



## MEMBINA JALAN PENGHUBUNG DI ANTARA KG. GUNTUR KE LANGKAP, KUALA PILAH, NEGERI SEMBILAN

### EXECUTIVE SUMMARY

- The project development is parallel to the development objective of the plan which is to improve the connectivity especially in rural areas and Orang Asli settlement area. The constructing a new road from Persimpangan Kg. Guntur and connect to Langkap objectively to improve the efficiency of the transportation system to the surrounding areas.
- The constructing new road from Kg. Guntur to Langkap is used to be new alternative road from Seremban to Jelebu, Jempol and also Pantai Timur. Hence, it would reduce the traffic congestion at Kuala Pilah City. In the conjunction with the mission of Government of the State of Negeri Sembilan which is to construct a new road to connect cities and urban area.



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# PROJECT DESCRIPTION

## Need for Project

### RANCANGAN STRUKTUR NEGERI SEMBILAN (2045)

The project development runs parallel to the development objective of the plan, which is **to improve connectivity, particularly to rural areas and the Orang Asli settlement area.**

### RANCANGAN TEMPATAN DAERAH KUALA PILAH (2035)

Align with **BPK 11.1 : HSK Serting, BPK 11.2 : Kg. Jerjak, BPK 12.1 : Kg. Langkap, BPK 12.2 : HSK Berembun 1.**

### RANCANGAN MALAYSIA KE-11

- The project is listed under the Rancangan Malaysia Ke-11.
- The project is part of the implementation of new road that connects Kg. Guntur to Kg. Langkap.

### REDUCE TIME TRAVEL

- The proposed new road from Kg. Guntur to Langkap will be the **new alternative road** from Seremban to Jelebu, Jempol and also Pantai Timur. As such, it would **ease traffic congestion** in Kuala Pilah City.
- **Reduce the travel time** to the local residents particularly Orang Asli.

## Project Activities

### PRE-CONSTRUCTION STAGE

1. Preliminaries works
2. Survey
3. Soil Investigation

### POST-CONSTRUCTION STAGE

1. Site Inspection
2. Hand Over Project

### CONSTRUCTION STAGE

1. Site Clearance/Vegetation clearing
2. Demolition works
3. Earthworks
4. Access road
5. Drainage works
6. Geotechnical works
7. Road works
8. Piling works
9. Maintenance works

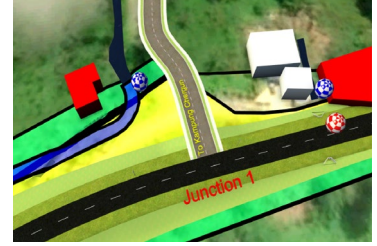
# PROJECT COMPONENT



**Upgrading Existing Road  
(CH 0.00 –  
CH 1000.00)**



**New Road from  
Kampung Guntur to  
Langkap  
(CH 1000.00 –  
CH 5900.00)**



**Road Junction**



**Bridge Over  
Wildlife Crossingj  
(CH 2980.00)**



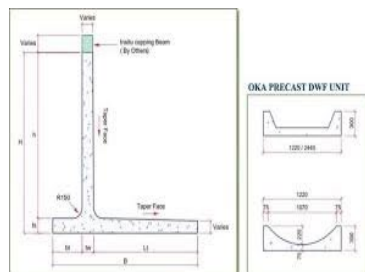
**River Diversion**



**Culvert Crossing**



**On Site Detention  
(OSD) and Final  
Discharge**



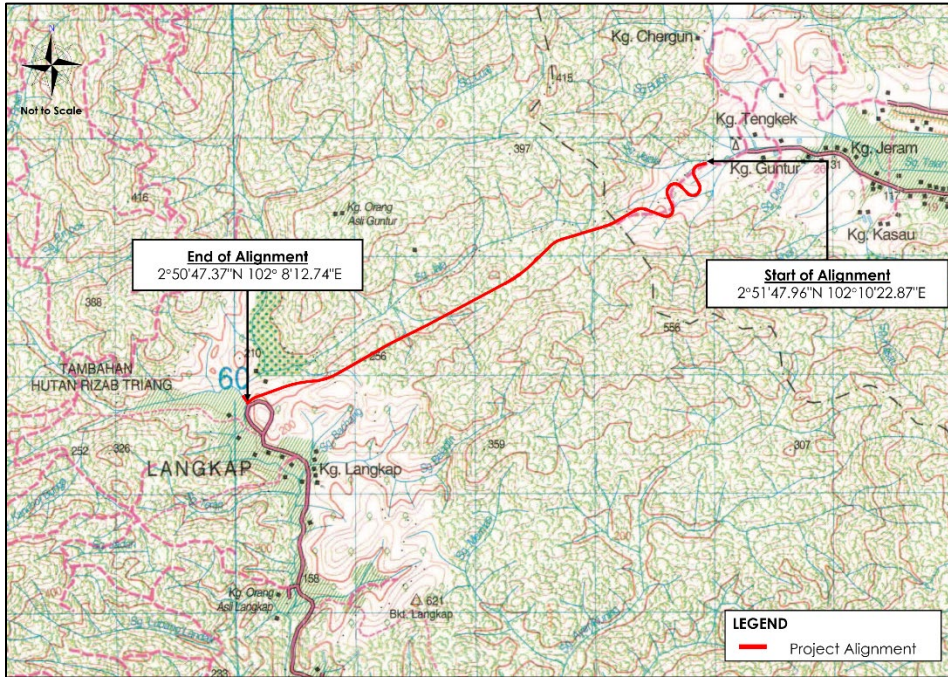
**L Shape Wall &  
Flat Berm**



**Infrastructure  
Works**

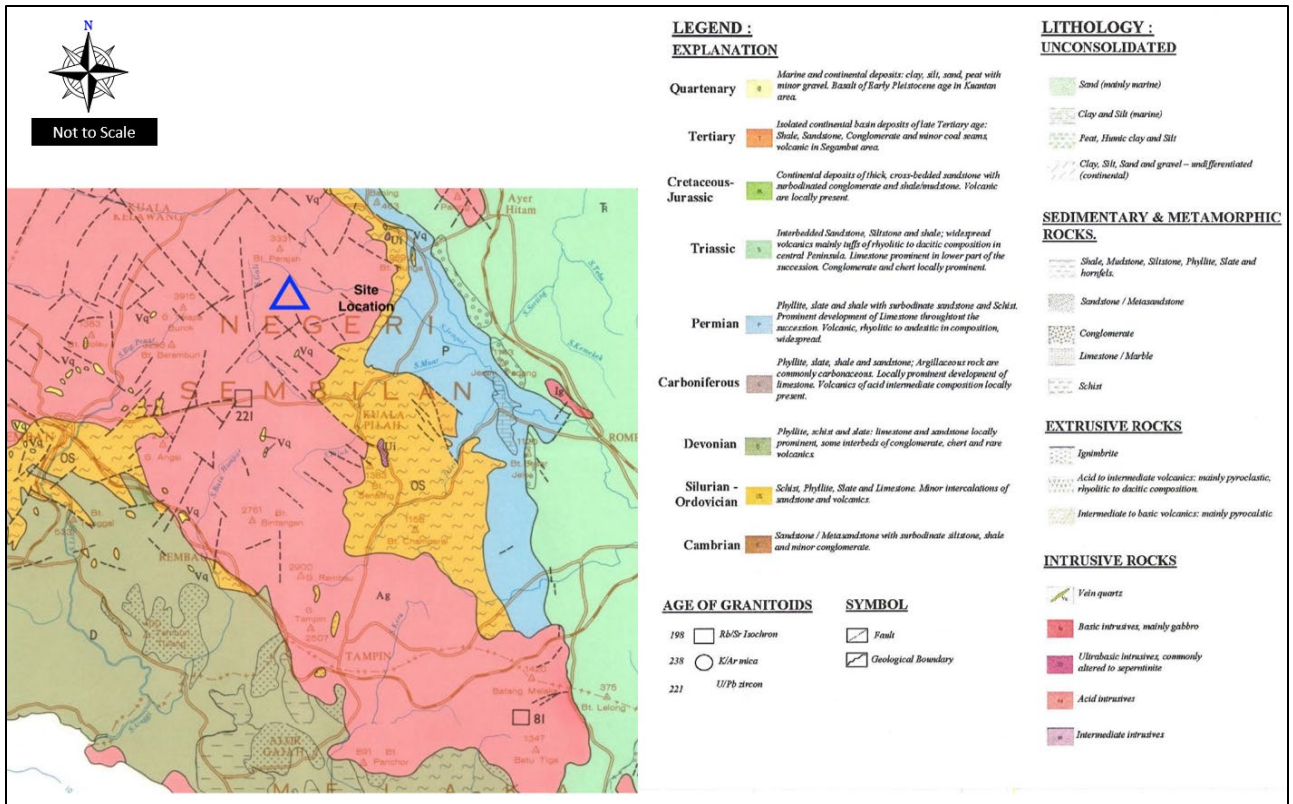
# EXISTING ENVIRONMENT

## Topography



- This proposed road basically traverses across a hilly terrain with elevation of RL130 to RL250 along the centerline of the proposed road.
- The proposed sites are largely covered by primary jungle.

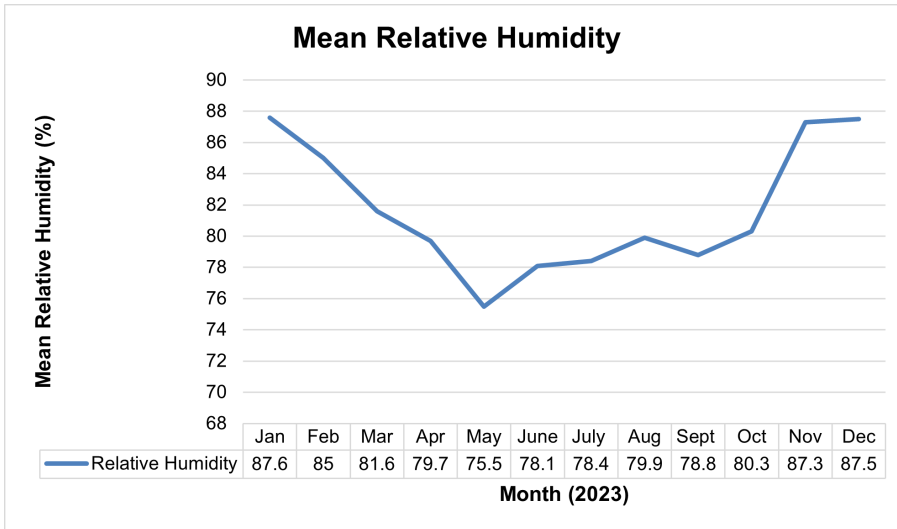
## Geology



# EXISTING ENVIRONMENT

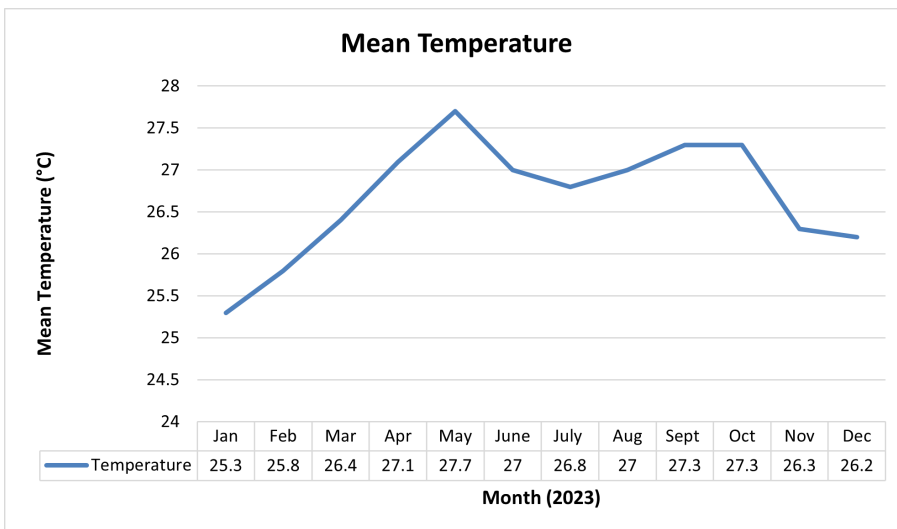
## Meteorology

### Mean Relative Humidity



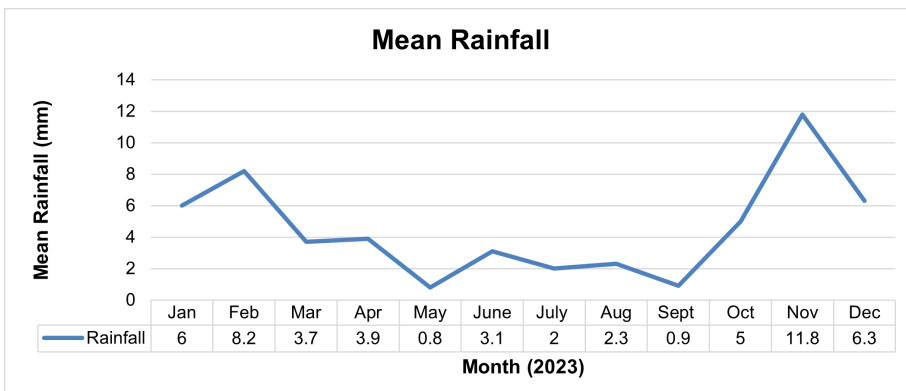
- The lowest monthly humidity occurred in May 2023 (75.5%),
- The highest was recorded during the month of January 2023 (87.6%).

### Mean Temperature



- The highest mean monthly temperature of 27.7°C in May 2023.
- The lowest was recorded during the months of January 2023 (25.3 °C).

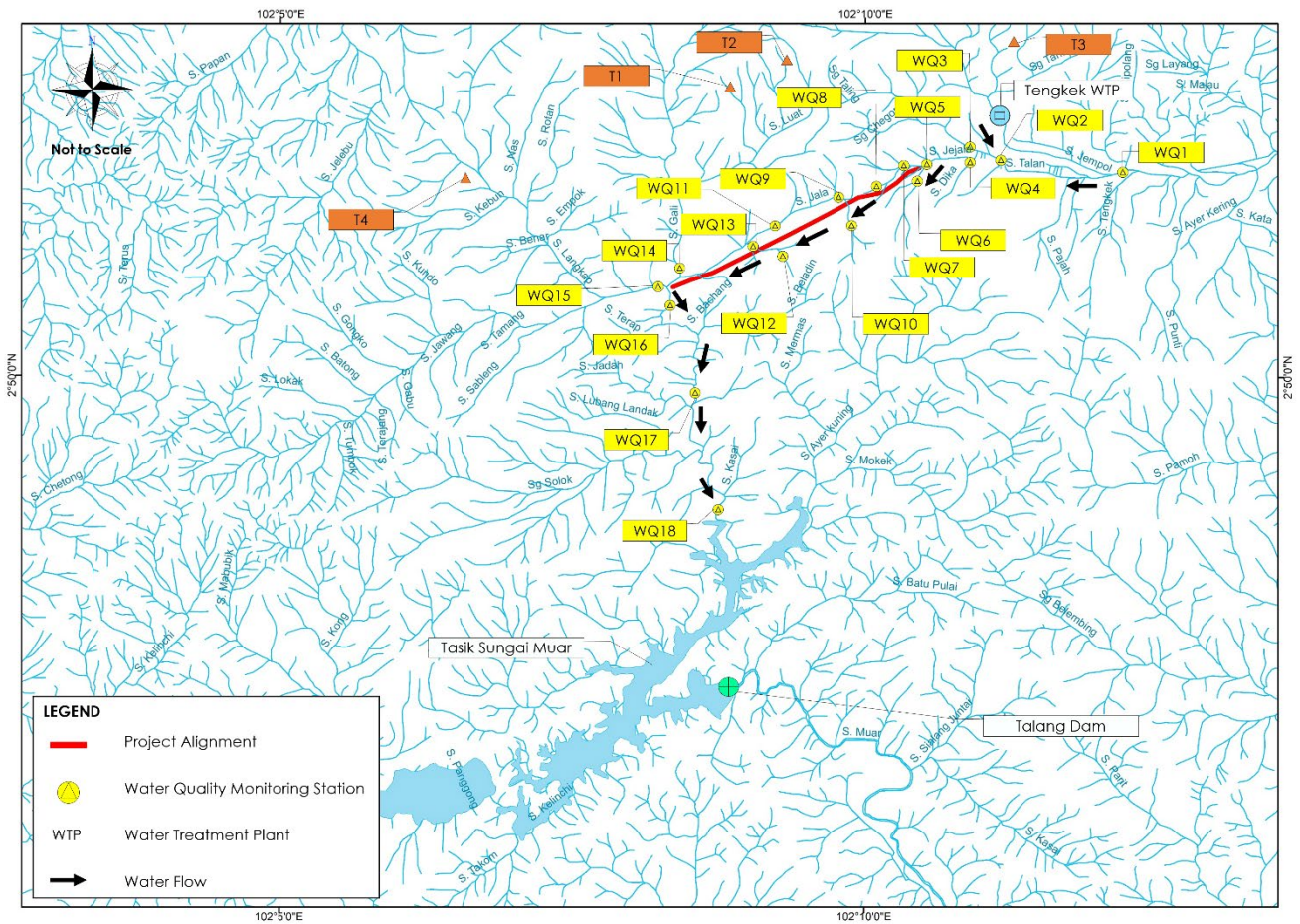
### Mean Rainfall



- The heaviest mean rainfall occurs in November 2023 (11.8 mm).
- The lowest was recorded in May 2023 (0.8 mm).

# EXISTING ENVIRONMENT

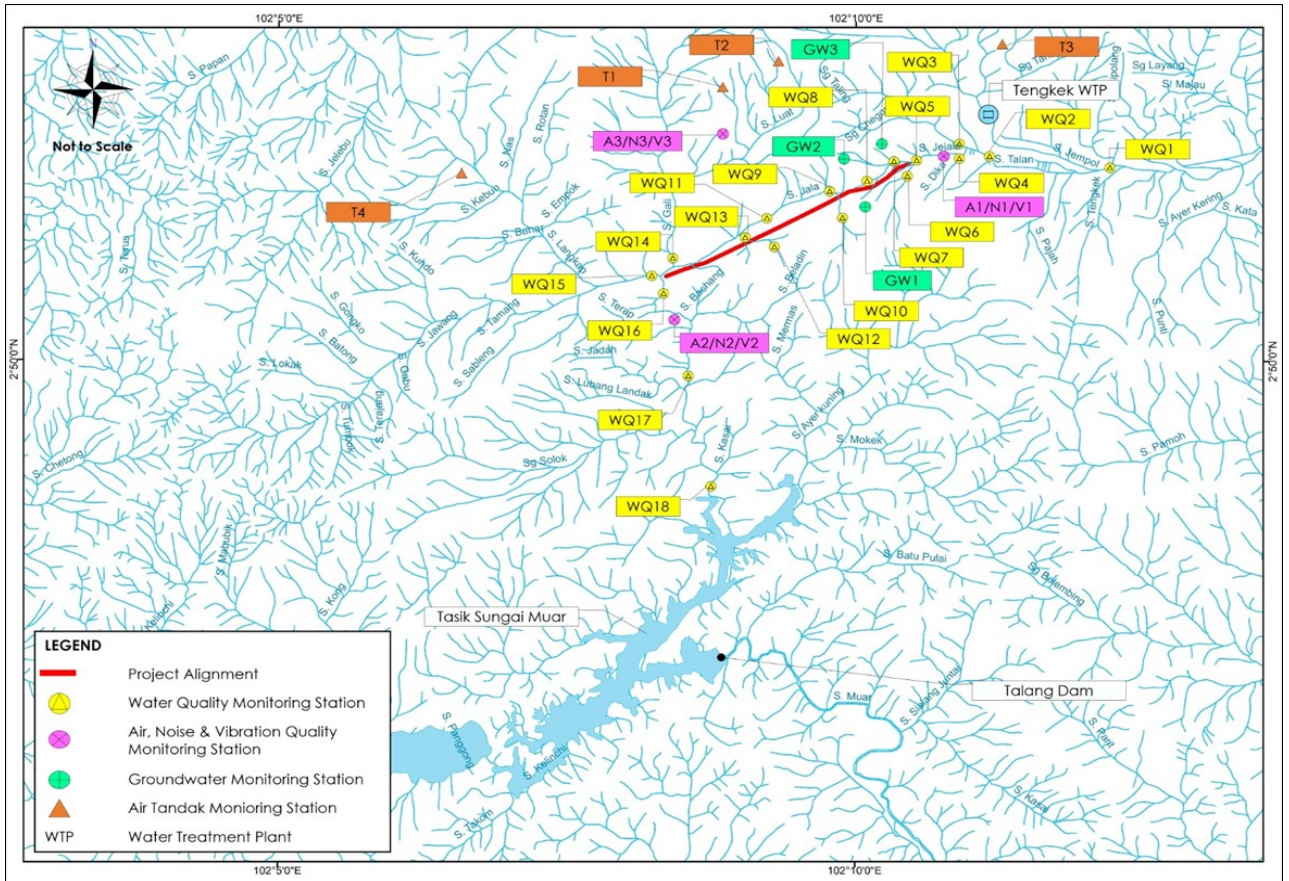
## Hydrology & Gravity Feed System (GFS) / Air Tandak



- The nearest main water body is **Tasik Sg. Muar** .
- **Talang Dam** located more than 5 km radius from the Project area.
- The nearest Water Treatment Plant (WTP) named **Tengkek WTP**.
- There are eight (8) nearest rivers located near to the Project area named **Sg. Jempol, Sg. Talan, Sg. Dika, Sg. Jejala, Sg. Jala, Sg. Gali, Sg. Bachang and Sg. Kasai**.
- There are **four (4)** points of GFS located near to Kg. Guntur and Kg. Langkap.

# EXISTING ENVIRONMENT

## Environmental Monitoring Stations



SAMPLING STATIONS	COORDINATES		JUSTIFICATION
	LATITUDE	LONGITUDE	
WQ1	2°51'39.74"N	102°11'35.94"E	Represent the upstream of Sg. Jempol
WQ2	2°51'50.11"N	102°10'55.01"E	Represent the upstream of Sg. Talan
WQ3	2°51'53.27"N	102°10'46.18"E	Represent the upstream of Sg. Jejala
WQ4	2°51'50.53"N	102°10'44.77"E	Represent the upstream of Sg. Dika
WQ5	2°51'52.02"N	102°10'38.75"E	Represent the middle part of Sg. Jejala
WQ6	2°51'50.23"N	102°10'38.04"E	Represent the downstream of Sg. Jejala
WQ7	2°51'48.73"N	102°10'21.25"E	Represent the upstream of unnamed stream
WQ8	2°51'35.14"N	102°10'10.81"E	Represent the downstream of unnamed stream
WQ9	2°51'33.59"N	102° 9'54.20"E	Represent the upstream of Sg. Jala
WQ10	2°51'31.39"N	102° 9'55.43"E	Represent the downstream of Sg. Jala
WQ11	2°51'16.02"N	102° 9'18.44"E	Represent the upstream of unnamed stream
WQ12	2°51'10.12"N	102° 9'12.74"E	Represent the middle part of unnamed stream
WQ13	2°51'7.91"N	102° 9'16.60"E	Represent the downstream of unnamed stream
WQ14	2°50'49.93"N	102° 8'19.65"E	Represent the upstream of Sg. Gali
WQ15	2°50'45.24"N	102° 8'14.56"E	Represent the middle part of Sg. Gali
WQ16	2°50'43.95"N	102° 8'16.13"E	Represent the downstream of Sg. Gali
WQ17	2°49'46.95"N	102° 8'33.31"E	Represent the upstream of Sg. Bachang
WQ18	2°49'3.64"N	102° 8'34.93"E	Represent the upstream of Sg. Kasai

# EXISTING ENVIRONMENT

## Water Quality

POINT	WATER QUALITY INDEX (WQI)	CLASS	STATUS
WQ1	87.0	Class II	Clean
WQ2	92.0	Class I	Clean
WQ3	94.0	Class I	Clean
WQ4	84.0	Class II	Clean
WQ5	88.0	Class II	Clean
WQ6	83.0	Class II	Clean
WQ7	87.0	Class II	Clean
WQ8	92.0	Class I	Clean
WQ9	90.0	Class II	Clean
WQ10	92.0	Class II	Clean
WQ11	89.0	Class II	Clean
WQ12	86.0	Class II	Clean
WQ13	90.0	Class II	Clean
WQ14	92.0	Class I	Clean
WQ15	90.0	Class II	Clean
WQ16	85.0	Class II	Clean
WQ17	91.0	Class II	Clean
WQ18	92.0	Class I	Clean

PARAMETERS (CLASS IIA NWQS COMPARISON)	DISCUSSION
pH value (6-9)	<ul style="list-style-type: none"> <li>Ranged between 6.3-6.9, normal value for a tropical water environment.</li> </ul>
Temperature	<ul style="list-style-type: none"> <li>All stations recorded at 28°C.</li> </ul>
DO (5-7 mg/l)	<ul style="list-style-type: none"> <li>Ranged between 6.0 mg/l to 6.5 mg/l.</li> <li>Ranged from 1 mg/l to 6 mg/l.</li> </ul>
BOD (3 mg/l)	<ul style="list-style-type: none"> <li>The BOD concentration was suspected due to the usage of fertilizer from the nearby oil palm plantation nearby the sampling point.</li> <li>Ranged from 6 mg/l to 39 mg/l.</li> </ul>
COD (25 mg/l)	<ul style="list-style-type: none"> <li>The COD concentration was related with the chemical component, which might be contributed from the plantation activities at the upstream area.</li> </ul>
TSS (50 mg/l)	<ul style="list-style-type: none"> <li>Ranged between 8 mg/l to 18 mg/l.</li> </ul>
O&G (7 mg/l)	<ul style="list-style-type: none"> <li>Oil and grease were not detected in all samples.</li> </ul>
NH3-N (0.3 mg/l)	<ul style="list-style-type: none"> <li>Ranged from less than 0.01 mg/l to 0.11 mg/l</li> </ul>
E.coli count	<ul style="list-style-type: none"> <li>Ranged between 170 CFU/100ml to 370 CFU/100ml.</li> </ul>
Turbidity (50 NTU)	<ul style="list-style-type: none"> <li>Ranged between 6.8 NTU to 16 NTU, indicates these streams are clean.</li> </ul>
Heavy metals (Cd, Pb, Cr3+, Mn, Ni, Zn, Fe, NO3, NO2, Cl-, Ar, Al)	<ul style="list-style-type: none"> <li>The heavy metals were recorded at low concentration or undetected.</li> </ul>

# EXISTING ENVIRONMENT

## Air Quality

Parameter	Unit	Averaging Time	MAAQS Limit 2020	Station		
				A1	A2	A3
PM <sub>10</sub>	µg/m <sup>3</sup>	24 hours	100	38	40	41
PM <sub>2.5</sub>	µg/m <sup>3</sup>	24 hours	35	26	27	24
SO <sub>2</sub>	µg/m <sup>3</sup>	24 hours	80	ND (<1)	ND (<1)	ND (<1)
NO <sub>2</sub>	µg/m <sup>3</sup>	24 hours	70	ND (<1)	ND (<1)	ND (<1)
CO	µg/m <sup>3</sup>	8 hours	10	1.4	1.4	1.6
O <sub>3</sub>	µg/m <sup>3</sup>	8 hours	100	ND (<5)	ND (<5)	ND (<5)

The air quality at the Project site and its surrounding area can be considered good as all the parameters recorded were within the **New Malaysian Ambient Air Quality Standards, 2020**.

## Noise Level

Station	Guidelines for Environmental Noise Limits and Control 2021, Department of Environment Malaysia (DOE), 2021. Second Schedule - Recommended Permissible Sound Level (LAeq) by Receiving Land Use for Existing Built-Up Areas		Receiving Land Use Category
	Day Time (7.00am-10.00pm)	Night Time (10.00pm-7.00am)	
N1	LAeq≤60 dBA	LAeq≤55 dBA	Low Density Residential, Noise Sensitive Receptors, Institutional (School, Hospital, Worship).
	49.7	45.9	
	N2	LAeq≤60 dBA	
54.1		47.4	
N3		LAeq≤60 dBA	
	46.0	43.1	

The ambient noise level at the project area were within the daytime and nighttime recommended permissible level of 60 dBA and 55 dBA for low density residential area as proposed in Schedule 2 of **DOE Guidelines for Environmental Noise Limits and Control, 2019**.

## Vibration

Location	Date / Time	Maximum RMS Velocity in vertical direction (z-axis), mm/s	Recommended Vibration Limit*	Date / Time	Maximum RMS Velocity in vertical direction (z-axis), mm/s	Recommended Vibration Limit*
			Daytime 7:00am – 10:00 pm			Night Time 10:00pm – 7:00 am
V1	23/10/24 21:52:20	1.750 (73 Hz)	0.8 mm/x to 1.6 mm/s # (R=8 to R=16)	24/10/24 02:06:20	0.223 (22 Hz)	0.4 mm/s # (R=4)
V2	22/10/24 07:49:55	0.362 (30 Hz)		23/10/24 02:30:55	0.173 (39 Hz)	
V3	24/10/24 10:04:05	0.217 (28 Hz)		25/10/24 02:38:05	0.195 (37 Hz)	

The vibration noise level at the project area were within recommended permissible level as proposed in **Sixth Schedule Guide Values for Intermittent Vibration Relating to Cosmetic Damage, Guidelines for Environmental Vibration Limits and Control (Third Edition), DOE 2021**. except V1 during daytime.

# EXISTING ENVIRONMENT

## Groundwater

Parameter	Unit	GW1	GW2	GW3	Standard
pH	-	6.7	*	6.5	5.5-9.0
Temperature	°C	28	*	28	Normal ± 2
Dissolved Oxygen as DO	mg/l	6.2	*	6.1	-
Colour @pH	TCU	5 @ 6.7	*	5 @ 6.5	300
Conductivity	µS/cm	9.87	*	7.54	1,000
Nitrate as NO <sub>3</sub>	mg/l	0.13	*	0.27	10
Cyanide as CN	mg/l	ND (<0.02)	*	ND (<0.02)	0.07
Anionic Detergent (MBAS)	mg/l	ND (<0.02)	*	ND (<0.02)	1.0
Phenol	mg/l	ND (<0.001)	*	ND (<0.001)	0.002
Turbidity	NTU	3.0	*	0.85	1,000
Total Hardness (EDTA)	mg/l	5.8	*	5.8	500
Arsenic as As	mg/l	ND (<0.01)	*	ND (<0.01)	0.01
Cadmium as Cd	mg/l	ND (<0.001)	*	ND (<0.001)	0.003
Chromium as Cr	mg/l	0.003	*	0.004	0.05
Lead as Pb	mg/l	0.010	*	0.012	1.0
Iron as Fe	mg/l	ND (<0.002)	*	ND (<0.002)	1.0
Lead as Pb	mg/l	ND (<0.006)	*	ND (<0.006)	0.05
Mercury as Hg	mg/l	ND (<0.001)	*	ND (<0.001)	0.001
Manganese as Mn	mg/l	ND (<0.003)	*	ND (<0.003)	0.2
Magnesium as Mg	mg/l	0.043	*	0.040	150
Nickel as Ni	mg/l	ND (<0.006)	*	ND (<0.006)	0.05
Sodium as Na	mg/l	3.30	*	3.22	200
Selenium as Se	mg/l	ND (<0.01)	*	ND (<0.01)	0.01
Zinc as Zn	mg/l	ND (<0.040)	*	ND (<0.040)	3.0

The groundwater level at the project area were recorded below than the **Standard Kualiti Air Tanah Kebangsaan** limit.

## Air Tandak

Parameter	Unit	Air Tandak 1	Air Tandak 2	Air Tandak 3	Air Tandak 4	Class IIA
pH	-	6.4	6.8	6.8	6.4	6.0-9.0
Temperature	°C	28	28	28	28	Normal ± 2
Dissolved Oxygen as DO	mg/l	6.0	6.1	6.2	6.0	5-7
Chemical Oxygen Demand as COD	mg/l	16	19	19	23	25
Biological Oxygen Demand as BOD <sub>5</sub>	mg/l	3	3	3	4	3
Total Suspended Solids as TSS	mg/l	7	6	7	9	50
Oil & Grease	mg/l	ND (<1)	ND (<1)	ND (<1)	ND (<1)	7; N
Ammoniacal Nitrogen as NH <sub>3</sub> -N	mg/l	0.08	ND (<0.01)	ND (<0.01)	ND (<0.01)	0.3
<i>E. coli</i> count	CFU/100ml	150	100	170	100	-
Turbidity	NTU	4.6	3.3	4.3	6.8	50
Cadmium as Cd	mg/l	ND (<0.001)	ND (<0.001)	ND (<0.001)	ND (<0.001)	0.01
Lead as Pb	mg/l	ND (<0.006)	ND (<0.006)	ND (<0.006)	ND (<0.006)	0.05
Chromium, Trivalent as Cr <sup>3+</sup>	mg/l	ND (<0.02)	ND (<0.02)	ND (<0.02)	ND (<0.02)	-
Manganese as Mn	mg/l	0.004	0.006	0.005	0.009	0.1
Nickel as Ni	mg/l	0.033	0.032	0.015	0.012	0.05
Zinc as Zn	mg/l	ND (<0.004)	ND (<0.004)	ND (<0.004)	0.077	5.0
Iron (Fe)	mg/l	0.124	0.228	0.114	0.441	1.0
Nitrate as NO <sub>3</sub>	mg/l	3.4	3.29	4.12	3.56	7
Nitrite as NO <sub>2</sub>	mg/l	0.007	ND (<0.005)	0.010	0.007	0.4
Chloride as Cl <sup>-</sup>	mg/l	1.3	1.2	3.0	2.2	200
<b>Water Quality Index (Class)</b>		88	90	90	87	-

The air tandak level at the project area were compared to the the **National Water Quality Guideline Class IIA** limit.

# EXISTING ENVIRONMENT

## Ecology

### Flora Survey

A total of 243 species of plants have been identified which comprised from 181 families and 84 genera.

### Bird Survey

#### Protection Status Wildlife Conservation Act 2020 (Act 716)

(TP) Totally Protected: 89 species  
(P) Protected: 12 species  
(NP) Not Protected: 11 species

#### IUCN-RL Status IUCN Red List of Threatened Species (2020)

(EN) Endangered: 2 species  
(VU) Vulnerable: 2 species  
(NT) Near Threatened: 9 species  
(LC) Least Concern: 99 species

### Large & Medium Mammal Survey

#### Protection Status Wildlife Conservation Act 2020 (Act 716)

(TP) Totally Protected: 7 species  
(P) Protected: 8 species  
(NP) Not Protected: 38 species

#### Red List of Mammals for Peninsular Malaysia (2017)

(EN) Endangered: 3 species  
(VU) Vulnerable: 1 species  
(NT) Near Threatened: 6 species  
(LC) Least Concern: 43 species

#### IUCN-RL Status IUCN Red List of Threatened Species (2020)

(EN) Endangered: 4 species  
(VU) Vulnerable: 3 species  
(NT) Near Threatened: 2 species  
(LC) Least Concern: 44 species

### Herpetofauna Survey

#### Protection Status Wildlife Conservation Act 2020 (Act 716)

(TP) Totally Protected: 0 species  
(P) Protected: 3 species  
(NP) Not Protected: 14 species

#### IUCN-RL Status IUCN Red List of Threatened Species (2020)

(EN) Endangered: 0 species  
(VU) Vulnerable: 0 species  
(NT) Near Threatened: 1 species  
(LC) Least Concern: 16 species

#### Amphibians

#### Reptiles

(TP) Totally Protected: 2 species  
(P) Protected: 21 species  
(NP) Not Protected: 13 species

(EN) Endangered: 2 species  
(VU) Vulnerable: 1 species  
(NT) Near Threatened: 0 species  
(LC) Least Concern: 33 species

# EXISTING ENVIRONMENT

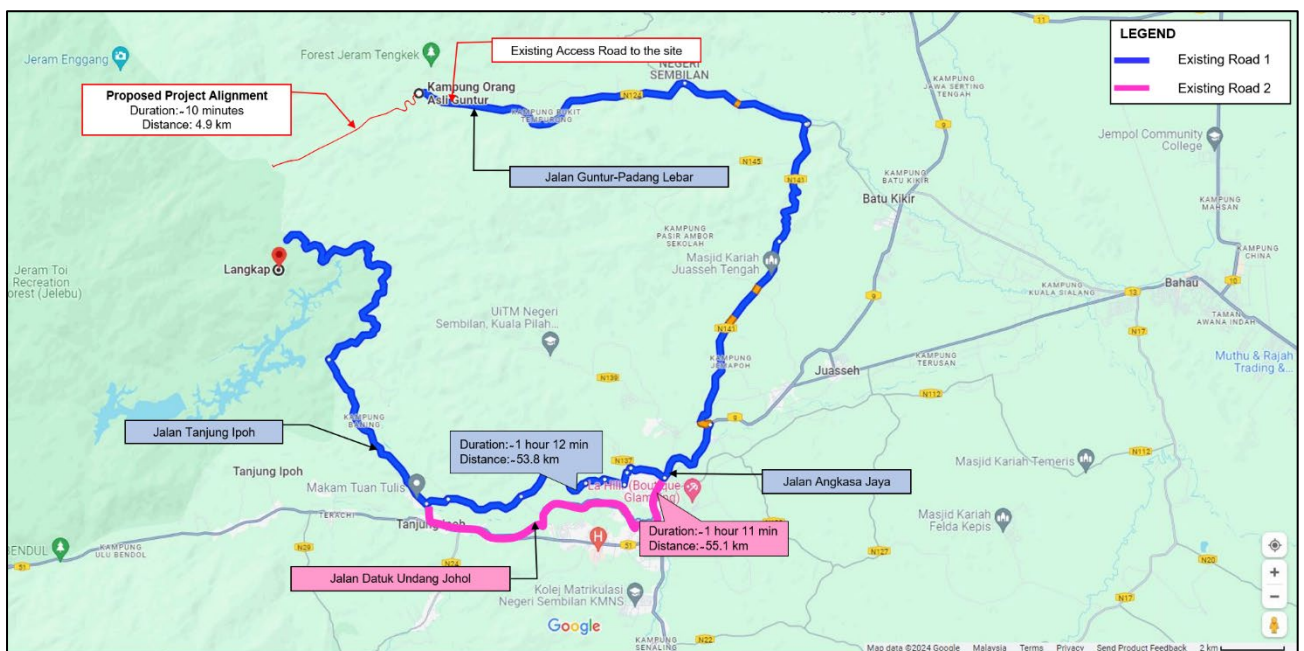
## Socioeconomic

The status of respondent is shown below.

DEMOGRAPHIC		PERCENTAGE (%)	
		Zone Direct Impact 0-3 km	Zone Indirect Impact 3-5 km
Ethnic	Malay	72.73	100.00
	Orang Asal (Orang Asli)	27.27	-
	Indian	-	-
	Others	-	-
Age group (years)	21 – 30	7.58	3.45
	31 – 40	18.94	18.39
	41 – 50	24.24	32.18
	51 – 60	25.76	32.18
	>61	24.24	12.64
Marital status	Single	9.09	4.6
	Married	87.88	94.25
	Widow / Widower	3.03	1.15
Place of origin	Local	100	100
Fixed term (years)	<1 year	-	-
	1 – 5	-	-
	6 – 10	-	-
	11 – 15	-	-
	16 – 20	-	-
	21 – 25	0.58	1.38
	26 – 30	7.00	2.07
	>30	93.18	96.55
Level of education	Not School	3.79	-
	Primary School	6.82	-
	Secondary School	52.27	36.78
	College/ Polytechnic/ University	37.12	43.68

## Traffic

The current existing road to the Project site is shown below.



# EXISTING ENVIRONMENT

## Health

The Community Health Status is shown below.

Disease	Number	Incidence (%)	National incidence (%)
Asthma	0	0	6.3 (adults) <sup>a</sup> 8.9 - 13.0 (children) <sup>a</sup>
Upper respiratory tract infection (URTI)	0	0	NA
Emphysema	0	0	NA
Chronic bronchitis	0	0	NA
Influenza	40	2.60	NA
Pneumonia	0	0	NA
Tuberculosis	0	0	0.08 <sup>d</sup>
Nasopharyngeal cancer	0	0	4.0 <sup>b</sup>
Lung cancer	0	0	9.8 <sup>b</sup>
Esophageal cancer	0	0	NA
Rhinitis	0	0	NA
Hypertension	41	2.70	15.9 <sup>c</sup>
Cerebrovascular accident/stroke	1	0.07	NA
Cardiac/heart problems	1	0.07	NA
Diabetes mellitus	12	0.79	9.4 <sup>c</sup>
Dengue	3	0.2	0.2 <sup>d</sup>
Malaria	0		0.009 <sup>d</sup>
Leptospirosis	1	0.07	0.009 <sup>d</sup>
Cholera	0	0	0.00002 <sup>d</sup>
Typhoid	0	0	0.00028 <sup>d</sup>
Hepatitis A	0	0	0.00019 <sup>d</sup>
Hepatitis B	0	0	0.016 <sup>d</sup>
Kidney disease	1	0.07	NA
Liver disease	0	0	NA
HIV/AIDS	0	0	0.013 <sup>d</sup>
COVID-19	0	0	6.9 <sup>d</sup>
Spontaneous abortion	0	0	NA
Stillbirth	0	0	NA
Skin diseases	10	0	NA

Sources:

<sup>a</sup> Hussein et al., 2023.

<sup>b</sup> Institut Kanser Negara, 2019.

<sup>c</sup> Institute for Public Health (IPH), 2020.

<sup>d</sup> Ministry of Health, 2023.

# Potential Impact and Mitigation Measures

## Pre-Construction Phase

SIGNIFICANT POTENTIAL IMPACTS	MAGNITUDE OF SIGNIFICANT IMPACT	POLLUTION PREVENTION MITIGATION MEASURES (P2M2)
<b>Survey Works</b>		
The deployment of contractors, especially the contractor's surveying firm/s in carrying the job and the economic benefits that go with it.	Low	No mitigation measure is needed.

## Construction Phase

SIGNIFICANT POTENTIAL IMPACTS	MAGNITUDE OF SIGNIFICANT IMPACT	POLLUTION PREVENTION MITIGATION MEASURES (P2M2)
<b>Soil Erosion and Sedimentation</b>		
The moving water will erode the soil to further increase the sediment load.	High	The control measures that can be used are : <ul style="list-style-type: none"> <li>• Temporary drain</li> <li>• Check dam</li> <li>• Silt trapping</li> <li>• Silt fence</li> </ul>
<b>Water Quality</b>		
High level of turbidity and suspended solids (SS). Sediment from the said activity will flow with the runoff into the rivers.	Moderate	<ul style="list-style-type: none"> <li>• Erosion and Sediment Control</li> <li>• Vegetative Buffer Strips</li> <li>• Soil Stabilization</li> <li>• Riparian Zone Protection and Restoration</li> <li>• Water Release and Compliance</li> <li>• Monitoring and Maintenance</li> <li>• Awareness and Training</li> </ul>
<b>Air Quality</b>		
The potential sources of fugitive dust.	Moderate	<ul style="list-style-type: none"> <li>• Regular watering of excavated materials and stockpiles</li> <li>• Side enclosure and covering of any aggregates or stockpiles</li> <li>• Regular watering of all site and access roads to ensure that these roads remain wet during use</li> <li>• Provision of wheel wash facilities</li> </ul>
<b>Noise</b>		
Primarily contributed from rock blasting activities.	Moderate	<ul style="list-style-type: none"> <li>• Hoarding to be erected along work boundary</li> <li>• All vehicles and machinery will be properly serviced and maintained to ensure good working condition</li> <li>• Follow work time limit as approved for construction activities</li> <li>• Usage of equipment that emit lower noise level</li> <li>• Install silencers or sound insulators for noisy construction equipment</li> <li>• Blasting work to adopt "controlled blasting"</li> <li>• Arrange high noise emission works at different location within the work area thus reduce the total noise intensity from one area</li> </ul>

# Potential Impact and Mitigation Measures

## Construction Phase (~cont)

SIGNIFICANT POTENTIAL IMPACTS	MAGNITUDE OF SIGNIFICANT IMPACT	POLLUTION PREVENTION MITIGATION MEASURES (P2M2)
<b>Vibration</b>		
<ul style="list-style-type: none"> <li>Rock blasting activities is expected to be the most significant source of vibration.</li> <li>Use of vibratory roller for road compaction activities along the alignment and bore pile drilling activities.</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Schedule earthmoving and ground impacting operation in difference period to reduce cumulative vibration from separate sources.</li> <li>Avoid night time activities where people are more aware of vibration in their home during the night time hours.</li> <li>Uses smaller unit of vibratory roller</li> <li>Installation of roadside drain prior road compaction</li> </ul>
<b>Drainage and River</b>		
<ul style="list-style-type: none"> <li>Blockage of drainage and disruption of the hydrology system that can lead to flooding as well as soil erosion</li> <li>Sedimentation in the drainage system and in the river leads to the raising of bed levels, which resulting in flash floods during heavy rainstorm</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Implement the LD-P2M2 in accordance to approved design.</li> <li>Installing silt traps or sedimentation ponds to prevent runoff water.</li> <li>Silt trap or sedimentation pond must be inspected and desilted on a regular basis.</li> <li>Silt collected from the silt trap must be dredged out when two-thirds full</li> </ul>
<b>Terrestrial Flora</b>		
<ul style="list-style-type: none"> <li>Vegetation loss.</li> <li>Impact on Flora Biodiversity.</li> <li>Biomass Generation.</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Planning of Site Clearing/ Vegetation Removal Activities.</li> <li>Biomass Management.</li> <li>Restriction of Open Burning.</li> <li>Allocation of Riparian Buffer Zone and BMPs.</li> <li>Minimise Exposed Surfaces.</li> </ul>
<b>Terrestrial Fauna</b>		
<ul style="list-style-type: none"> <li>Increase disturbance to wildlife</li> <li>Increase disorientation and displacement due to habitat lost</li> <li>Loss of animals due to clearing activity</li> <li>Wildlife-Human Conflicts</li> <li>Illegal Hunting &amp; Poaching</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Minimize earth work activity.</li> <li>Phasing the construction activities.</li> <li>Road kill within the forest can be reduced by be alert to the presence of wildlife and avoid travelling on vehicle at night in the forest.</li> <li>The contractors, workers and villagers must be prohibited from illegal wildlife hunting or poaching.</li> <li>Keeping and possessing complete specimen of wildlife and part or derivative from wildlife must be prohibited.</li> </ul>
<b>Socio-Economic</b>		
<ul style="list-style-type: none"> <li>Create job opportunities to the people since general and skilled workers are needed.</li> <li>Business opportunities were also created in terms of supplying the everyday needs.</li> </ul>	Moderate	Proper road signs and warnings need to be provided at localised area.
<b>Traffic</b>		
<ul style="list-style-type: none"> <li>Increase the existing traffic flow and may cause heavy traffic volume.</li> <li>Heavy vehicles may damage the existing roads and form potholes.</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Flagman or temporary traffic light shall be installed to control traffic movement.</li> <li>Signboard and traffic diversions must be properly erected along the road and conform to the requirements of "Arahan Teknik (Jalan) 2C/85 Manual on Traffic Control Devices – Temporary Signs and Work Zones Control".</li> </ul>





# Potential Impact and Mitigation Measures

## Operational Phase

SIGNIFICANT POTENTIAL IMPACTS	MAGNITUDE OF SIGNIFICANT IMPACT	POLLUTION PREVENTION MITIGATION MEASURES (P2M2)
<b>Air Quality</b>		
The air pollution would primarily come from heavy vehicles emission.	Moderate	<ul style="list-style-type: none"> <li>Regular watering of excavated materials and stockpiles.</li> <li>Side enclosure and covering of any aggregates or stockpiles.</li> <li>Regular watering of all site and access roads to ensure that these roads remain wet during use.</li> </ul>
<b>Water Quality</b>		
The concentration of discharge pollutants can be flowing into the nearby water bodies.	Moderate	<ul style="list-style-type: none"> <li>Allocation of collection bins or areas for different wastes to be recycled or reused</li> <li>If contracted to private industrial waste collectors, the waste generator must ensure that the waste load will be dumped at a properly-operated waste disposal or landfill site and not illegally dumped.</li> </ul>
<b>Noise</b>		
Traffic noise from the operation of the road is anticipated to be insignificant	Moderate	No mitigation measure is needed.
<b>Socio-Economic</b>		
<ul style="list-style-type: none"> <li>The earthwork will create employment to the local people and business opportunities will be created in terms of supplying the everyday needs.</li> <li>Construction of Infrastructures.</li> <li>Construction workforce generally employed foreign workers, aside from local workforce.</li> <li>Waste Disposal.</li> </ul>	Moderate	<ul style="list-style-type: none"> <li>Proper care should be taken especially during the construction of infrastructures.</li> <li>Racial clashes and other social problems especially at the base camp could be avoided.</li> <li>Proper action should be taken care in order to demolish the waste properly.</li> </ul>
<b>Landuse</b>		
The project will enhance space for the nearest villages and commercial properties nearby.	Moderate	The landuse of the project area will be changed from the forest area to the road and transportation area. The impact will be beneficial, and no mitigation is needed.
<b>Traffic and Transportation</b>		
An increase in traffic volume is expected once the Project enters its operational phase.	Moderate	The project proponent should ensure that the road network design must be able to cater to the amount of traffic generated in order to ensure smooth traffic flow and to minimize traffic hazard.
<b>Terrestrial Fauna</b>		
Presence of Road as Barrier.	Moderate	<ul style="list-style-type: none"> <li>Placement of alignment as close or along the forest boundary.</li> <li>Construction of wildlife corridor.</li> <li>Forest and plantations needs to be properly fenced.</li> <li>Wildlife crossing sign board.</li> </ul>

# PROPOSED ENVIRONMENTAL MONITORING PROGRAMME

## Compliance Monitoring

Component	Stations	Parameter	Frequency
	18 water quality sampling stations	pH, Temperature, DO, Turbidity, BOD, COD, NH3-N, E.coli, O&G	Monthly
	3 air quality sampling stations	PM10, PM2.5, NO2, SO2, CO, O3	Quarterly
	3 noise level sampling stations	Leq, Lmax, Lmin, L10, L50, L90	Quarterly
	3 vibration level sampling stations	Peak Particle Velocity(x,y&z axis), Peak Vector Sum(ppv), Vertical Vibration Peak Velocity (vmax)	Quarterly