches within the industrial area.

Potential Impacts	Significance
• Potential of wildlife rail-kill particularly when track passing near mangrove forest • Human-wildlife conflict (HWC) if wildlife continues to forage in areas surrounding the infrastructure	**Low**

Assessment Findings

Summary of RIAM criteria scoring for impact to flora and fauna during operation

Impact	Before Mitigation Measures	After Mitigation Measures
Wildlife Rail-kill	Slight Negative Impact	Slight Negative Impact
Human-Wildlife Conflicts (HWC)	Minor Negative Impact	Slight Negative Impact

Proposed Mitigations

Mitigation Action for Minimising Wildlife Rail-kill

- Provision of barriers and fences to prevent wildlife encroachment onto the alignment

Mitigation Action for Minimising Human-wildlife Conflicts

- Periodic waste collection
- Deploy wildlife-proof waste receptacles featuring secure, self-closing lids across all common areas



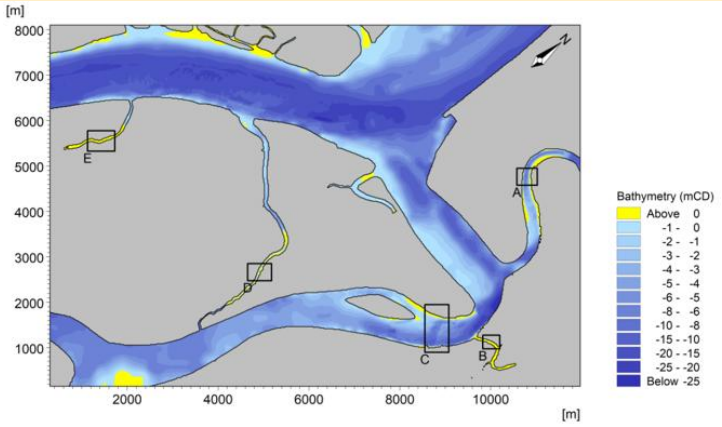
Example of Barrier Along the Alignment

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Marine Hydraulic

Potential Receptors	Potential Impacts	Significance
• Environmental Sensitive Areas (ESAs) which include Sungai Klang, Sungai Aur, Selat Lumut and Sungai Chandong Besar. • Fish Landing points • Fisheries • Recreational and institutional • Tourism	Short term impact during construction: • Sediment spills from the pilling activities. The long-term impacts: • Water Levels and Current Flow • Sediment Transport • Water Quality	**Not Significant**

Assessment Area



- Point A at Sungai Klang
- Point B at Sungai Aur
- Point C at Selat Lumut
- Point D at Sungai Chandong Besar
- Point E at Sungai Perigi Nanas

Short Term Impact – Sediment Spills

Assessment Findings

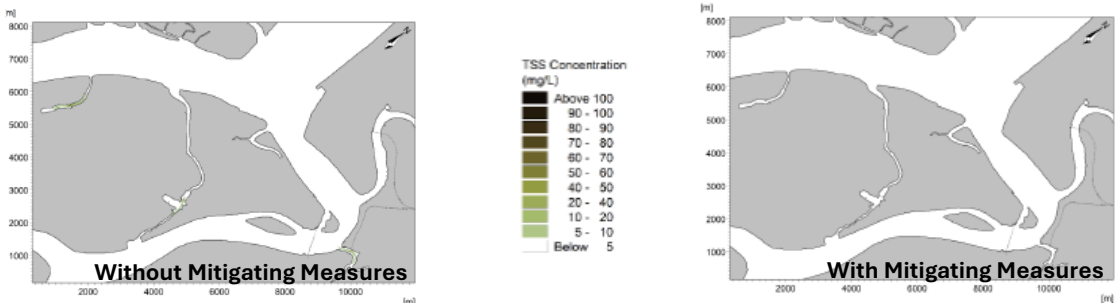
Scenario 1: Without Mitigating Measures

- Mean and maximum excess suspended sediment concentrations from pilling activities are generally localised at the source points and below 5 mg/L at identified ESAs and receptors, indicating no significant impact on the ESAs and receptors.

Scenario 2: With Mitigating Measures

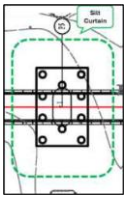
- The results indicate that the mean excess suspended sediment concentrations at all project areas remained below 5 mg/L.

Maximum excess suspended sediment concentration due to piling works (inter-monsoon condition)



Proposed Mitigations

- Deployment of silt curtain/cofferdam
- Water quality Monitoring
- Periodic bathymetric and nearshore surveys quarterly during construction



Proposed silt curtain placement around pier during piling works

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Marine Hydraulic

Long Term Impact – Water Levels & Current Flow

Assessment Findings

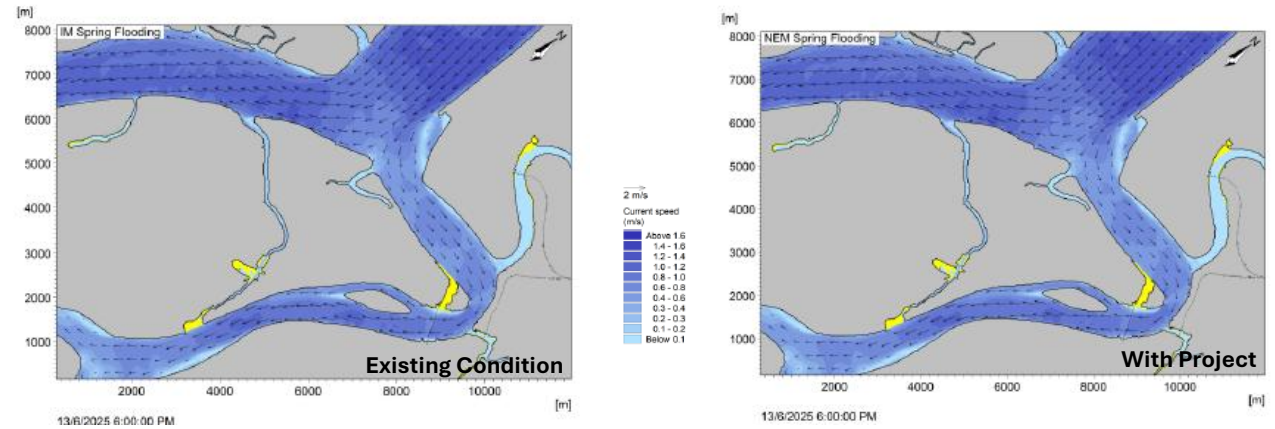
Scenario 1: Existing Condition

- Low mean velocities: 0.1 m/s at Sg. Klang, 0.2 m/s at Sg. Aur, Sg. Chandong Besar and Sg. Perigi Nanas; and 0.6 m/s at Selat Lumut with little variation across conditions.
- Maximum current speeds: 1.2 m/s at Selat Lumut, 0.6 m/s at Sg. Aur, Sg. Chandong Besar and Sg. Perigi Nanas; and 0.3 m/s at Sg. Klang.

Scenario 2: With Project

- Negligible change in mean current speeds at the permanent bridge locations across all climatic conditions.
- Changes in maximum current speeds are generally localized to the immediate vicinity of the bridge piles
- No discernible changes in water levels at the ESAs.

Current flow pattern (inter-monsoon condition)

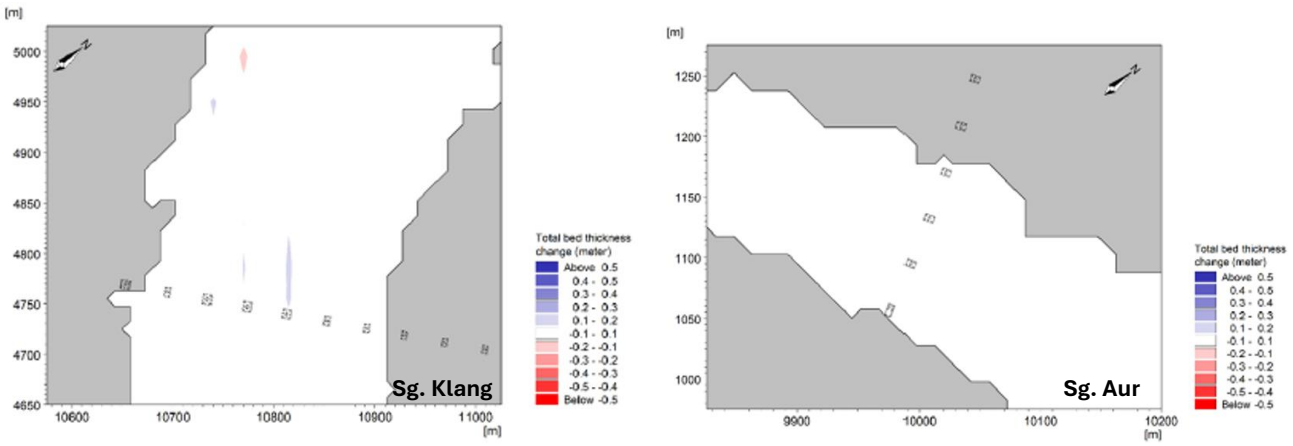


Long Term Impact – Sediment Transport

Assessment Findings

- The results indicate no significant changes in bed levels at most river crossings due to the presence of the bridges except at Sungai Klang and Selat Lumut.
- No significant changes in bed levels are predicted at the identified ESAs except for Jeti Muhibbah where minor change of about 0.1 m/year is observed.

Projected annual bed level change in the vicinity of bridge crossing

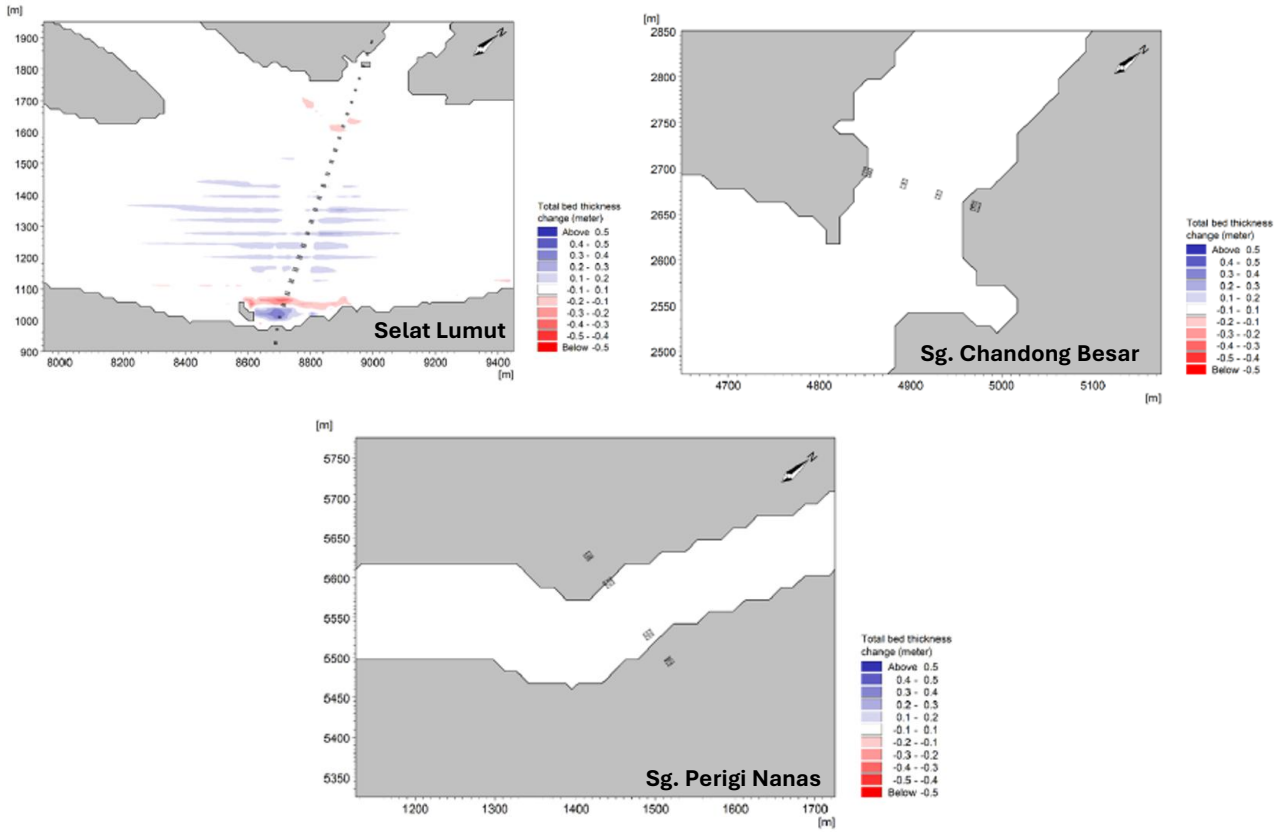


POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Marine Hydraulic

Long Term Impact – Sediment Transport

Projected annual bed level change in the vicinity of bridge crossing



Long Term Impact – Water Quality

Assessment Findings

Flushing performance for the "with Project" condition is consistent with the existing scenario, indicating **no significant impact on water quality**.
Overall, both existing and "with Project" conditions show no significant differences in flushing performance, with all T_{37} values well below the 96-hr PIANC threshold, indicating compliance with accepted water quality guidelines.

T_{37} at extraction points for different climatic conditions: Existing and 'with Project' condition

Climatic Condition	T_{37} (hrs)																			
	Spring										Neap									
	Sg. Klang		Sg. Aur		Selat Lumut		Sg Chandong Besar		Sg Perigi Nanas		Sg Klang		Sg Aur		Selat Lumut		Sg Chandong Besar		Sg Perigi Nanas	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
Northeast Monsoon	3	3	3	3	1	1	3	3	3	3	2	2	1	1	1	1	13	13	12	12
Inter-monsoon	3	3	3	3	1	1	3	3	3	3	2	2	1	1	1	1	13	13	12	12
Southwest Monsoon	3	3	3	3	1	1	3	3	3	3	2	2	1	1	1	1	10	10	12	12

**Note:*
E – Existing Conditions
P – "With Project" Conditions

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Fisheries

Potential Receptors

- Marine capture fisheries from the 16 fish landing points (e.g: Kunci Air Sg. Aur/Pandamaran, Sg. Aur, Jalan Tangki, Telok Gong, Jeti Perajurit, Jeti Orang Asli Pulau Indah and Sg. Chandong Besar)
- Recreational fisheries: Shore-based anglers at Tg. Harapan, Jambatan Muhibbah, Laguna Park and Kg. Teluk Nipah; boat-based anglers staged at Sg. Delek, Sg. Sireh, Bandar Sultan Sulaeiman, Jeti Muhibbah, Telok Gong, Laguna Park P. Indah and Kg. Teluk Nipah; recreational fee pond and kelong/rumah rakit operators at Sg. Klang and Selat Lumut.

Construction Phase

Potential Impacts	Significance
• Temporary impediment to fishing grounds • Affect the income and livelihood of fishermen. • Obstruction of fishermen access to sea, incur additional fuel costs and collision risk to alter navigational route. • Relocation of anglers due to disturbance to shore-based and boat-based angling activities near construction zones	**Low**

Assessment Findings

Magnitude of the impact with mitigation measures:

- Marine Capture Fisheries: **Significant** for fishermen undertake fishing activities within Selat Lumut as the proposed railway bridge alignments are the main navigational routes for fishermen.
- Recreational Fisheries: **Low** (Sediment plume dispersion modelling indicated that Sg. Klang and Selat Lumut exhibit very low impact with maximum concentration recorded below 5 mg/L. indicates minimal dispersion of suspended sediment for both with mitigation and without mitigation scenario)

Proposed Mitigations

- The project proponent should closely and continuously liaise with the fishing communities prior and during the construction phase to ensure a satisfactory agreement is reached with respect to the construction schedule and movement of barges for transportation of construction material.
- Ensure fishermen access to sea is not obstructed during construction period.
- Provision of buoys and navigational lights along the proposed pilling area to avoid any risk of accidents.
- Suitable compensation/ex-gratia in terms of replacement of fishing gear or fishing boat should be provided by the Project Proponent for fishermen affected (in case of accidents) due to the construction activities.
- Conduct periodical monitoring (**half yearly basis**) to engage with fishing communities regarding any major changes or trends with respect to fish landings within the impact zone.
- Conduct marine water quality monitoring to ensure that the construction activities will not cause any significant deterioration to the surrounding water quality.

Operation Phase

No significant impacts during the operational phase. Hence, no mitigation measures are proposed for aquatic fauna, capture fisheries, and recreational fisheries.

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Marine Ecology & Habitat

Construction Phase

Potential Receptors

- Phytoplankton, zooplankton, microbenthic, fish fauna and marine mammals within Sg. Klang, Sg. Aur, Selat Lumut, Sg. Chandong Besar and Sg. Perigi Nanas..
- Mangrove forest at the northern end of Pulau Indah

Potential Impacts	Significance
• **Plankton:** Elevated suspended sediment potentially lowering primary productivity of plankton and disrupting the aquatic food web. • **Macrobenthos:** Potential destruction of spawning areas, burial and smothering or suffocation due to seabed disturbance. Total and permanent loss within the piling footprint. • **Fish Fauna**: Potential gill clogging/abrasion reduced foraging efficiency, and disrupted spawning and reproduction of fish fauna, potentially shifting species composition toward sediment-tolerant species. Potential behavioural disturbance, auditory damage or mortality from piling-related noise and vibration. • **Marine Mammals:** Underwater piling noise causing signal masking, acoustic trauma, behavioural changes (altered vocalisation, swim speed, surfacing interval), and non-auditory effects such as bubble formation and stress. • **Mangroves:** Clearing of mangrove vegetation may result in leaching of organic matter during decomposition.	**Low**

Assessment Findings

Magnitude of the impact with mitigation measures:

- Plankton: Low
- Macrobenthos: Low (Significant at piling footprints)
- Fish Fauna: Low
- Marine Mammals: Low

Proposed Mitigations

Mitigations for Aquatic Ecology

- Deploy silt curtains at pilling areas to confine the movement of suspended fines.
- Regular checking and maintenance on the barge (if any) and machinery involved
- Use hydraulic hammer to reduce the sound pressure during the pilling activity.
- Half year basis of marine biological resource monitoring throughout the construction phase
- Monthly water quality monitoring throughout the construction phase

Mitigations for Marine Mammals

- Implement Marine Mammals Monitor/Watch Plan
- Establish exclusion zone of at least 500 m from the construction site (BHPbilliton, 2011).
- Routinely maintain and inspect noise-generating
- Equipment should operate in compliance with appropriate industry equipment noise standards.

Mitigations for Mangrove

- The clearing footprint for mangrove area shall be limited strictly to the approved working corridor.
- Temporary disturbance areas shall be reinstated immediately after completion of works
- Regular site inspections shall be carried out during clearing operations to ensure proper biomass handling and disposal.

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Marine Ecology and Fisheries

Operational Phase

Potential Receptors

- Fish landing points, fishing grounds, and recreational fishing activities at Selat Lumut, particularly in the vicinity of Jeti Muhibbah.
- Mangrove near railway infrastructure (embankments, track foundations, drainage structures) within the operational railway corridor at the northern end of Pulau Indah

Potential Impacts

- Minor change in sediment transport (approximately 0.1 m/year) and a maximum current speed difference of -0.04 m/s near Jeti Muhibbah at Selat Lumut, with flushing efficiency and bed levels otherwise comparable to existing conditions across both spring and neap tides and all monsoonal periods.
- Natural mangrove recolonisation within the cleared railway corridor may produce root systems that interfere with embankments, track foundations or drainage structures if saplings are allowed to mature, potentially affecting soil stability and structural integrity over time.

Significance

Low

Assessment Findings

There will be **no significant impacts** expected where the aquatic ecology including marine mammals, fisheries and recreational fisheries activities are concerned during the operational phase

Proposed Mitigations

- Implement mangrove habitat enrichment using native species to compensate for permanent vegetation loss at a minimum restoration ratio of 1:2, subject to ecological assessment.
- Establish a long-term ecological monitoring programme (5–10 years) to assess vegetation survival, regeneration and habitat functionality, with supplementary planting where necessary.
- Conduct regular vegetation inspections within the railway corridor and selectively trim or remove vegetation only where it poses a risk to railway safety or infrastructure.
- Restrict vegetation clearing strictly to the approved railway corridor to allow natural mangrove regeneration and minimise disturbance to surrounding habitats.

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Marine Traffic and Navigation

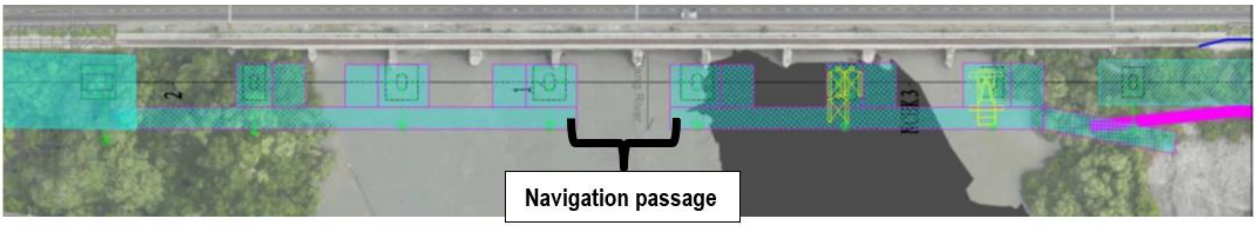
Potential Receptors	
	• Small craft • Fishing boats • Local crafts

Construction Phase

Potential Impacts	Significance	Assessment Findings
• No movement of large commercial vessels or deep-draft vessels at ECRL bridge crossing areas. Impact on overall marine traffic flow is expected to be limited to immediate work area and temporary in nature. • Temporary reduction in available navigational width and maneuvering space at bridge crossings at Selat Lumut, Sg Klang, Sg Aur and Sg Chandong Besar. • Risk of vessel collision. • Presence of floating debris or construction materials	**Moderate**	The level of impact is considered **low to moderate** before mitigation and can be reduced to **low** with the implementation of proper marine safety control measures.

Proposed Mitigations

- Provide dedicated navigation passage/route for small vessels and fishing boats to pass under temporary bridges at all times.
- Marine Traffic Management Plan shall be prepared prior to the commencement of works.
- Appropriate navigational safety measures shall be provided at construction area including warning signage, temporary marker buoys, reflective markers, marine safety lighting and other temporary navigation aids where required.
- Ensure no waterway obstruction and maintain good housekeeping control.
- Communication and coordination with authorities and marine users.



Navigation passage for temporary trestle bridge of Sg. Klang bridge on Northport Alignment

Operation Phase

Potential Impacts	Significance
• Permanent navigation constraint due to the permanent bridge configuration	**Low**

Assessment Findings	Proposed Mitigations
With proper bridge marking, warning signage, maintenance of navigational clearance and safe navigation practices, the residual impact on marine traffic is assessed as **low**.	• New bridges will have same vertical clearance as existing bridges. • Maintain designated navigation opening beneath the bridges to allow safe passage for existing marine traffic. • Installation of permanent warning signage of the presence of bridge • Inspection, maintenance and incident management

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Air Quality

Construction Phase

Potential Receptors	Potential Impacts	Significance
• Air Sensitive Receptors (ASRs), i.e. residential areas, places of worship, educational institutions within 250m of ROW	• Fugitive dust generation during earthworks and construction activities • Gaseous emissions from the operation of the construction equipment and machineries.	**Moderate**

Assessment Findings

Overall, impacts to ASRs are generally of low risk, with localised medium-risk areas identified below.

Northport Alignment
Parts of Kampung Keretapi, Surau Al-Hidayah, parts of Kampung Raja Muda

Westport Alignment
Parts of Kampung Raja Muda, Arulmigu Sri Nagammal Alayam Temple, Persatuan Penganut Lian Tiong Keng, SJK (C) Tshing Nian, Sri Balasubramania Swamy Temple

Proposed Mitigations

- Install perimeter hoarding/barriers and wheel-washing facilities at site entrances and exits.
- Minimize exposed soil by carrying out site clearing and earthworks in stages, and cover exposed surfaces and stockpiles with tarpaulin, erosion control blankets, or vegetation.
- Regularly spray water on exposed areas, stockpiles, and haul roads, with increased frequency during dry weather.
- Control dust from vehicles by enforcing speed limits on unpaved roads, covering trucks carrying loose materials, minimizing material drop heights, and maintaining clean haul roads.
- Regularly maintain construction vehicles and equipment, prohibit smoke-belching vehicles, and minimize engine idling.
- Avoid major dust-generating activities during strong winds or prolonged dry conditions where practicable.
- Conduct regular visual dust inspections and ambient air quality monitoring (PM_{10} and $PM_{2.5}$) and implement corrective actions when necessary.

Examples of mitigation measures for air quality


Wheel Washing Facility


Tarpaulin covered truck


Water Bowser

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Air Quality

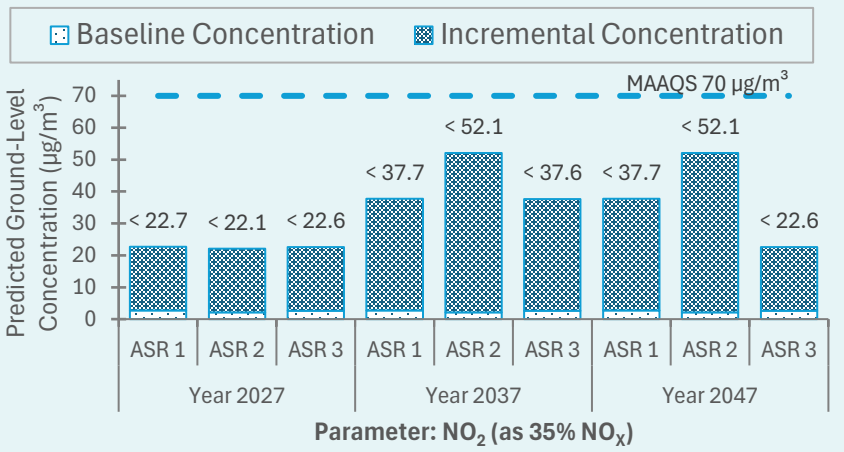
Operation Phase

Potential Receptors	Potential Impacts	Significance
• Air Sensitive Receptors (ASRs), i.e. residential areas, places of worship, educational institutions within 2.5 km of project alignment	• Emissions from diesel powered locomotives lowering ambient air quality	Low

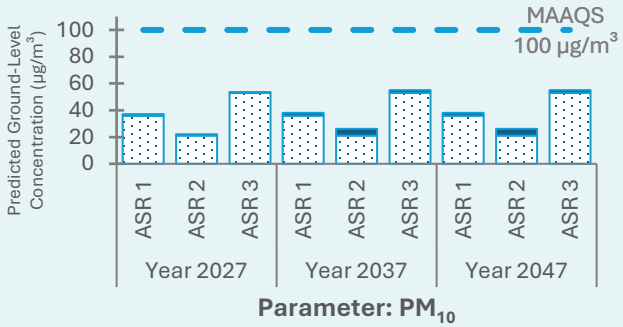
Assessment Findings

Based on the air modelling results, the predicted concentrations for all assessed pollutants **comply** with the relevant MAAQS limits for all applicable averaging period.

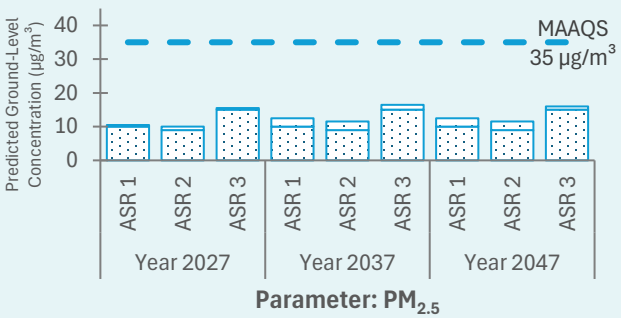
NO_x has the highest incremental concentration. All the other air quality parameters had negligible increments.



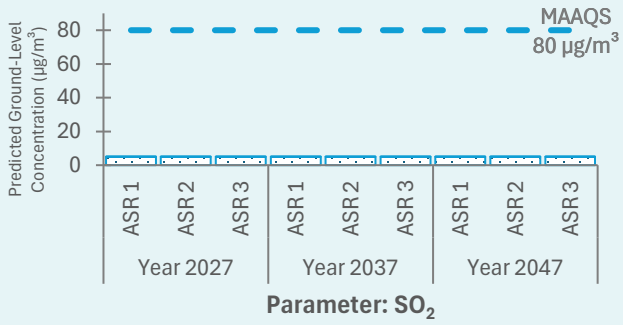
Parameter: NO_2 (as 35% NO_X)



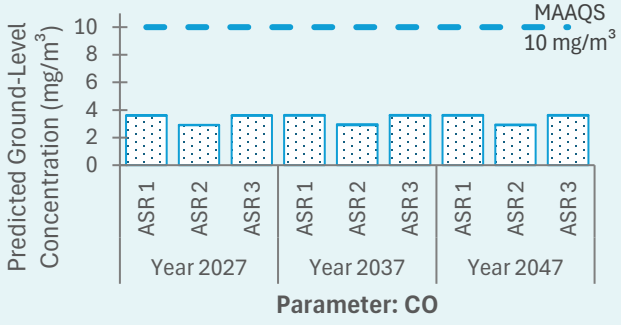
Parameter: PM_{10}



Parameter: $PM_{2.5}$



Parameter: SO_2



Parameter: CO

Proposed Mitigations

- Use well-maintained, low-emission diesel locomotives and low-sulphur diesel fuel.
- Minimise locomotive idling, conduct regular maintenance and emission inspections.
- Train operators on proper locomotive operation and maintenance.
- Cover dusty cargo during transport and use dust suppression measures during loading and unloading.
- Stabilise exposed soil, maintain railway tracks, and apply water spraying during dry weather where necessary.
- Enforce vehicle speed limits within rail yards to minimise dust generation.
- Monitor locomotive emissions regularly and maintain maintenance records.

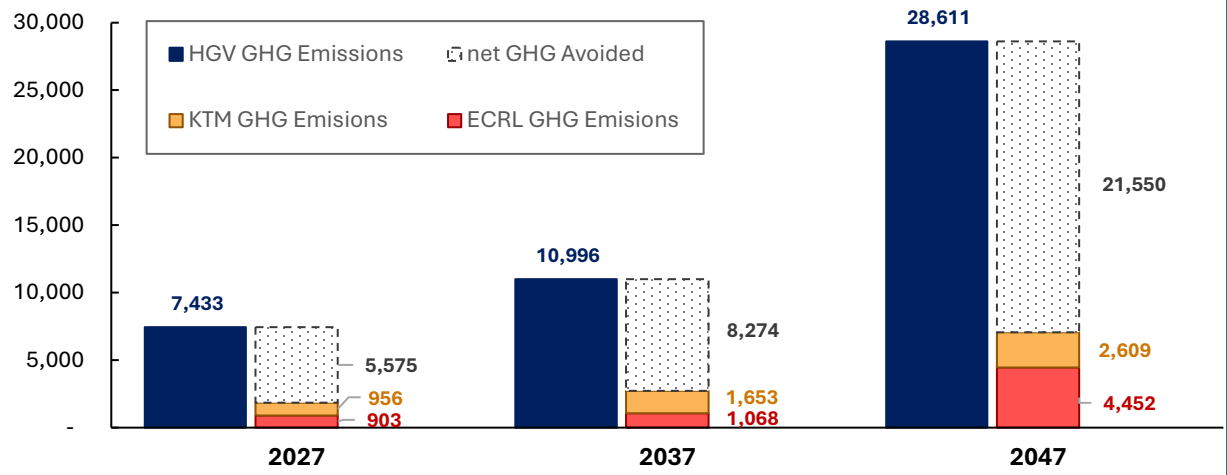
POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Greenhouse Gas (GHG) Emissions

Operation Phase

Potential Receptors	Potential Impacts	Significance
• National Determined Contributions (NDCs) • Climate Change Mitigation	• Lowering the GHG emissions for the transport sector.	**Positive Impact**

Assessment Findings



The GHG emission from freight transport increase throughout the years as freight volumes are projected to grow. Overall, rail transport-related GHG emissions are expected to remain lower than under the business-as-usual road transport scenario.

The modal shift from Heavy Goods Vehicles (HGVs) to freight rail (KTM and ECRL) will significantly reduce the GHG emissions emitted since trains have a lower rolling friction and relatively higher carrying capacity.

Proposed Mitigations

- Use fuel-efficient locomotives and carry out regular maintenance to reduce fuel consumption and emissions.
- Optimise train operations to reduce idling, empty trips, and improve freight efficiency.
- Gradually adopt lower-carbon fuels and cleaner locomotive technologies where feasible.
- Electrify freight yard facilities and utilise renewable energy

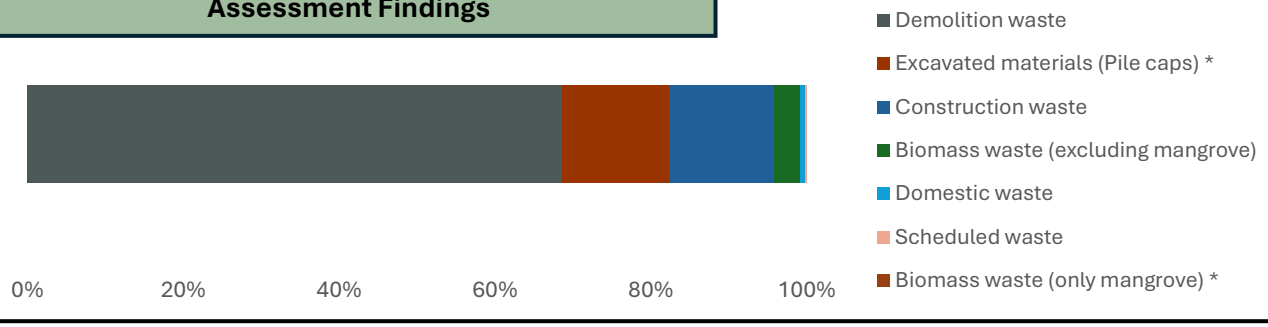
POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Waste Management

Construction Phase

Potential Receptors	Potential Impacts	Significance
• Construction workers • Residents in nearby residential areas	• Contamination of waterway & degradation of water quality • Increase flooding risk • Increased sedimentation and disruption of water flow • Health & hygiene risk	**Moderate**

Assessment Findings



Proposed Mitigations

- Management based on waste management hierarchy
- Proper storage & handling of materials
- Maximization of reduce, reuse & recycle practices
- Management of scheduled waste as per Environmental Quality (Scheduled Wastes) Regulations 2005
- Waste disposal in licensed facility by licensed contractor


Example of recycling bins at base camps


Example of scheduled waste container


Example of construction waste segregation on site


Example of scheduled waste storage area

Operation Phase

Potential Receptors	Potential Impacts	Significance
• Train operation crew • System building staff	• Environmental Pollution • Health & hygiene risk • Aesthetic and Social Impact • Air Pollution	**Low**

Proposed Mitigations

- Provision of adequate rubbish bins/disposal facility
- Proper segregation of waste, especially recyclables
- Regular waste collection and disposal
- Management and storage of scheduled waste as per EQR (SW) 2005

Sample photo for spill kit used to manage spillage of schedule waste



POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Socioeconomy

Construction & Operation Phase

Potential Receptors

- Landowners, residents, businesses, and nearby sensitive receptors.
- Schools, places of worship, healthcare, institutional, and community facilities.
- Commercial, industrial, logistics, and port operators.
- Orang Asli communities.
- Fishermen and river/coastal users.
- Road users, pedestrians, workers, and public facility users.

Significance

Moderate

Potential Impacts

Construction Phase

- Residual concerns over land acquisition, compensation, access, and business continuity.
- Community concerns regarding construction impacts, safety, and project implementation.
- Social concerns related to the presence of foreign workers.

Construction & Operation Phase

- Restricted access.
- Disruption to fishermen's livelihoods and river navigation
- Impacts on Orang Asli access and traditional livelihoods.
- Disruption to community facilities, religious or institutional activities.
- Disruption to commercial, industrial, and port operations.

Operation Phase

- Traffic and parking changes rail operations.
- Community concerns over long-term noise, vibration, safety, access, flooding, and livelihood.
- Positive impacts through improved port connectivity, freight movement, reduced road congestion, and economic growth.

Proposed Mitigations

Construction Phase

- Conduct stakeholder engagement and grievance management.
- Implement traffic, access, and public safety measures.
- Implement good site management and environmental controls.
- Coordinate with relevant authorities, utility providers, and port operators.
- Protect the livelihoods of affected communities, including fishermen & Orang Asli.

Construction & Operation Phase

- Maintain continuous stakeholder engagement, communication, and an effective Grievance Redress Mechanism (GRM).
- Protect sensitive receptors through regular environmental and social monitoring, with adaptive management and corrective actions where necessary.

Operation Phase

- Manage operational impacts through routine inspection, maintenance, and monitoring.
- Maintain safe access, community connectivity, river navigation, and livelihood continuity for surrounding communities, including fishermen and Orang Asli.
- Coordinate traffic, freight, and port operations to minimise disruptions and maintain efficient logistics and business activities.

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Heritage

Construction Phase

Potential Receptors	Potential Impacts	Significance
• Dermaga Port Swettenham (Port Klang) • KTM Staff Quarters, Lorong Gelam • Timber Quarters, Jalan Padang • KTMB Railway Arch Bridge • Klang River (Alignment Jalan Kastam Station to Northport)	• Visual impacts on heritage assets and their surroundings. • Alteration of the historic streetscape and landscape character. • Temporary access and traffic disruption to heritage sites. • Noise, vibration, and dust affecting heritage assets and visitor experience.	**Low**

Proposed Mitigations

- Conduct Heritage Awareness Induction for all construction personnel.
- Appoint an archaeologist if archaeological remains are discovered and comply with all requirements under the National Heritage Act and JWN.
- Install protective hoarding/barriers around heritage assets to prevent damage and vandalism.
- Conduct regular monitoring by a registered Conservator and report any damage immediately to JWN.
- Restore any accidental damage to heritage assets in accordance with JWN requirements.
- Submit regular progress and monitoring reports to JWN throughout construction.

Assessment Findings

The overall range of impacts from **'Neutral to Slight'**

Asset No.	Heritage Asset	Approx. Distance from ROW	Impact
BH01	Dermaga Port Swettenham (Port Klang)	70 m	Slight
BH02	KTM Staff Quarters, Lorong Gelam	150 m	Neutral/Slight
BH03	Timber Quarters, Jalan Padang	120 m	Neutral/Slight
BH04	KTMB Railway Arch Bridge	Within the ROW	Neutral/Slight
AC01	Klang River (Alignment Jalan Kastam Station to Northport)	Within the ROW	Unknown Potential

Operation Phase

Potential Impacts	Significance
The Northport alignment is not expected to impact cultural heritage assets, while the Westport alignment is expected to result in only minor visual impacts on nearby heritage assets from the elevated railway structures.	Low

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Public Health

Potential Receptors	Potential Impacts	Significance
• SJK (C) Tshing Nian • Kampung Raja Uda • Sri Balasubramania Swamy Temple • Port Klang Police Quarters	• $PM_{2.5}$ and PM_{10}: Increase cardiovascular and respiratory mortality. • Water pollution: Transmission of waterborne diseases • Noise: Hearing loss, hypertension, heart disease, sleep disturbance, and decreased school performance. • Vibration: Fatigue, stomach problems, headache, loss of balance • Sewage and wastewater: Intestinal and lung infections.	**Low**

Proposed Mitigations

Construction Phase
- Implement adequate mitigation measures to minimize air pollutant and noise levels.
- Conduct noise monitoring and operation schedule to avoid night time.
- Lower vibration by considering reversed circulation drilling method for piling instead of bored piling

Operation Phase
- Proper management of mitigation measures to avoid air quality from affecting the sensitive receptors in close distance to freight trains.
- Lower noise levels especially during night time to avoid sleep disturbances.

Construction Phase

Assessment Findings during Construction Phase

Hazards	Likelihood	Impact	Risk Level	Risk Grading
Air Pollution	Unlikely [2]	Minor [2]	4	Low
Water Pollution	Rare/Remote [1]	Minor [2]	2	Very Low
Aquaculture food contamination	Rare/Remote [1]	Minor [2]	2	Very Low
Noise	Possible/ Ocassionally [3]	Minor [2]	6	Moderate
Vibration	Unlikely [2]	Minor [2]	4	Low
Collision and Accident	Unlikely [2]	Major [4]	8	Moderate

Operational Phase

Assessment Findings during Operation Phase

Hazards	Likelihood	Impact	Risk Level	Risk Grading
Air Pollution	Unlikely [2]	Minor [2]	4	Low
Water Pollution	Rare/Remote [1]	Minor [2]	2	Very Low
Aquaculture food contamination	Rare/Remote [1]	Minor [2]	2	Very Low
Noise	Possible/ Ocassionally [3]	Minor [2]	6	Moderate
Vibration	Unlikely [2]	Minor [2]	4	Low
Collision and Accident	Rare/Remote [1]	Major [4]	4	Low

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Land Traffic

Potential Receptors

- Jalan Parang
- Pulau Indah Highway (Hwy)
- Jalan Limbungan

Traffic condition indicated by Level of Service (LOS)

LOS A : Free-flow
LOS B : Stable flow
LOS C : Restricted flow
LOS D : High-density flow
LOS E : Unstable flow
LOS F : Forced flow

Construction Phase

Potential Impacts	Significance
• Reduce roadway operating efficiency • Localized congestion • Increase travel time due to temporary lane closures, road shoulder occupation, traffic diversions, and intermittent traffic control measures • Increasing road safety risks	**Moderate**

Proposed Mitigations

Implementation of Traffic Management Plan (TMP):

- Provision of advance warning signage
- Off-peak scheduling of construction vehicle movements
- Close coordination with port operators and relevant authorities
- Designated haulage routes
- Traffic marshals
- Upgrade Jalan Parang and Pulau Indah Highway to 6-lane 2-way dual carriageway and upgrade Jalan Limbungan to 4-lane single carriageway

Operation Phase

Potential Impacts	Significance
• Reduction in truck volumes along major port access routes • Enhance freight handling efficiency • localized traffic impacts at rail–road interface points	**Low**

Proposed Mitigations

Upgrade road by widening Pulau Indah Highway to 6-lane dual carriageways and Jalan Limbungan to 4-lane single carriageway

Assessment Findings

- During construction analysis shows road and all junctions will operate at an acceptable level of service.
- The residual traffic impact during the construction phase is assessed as **Moderate** and manageable through the adoption of appropriate mitigation measures.
- During operation, minor and localized traffic disruption. **Low** and intermittent significance

Summary of Road Performance

SL	ROAD	LOS AM(PM)	
		Construction Phase (2026 – 2029)	Operation Phase (2029)
SL1 Jalan Parang	Northbound	E (D)	E (D)
	Southbound	C (D)	C (D)
SL2 Pulau Indah Highway	Eastbound	B (C)	B (C)
	Westbound	D (C)	D (D)
SL3 Jalan Limbungan	Northbound	D (D)	D (D)
	Southbound	D (E)	D (E)

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Land Traffic

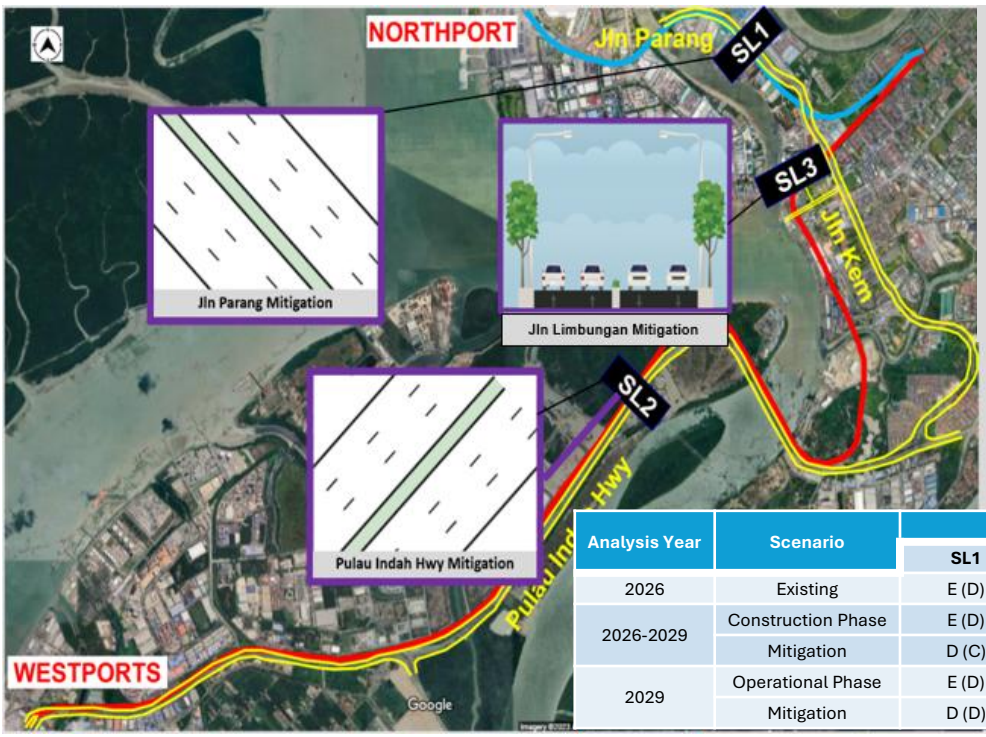
Construction Phase

Assessment Findings

Summary of Junction Performance

Level Crossing/ Adjacent Junction	Junction Name	LOS AM(PM)	
		Construction Phase (2026 – 2029)	Operation Phase (2029)
Northport Line			
LC1/JN1	Jln Parang - Industrial Area	F (C)	F (D)
LC2/JN2	Jln Parang - Industrial Area	F (C)	F (D)
LC3/JN3	Jln Parang - Industrial Area	F (C)	F (D)
Westport Line			
LC1/JW1	Persiaran Raja Muda Musa - Jln Syahbandar - Southport	B (B)	C (C)
LC6/JW2	Pulau Indah Hwy - Persiaran Pelabuhan Barat	B (B)	B (B)
LC7/JW3	Pulau Indah Hwy - Persiaran Sungai Pinang	B (B)	B (B)
LC8/JW4	Pulau Indah Hwy - Jln Perigi Nanas 6/1 - Jln Perigi Nanas 8/9	C (C)	C (C)
LC9/JW5	Pulau Indah Hwy - Westport	C (B)	D (C)

Screenlines Mitigation during construction phase



SL1 & SL2 Mitigation

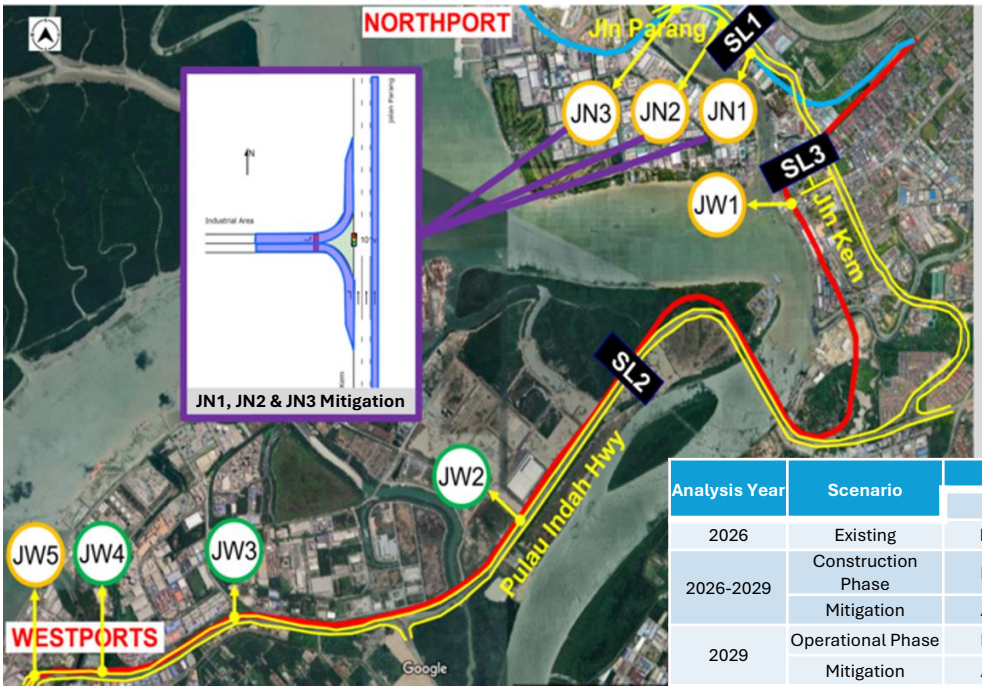
- For the year 2026-2029 during construction, the proposed mitigation is to upgrade Jalan Parang to 6-lane 2-waydual carriageway.
- The proposed mitigation is to upgrade Pulau Indah Highway to 6-lane 2-way dual carriageway and Jalan Limbungan to upgraded 4-lane single carriageway.

Analysis Year	Scenario	LOS - AM (PM)		
		SL1	SL2	SLN
2026	Existing	E (D)	D (C)	D (C)
2026-2029	Construction Phase	E (D)	D (C)	D (E)
	Mitigation	D (C)	-	B (B)
2029	Operational Phase	E (D)	D (D)	D (E)
	Mitigation	D (D)	-	B (B)

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Land Traffic

JN1, JN2 & JN3: Mitigation (Option A) during Construction Phase



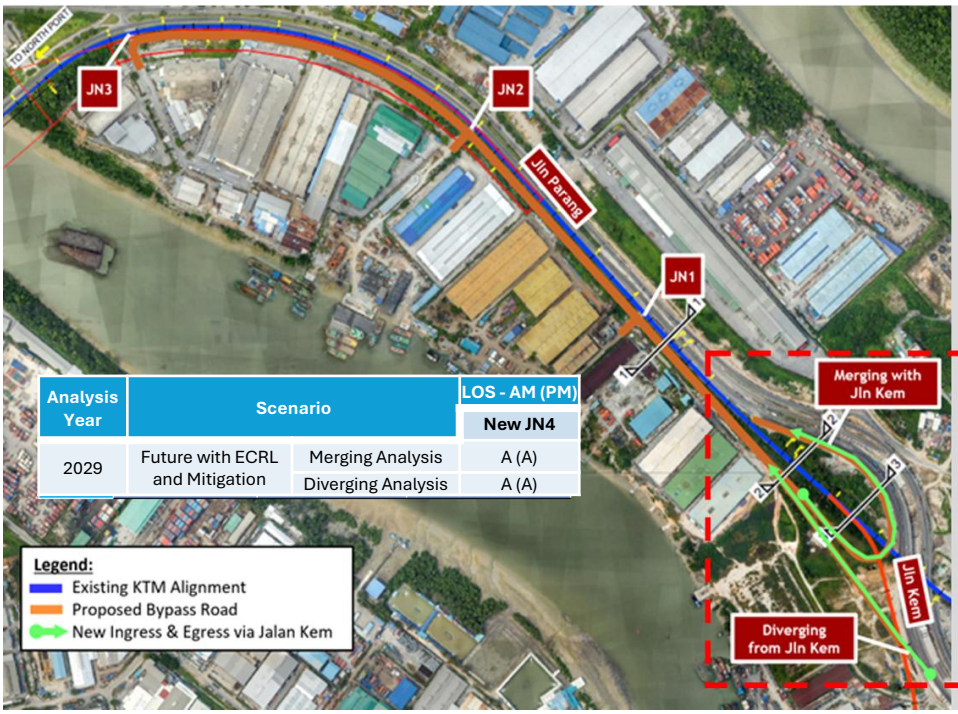
JN1, JN2 & JN3 Mitigation

OPTION A

- Additional lane for through movement, as stated in previous Figure.
- New acceleration/deceleration lanes and chevron island to segregate in &out traffic from major road for JN1,JN2 and JN3

Analysis Year	Scenario	LOS - AM (PM)		
		JN1	JN2	JN3
2026	Existing	D (B)	D (B)	D (B)
2026-2029	Construction Phase	F (C)	F (C)	F (C)
	Mitigation	A (A)	A (A)	A (A)
2029	Operational Phase	F (D)	F (D)	F (F)
	Mitigation	A (A)	A (A)	A (A)

JN1, JN2 & JN3: Mitigation (Option B) during Construction Phase

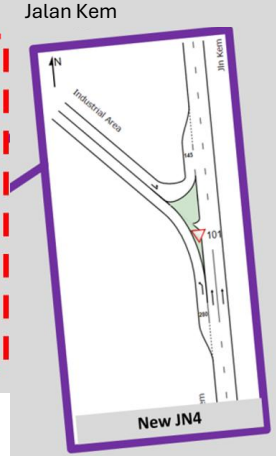


Analysis Year	Scenario		LOS - AM (PM)
			New JN4
2029	Future with ECRL and Mitigation	Merging Analysis	A (A)
		Diverging Analysis	A (A)

JN1, JN2 & JN3 Mitigation

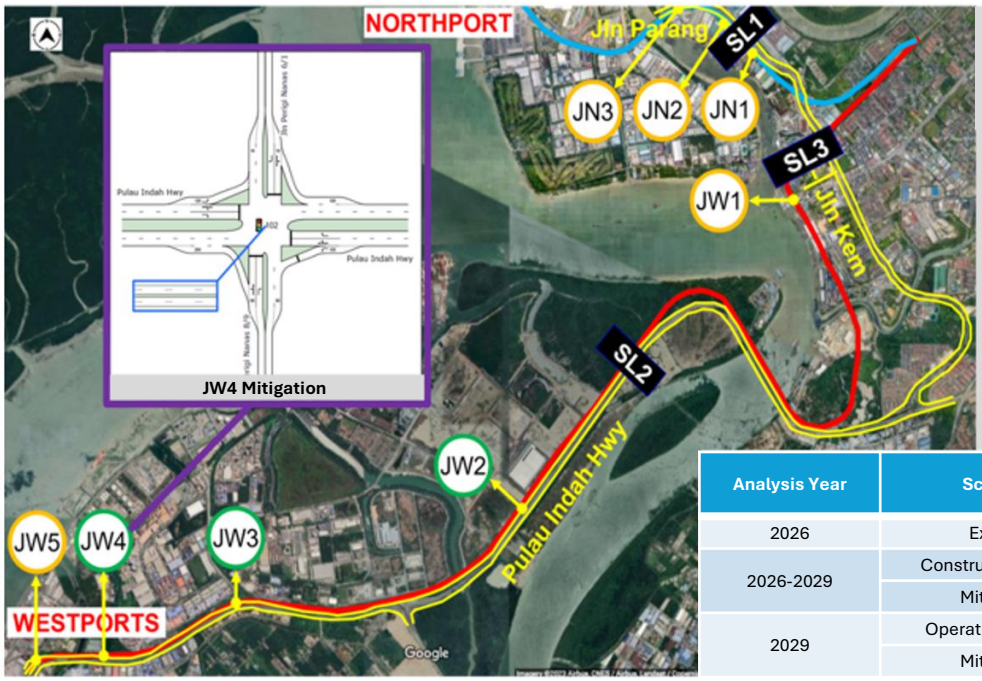
OPTION B

- New bypass road for vehicles going in and out of JN1, JN2 and JN3.
- Level crossings at JN1, JN2 and JN3 will be removed.
- Bypass road will connect via elevated Jalan Kem.
- New left-in left-out junction JN4 will connect bypass road to Jalan Kem



Land Traffic

JW4: Mitigation during Construction Phase

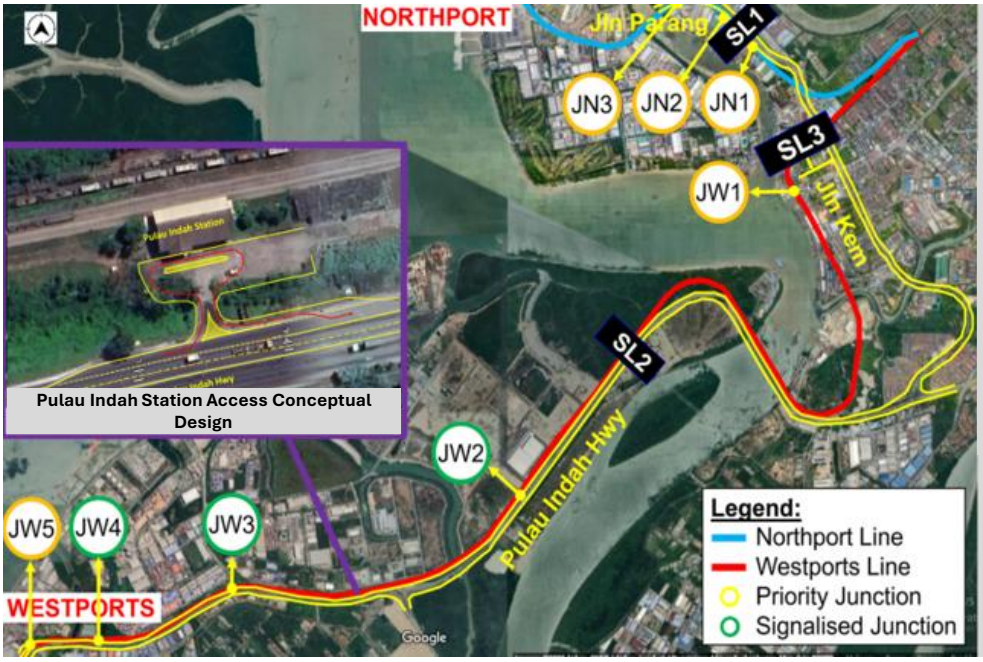


JW4 Mitigation

- East-West flyover for through-movement

Analysis Year	Scenario	LOS - AM (PM)
		JW4
2026	Existing	C (C)
2026-2029	Construction Phase	C (C)
	Mitigation	B (B)
2029	Operational Phase	C (C)
	Mitigation	B (B)

Pulau Indah: Access Conceptual Design during Operational Phase



- Left-in left-out junction is proposed as conceptual design for an access to Pulau Indah freight station
- Station structure already exists, but has been discontinued
- Actual design of station accesses can be proposed once more details are received

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Hazard and Public Safety

Construction Phase

Potential Receptors

- Construction workers
- Road users (Jln Parang, Jln Kem, and Persiaran Raja Muda Musa).
- Residential areas (e.g. Kuarters Polis Pelabuhan Klang, Kampung Raja Uda, Kampung Keretapi, Pangsapuri Seri Perantau etc),
- Public amenities around Persiaran Raja Muda Musa (Jabatan Laut Wilayah Tengah, Ibu Pejabat Jabatan Laut Malaysia, Balai Polis Pelabuhan Klang, Pejabat Kastam Pelabuhan Selatan, KTM Port Klang
- Industrial facilities within Southport and along the alignment between AsPac Lubricants and Sungai Klang.

Potential Impacts

- Accidental striking causing damage of water pipeline, sewer infrastructure and gas pipeline
- Temporary structural collapse
- Falling object incident
- Crushing incident
- Ground instability / ground collapse
- Unexpected train movement adjacent to work area

Significance

High

Proposed Mitigations

- Implement a Site-Specific Project Health and Safety Plan (PHSP) in accordance with Section 15(2)(a) of the Occupational Safety and Health Act 1994 [Act 514] (Amendment 2022).
- Safety induction/ trainings, inspections and drills
- Comprehensive traffic management plans
- Coordination with relevant stakeholders and operators of adjacent facilities,
- Strict adherence to established construction safety procedures, emergency response procedure and industry best practices.

Assessment Findings

The identified risks are expected to be reduced to an acceptable level through the implementation of stringent site control measures.

Activity	Risk classification (Rating)
Utility and services relocation	Moderate (4-12)
Site clearance, demolition and earthwork	Moderate (6-12)
Construction at grade	Low – Moderate (2-5)
Construction of land viaduct	Moderate – High (4-15)
Construction of river bridges	Moderate (4-10)
Testing & Commissioning	Moderate (4-5)
Construction interface with live railway operation	Low – Moderate (3-5)
Construction interface with industrial area	Low – Moderate (3-10)
Construction interface with port area	Low – Moderate (3-10)
Construction interface with live utilities	Moderate (6-10)
Construction interface with human sensitive receptor	Moderate (10)

POTENTIAL IMPACT & PROPOSED MITIGATION MEASURES

Hazard and Public Safety

Operation Phase

Potential Receptors

- Cargo train operators and railway workers
- Passengers and crew of KTM train up to Port Klang station
- Workers at nearby industrial facilities and public amenities
- Residents within the surrounding areas.
- Industrial facilities (e.g:AsPac Lubricants (Malaysia) Sdn. Bhd. and facilities within Southport, such as LG Logistic Sdn. Bhd., Medilux Oils Sdn. Bhd., Socship Company Sdn. Bhd., and Quantum Share Sdn. Bhd.)

Potential Impacts

- Derailment and collision involving moving trains
- Battery/electrical system failure
- Load shifts or cargo spillage
- Potential fires or explosions at industrial facilities

Significance

High

Proposed Mitigations

- Implementation of stringent operational safety procedures
- Regular inspection and maintenance programmes
- Effective coordination with relevant stakeholders, existing railway operators, and adjacent facility owners
- Strict compliance with the established Emergency response Plan (ERP).

Assessment Findings

- The risks associated with project operation are classified as moderate to high risks.
- The identified risks are expected to be effectively mitigated with the proposed mitigation measures

Activity	Risk classification (Rating)
Operation of train (cargo carrier)	Moderate – High (6-15)
Interface with live railway operation	Moderate – High (8-15)
Interface with industrial area	Moderate – High (5-15)
Interface with port activities	Moderate (4-10)
Interface with live utilities	Moderate (5-10)

PROPOSED ENVIRONMENTAL MONITORING

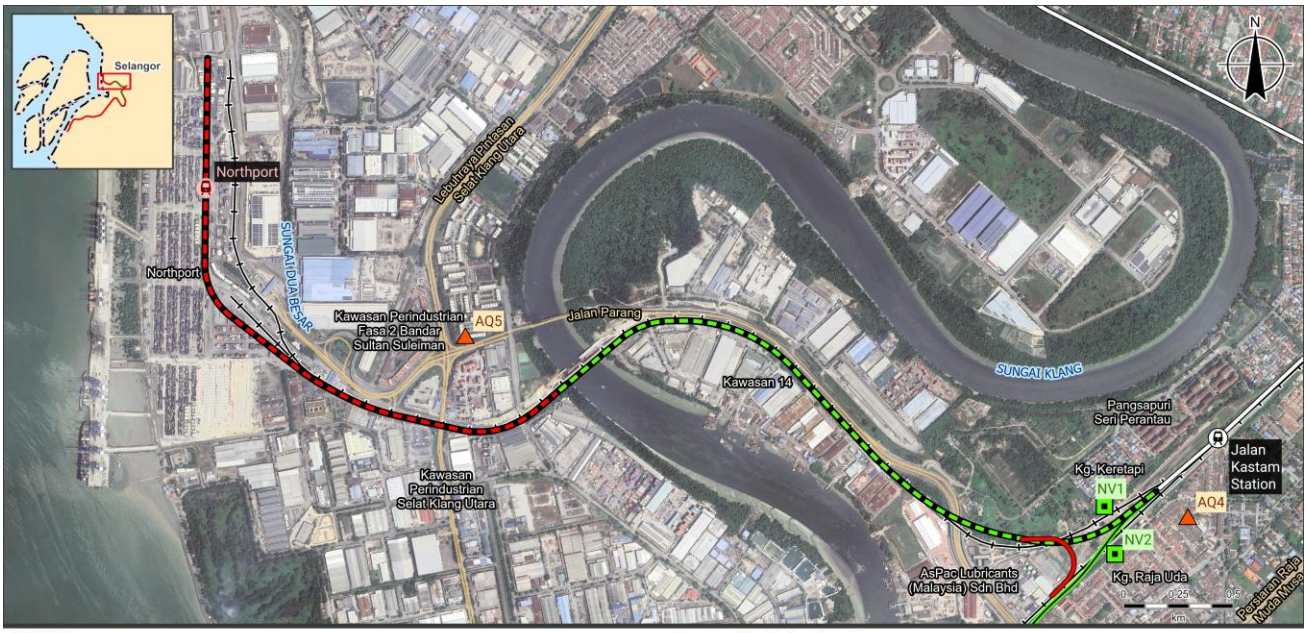
AIR QUALITY, NOISE AND VIBRATION MONITORING

Monitoring Component	Location	Parameters	Compliance Level	Frequency
Air Quality	**Performance Monitoring During Construction**			
	Inspection of temporary hoarding, wheel washing facilities	Structural integrity, functionality, practicality, and frequency of maintenance	• Comply with EIA approval conditions • Comply with approved EMP	<u>Monitoring</u> • Weekly <u>Reporting</u> • Weekly reporting in Performance Monitoring Report (PMR)
	Compliance Monitoring During Construction			
	5 locations as per EIA baseline monitoring map	• PM_{10} • $PM_{2.5}$ • Sulphur Dioxide (SO2) • Nitrogen Dioxide (NO2) • Ground Level Ozone (O3) • Carbon Monoxide (CO)	• Malaysian Ambient Air Quality Standard (2020)	<u>Monitoring</u> • Monthly <u>Reporting</u> • Quarterly reporting to DOE Selangor
Noise and Vibration	**Performance Monitoring During Construction**			
	Inspection of temporary hoarding , maintenance of vehicles and machinery	Structural integrity, functionality, practicality, and frequency of maintenance	• Comply with EIA approval conditions • Comply with approved EMP	<u>Monitoring</u> • Weekly <u>Reporting</u> • Weekly reporting in Performance Monitoring Report (PMR)
	Compliance Monitoring During Construction			
	6 locations as per EIA baseline monitoring map	• Noise: L_{eq}, Lmax, L_{10}, L_{90} (24 hours monitoring) • Vibration: Peak Particle Velocity, ppv (mm/s)	• The Planning Guidelines for Environmental Noise Limits and Control (Schedule 6) • The Planning Guidelines for Environmental Vibration Limits and Control (Schedule 5)	<u>Monitoring</u> • Monthly during piling works • Quarterly (after pilling works completed) <u>Reporting</u> • Quarterly reporting to DOE Selangor

PROPOSED ENVIRONMENTAL MONITORING

AIR QUALITY, NOISE AND VIBRATION MONITORING

Monitoring Locations for Air, Noise and Vibration at Northport Line



Monitoring Locations for Air, Noise and Vibration at Westport Line



PROPOSED ENVIRONMENTAL MONITORING

WATER QUALITY MONITORING

Monitoring Component	Location	Parameters	Compliance Level	Frequency
Water Quality	**Performance Monitoring During Construction**			
	Inspection of silt traps, temporary earth drains, check dams, temporary slope protection, turfing, silt fences	Structural integrity, functionality, practicality, and frequency of maintenance	• Comply with the EIA approval conditions • Comply with approved Erosion and Sediment Control Plan (ESCP) • Comply with approved Environmental Management Plan (EMP)	<u>Monitoring</u> • Weekly; or • After heavy rainfall (>12.5 mm) <u>Reporting</u> • Weekly reporting in Performance Monitoring Report (PMR) • Online reporting for the inspection of the BMPs • Report (PMR)
	Compliance Monitoring During Construction			
	Silt trap discharge points	• Total Suspended Solids (TSS) • Turbidity	• 50 mg/l • 250 NTU	<u>Monitoring</u> • Monthly <u>Reporting</u> • Quarterly reporting to DOE Selangor
	Impact Monitoring During Construction			
	8 locations **(WQ1, WQ2, WQ3, WQ4, WQ5, WQ6, WQ7 and WQ8)** as per monitoring figure	• pH • Temperature • Dissolved Oxygen • Chemical Oxygen Demand • Biochemical Oxygen Demand • TSS, • Oil & Grease • Ammoniacal Nitrogen • Total Coliforms • Faecal Coliforms • Turbidity	• Baseline data • Class III of the National Water Quality Standards (NWQS)	<u>Monitoring</u> • Monthly <u>Reporting</u> • Quarterly reporting to DOE Selangor

PROPOSED ENVIRONMENTAL MONITORING

MARINE WATER QUALITY MONITORING

Monitoring Component	Location	Parameters	Compliance Level	Frequency
	Impact Monitoring During Construction			
Marine Water Quality	2 locations **(MQ2and MQ3)** as per monitoring figure for three (3) depths (surface, middle and bottom) during two (2) tides (low tide and high tide)	• Temperature • pH • DO • Turbidity • Salinity • Conductivity • TSS • Oil & Grease • Phosphate • Nitrate • Unionised ammonia • Heavy metals (Hg, Cd, Cr^{6+}, Cu, Pb, As^{3+} and Zn) • Aluminium • Cyanide • Total Phenol • PAH • TBT • Faecal coliform	• Baseline data • Malaysia Marine Water Quality Criteria and Standard	<u>Monitoring</u> • Quarterly <u>Reporting</u> • Quarterly reporting to DOE Selangor

MARINE SEDIMENT MONITORING

Monitoring Component	Location	Parameters	Compliance Level	Frequency
	Impact Monitoring During Construction			
Marine Sediment	2 locations **(SD1 and SD2)** as per monitoring figure	• Physical view (photographs) • Oil & Grease • Heavy metals • Particle Size Distribution	• Baseline data • United States National Oceanic and Atmospheric Administration Screening Quick Reference Table (NOAA SQuiRTs) for Inorganics in Marine Sediment	<u>Monitoring</u> • Monthly <u>Reporting</u> • Quarterly reporting to DOE Selangor

PROPOSED ENVIRONMENTAL MONITORING

MARINE BIOLOGICAL RESOURCES & FISHERIES MONITORING

Monitoring Component	Location	Parameters	Compliance Level	Frequency
	Impact Monitoring During Construction			
Marine Biological Resources	2 locations **(M2 and M4)** as per monitoring figure	• Density and diversity of phytoplankton, zooplankton and macrobenthos • Diversity and abundance of fish fauna (CPUE)	• Compare with baseline results. • No degradation of phytoplankton density and introduction of harmful algae bloom. • No degradation of zooplankton, macrobenthos density and introduction of pollution indicator species. • No drastic decline of fish species diversity and abundance.	<u>Monitoring</u> • Half yearly <u>Reporting</u> • Half yearly reporting to the Department of Environment and other relevant agencies such as the Department of Fisheries
Environmental Audit	Project Site	As per EIA Approval Conditions		Quarterly reporting to DOE Selangor

Note: The proposed monitoring programme is not exhaustive and will be refined during the preparation of the EMP based on the EIA approval conditions and site conditions.

Proposed Monitoring Locations for Marine Water, Sediment & Biological Resources



LEGEND

- Northport Alignment: Elevated
- Northport Alignment: At-Grade
- Westport Alignment: Elevated
- Westport Alignment: At-Grade
- ITT Bypass: At-Grade
- Freight Yard
- Existing KTMB Stations
- Sect C2 ECRL Station
- Sect C2 Alignment
- KTM Railway
- Major Road

Proposed Monitoring Points

- Marine Biological Monitoring
- Marine Water Quality
- Surface Water Quality
- Sediment Quality
- Air Quality
- Noise and Vibration