

EXECUTIVE SUMMARY

1.0 PROJECT TITLE

The title of this report is Environmental Impact Assessment (EIA) (First Schedule) for the ***“Cadangan Membina dan Menyiapkan Jajaran 10KM Lebuhraya Rakyat Dari Machang ke Kuala Krai, Kelantan Darul Naim yang Menghubungkan Bukit Tiu dan Berangan Mek Nab”*** herein after referred to as ‘project’ in this report.

The proposed infrastructure development is a Prescribed Activity under First Schedule **20(b)** of the Environment Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015 which states that **“construction of highways”** requires the submission of a report on the impact on the environment to the Department of Environment (DOE) for approval.

2.0 PROJECT PROPONENT & CONSULTANT

The project proponent for this project is the Kerajaan Negeri Kelantan with superintending Officer is Baldah Toyyibah (Kelantan) Sdn. Bhd. with the address and the management contact information are as follows:

BALDAH TOYYIBAH (KELANTAN) SDN. BHD. (477601-W)

Address : 2679-F, Jalan Telipot,
15150 Kota Bharu
Kelantan Darul Naim.

Contact Person : En. Nik Hisyam bin Nik Mohd Kamal

Telephone : 09 – 748 5007

Facsimile : 09 – 748 5707

The Project Proponent has appointed UniSZA Consultancy Sdn. Bhd. to conduct the Environmental Impact Assessment (EIA) (First Schedule) for the Proposed ***“Cadangan Membina dan Menyiapkan Jajaran 10KM Lebuhraya Rakyat Dari Machang ke Kuala Krai, Kelantan Darul Naim yang Menghubungkan Bukit Tiu dan Berangan Mek Nab”***. The correspondence address of UniSZA Consultancy Sdn Bhd is as follows:

UniSZA CONSULTANCY SDN.BHD

Address : Bangunan Hal Ehwal Pelajar & Alumni (HEPA),
Aras 1, UniSZA Kampus Gong Badak,
21300 Kuala Terengganu
Terengganu Darul Iman

Contact Person : En. Roslie Bin Zakarya @ Derahman
(General Manager)

Telephone : 09 – 668 8818

Facsimile : 09 – 662 6862

3.0 STATEMENT OF NEEDS

Transportation is a key element in national development. Since the last decade the country has made progress in terms of sustainable road transport system in Malaysia. The efficient transportation system will facilitate movement between the centres of the facilities, and also movement of people to their daily activities.

It is anticipated that the proposed project will result in many benefits to the road users especially the users from Machang to Kuala Krai. Among the beneficial aspects include economic growth, limit the time travel and reduce traffic congestion and road accidents.

4.0 PROJECT DESCRIPTION

The proposed highway alignment will mostly traverse within the State of *Kelantan*. The starting chainage (CH 0) at *Bukit Tiu* is located at coordinates 5° 46' 9.64" N, 102° 14' 13.92" E while the ending chainage (CH 10000) is located at 5° 41' 31.88" N, 102° 13' 39.04" E in *Berangan Mek Nab*. The total length of the alignment will be 10.0 km. There will be three interchanges and two rest and services area (R&R). **Figure 4.1** below show the key plan and location plan of the proposed project.

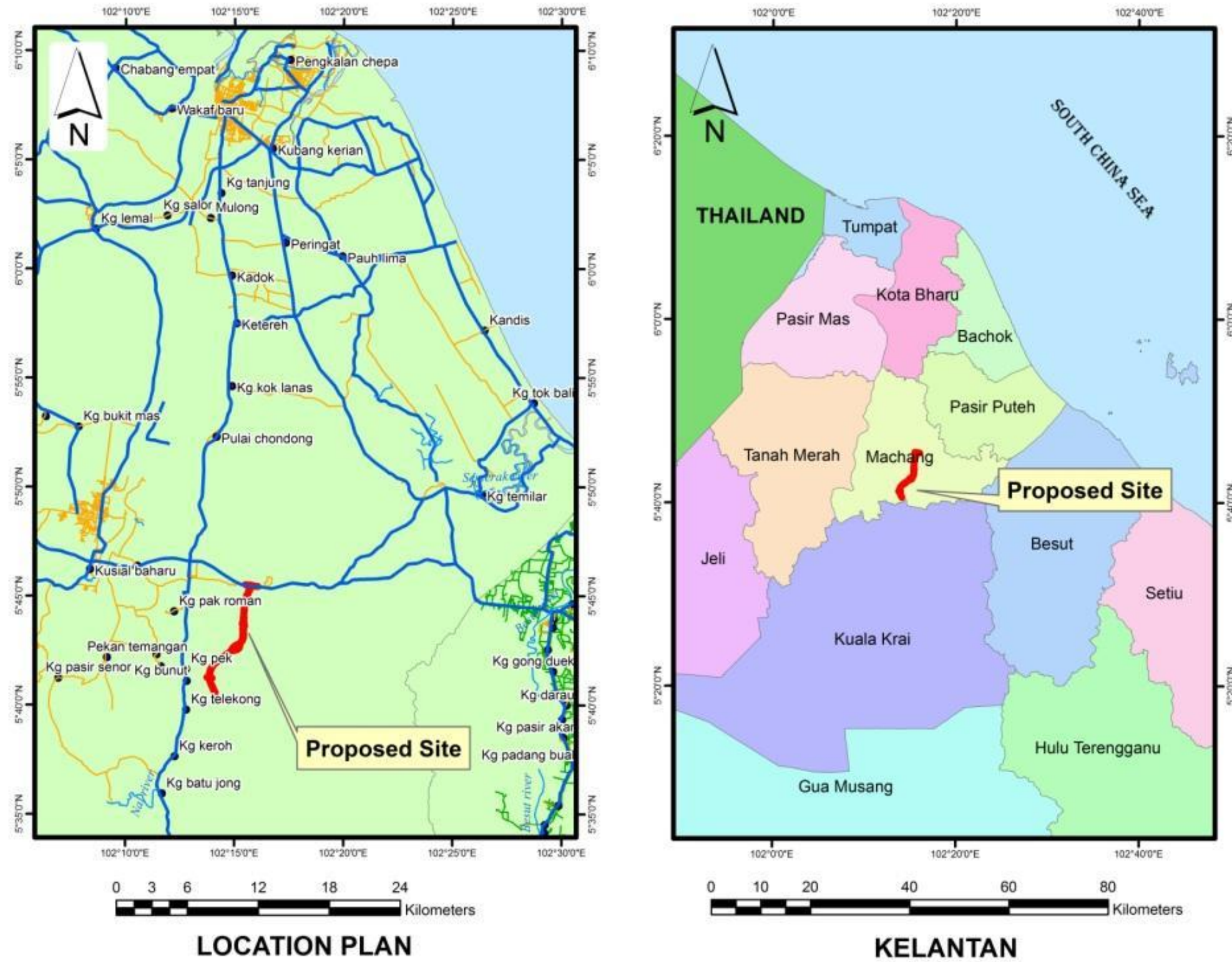


FIGURE 4.1
 Key Plan and Location Plan of the Project Site

5.0 EXISTING ENVIRONMENT

	DESCRIPTION
Topography	<ul style="list-style-type: none"> • Flat terrain and undulating area surrounded by wet paddy, mix cash crops, rubber, some hilly area and primary forest (<i>Hutan Simpan Hulu Sat</i>).
Geology	<ul style="list-style-type: none"> • The geology of this area is mostly composed of intrusive rocks, mainly granite with minor granodiorite.
Landuse	<ul style="list-style-type: none"> • The existing development surrounding the alignment can be categorized as mixed landuse that consist of settlement area, agricultural area and paddy field area. Agriculture is the main landuse and will continue to be the largest landuse component in the future based on <i>Rancangan Tempatan Machang 2020</i>. • There are about sixteen (16) villages along the alignment of Project site. All villages are traditional Malay villages. There are 16 settlement area along the alignment, namely Kg. Kolam air Merah, Kg. Pangkal Petai Luar, Kg. Tualang Kikir, Kg. Banggol Kuin, Kg. Pek, Kg. Air Dalam, Kg. Limau Nipis, Kg. Pangkal Mempelam, Kg. Air Merah, Kg. Kemuning, Kg. Kok Kiak, Kg. Bukit Bakar, Kg. Wakaf Tapai, Kg. Bukit Tiu, Kg. Lepa Rembulan and Kg. Perk Kiri.
Meteorology	<ul style="list-style-type: none"> • Climate data obtained from Kuala Krai Station Meteorological station shows study area experience a tropical climate which is hot and wet throughout the year. Mean for annual rainfall 2729.5 mm. The maximum temperature was recorded in June at 27.8°C and the lowest temperature was recorded in January with mean minimum temperature at 25°C. Seasonal of heavy rainfall occurs around November and December. The average humidify range is from 82.9% in February to the highest of 89.9% in December.
Hydrology	<ul style="list-style-type: none"> • Five of hydrological stations were selected and each station hydrological measurements were conducted such as length of river banks, width of the river, water depth, water current and flowage was calculated from them. • Based on the calculation show that flowage of each river is fluctuated from as low as 0.532 m³/s (third order stream) to 1.765 m³/s (last station at Sawa River).

	DESCRIPTION
Water Quality	<ul style="list-style-type: none"> Existing surface water quality around the proposed project site is assessed as this would be the background condition before the project was set up. Ten (10) points from river water were sampled are upstream and downstream Sg. Sawa, upstream and downstream Sg. Bakar, upstream and downstream Sg. Kapis, upstream and downstream Sg. Tualang Kelikir and upstream and downstream Sg. Gaung. Based on the water quality values for 6 parameters obtained for all water sampling points, the WQI obtained indicated that the water quality at WQ6 (downstream Sg. Kapis), WQ7 and WQ8 (upstream and downstream Sg. Tualang Kelikir) fall within Class II. While, WQ1 and WQ2 (Upstream and Downstream Sg. Sawa), WQ4 (downstream Sg. Bakar), WQ5 (upstream Sg. Kapis), WQ9 and WQ10 (upstream and downstream Sg. Gaung) were slightly polluted and fall within class III. The water quality at WQ3 (Upstream Sungai Bakar) within class IV was polluted.
Air Quality	<ul style="list-style-type: none"> There are three (3) air quality sampling locations that had been selected for the proposed project. The results indicated that the concentrations of TSP, PM₁₀, NO₂, SO₂ and CO recorded in the proposed area were below the concentrations suggested for the new Malaysian Air Quality Standard. TSP range for station A1, A2 and A3 are 75 (ug/m³), 70 (ug/m³) and 68 (ug/m³) respectively.
Noise Level Measurement	<ul style="list-style-type: none"> A total of three sampling stations were selected to obtain the existing noise levels along the route of the highway project. All sampling stations have been selected to best represent affected residential areas, as well as the sensitive recipients such as schools and sensitive areas along the proposed alignments during construction stage and operational phase. The day-time L_{eq} noise measurements at those sampling stations vary between 55.2 dBA to 61.5 dBA. The noise levels at most of the stations were mainly due to road traffic and human activities. The night-time L_{eq} noise levels range 45.2 dBA to 49.6 dBA. The noise levels at most of the stations were mainly due to insects and human activities.
Vibration	<ul style="list-style-type: none"> There are two stations for vibration monitoring identified for this study. From the measurement, the range of the ground borne vibration is between 0.648 and 0.458 mm/s, which is below the limiting vertical peak velocity of 3 mm/s as specified by the guideline for the newly built buildings and/or foundation of a foot plate (spread footing).

	DESCRIPTION
Terrestrial Flora	<ul style="list-style-type: none"> • Five sites were chosen for the survey in the vicinity of the proposed alignment from Machang to Berangan Mek Nab. Sites 1-3 were located in the Bukit Bakar Forest Reserve, Site 4 was in the rubber plantation and site 5 near the villages. The sites were chosen to represent 5 different ecosystems found in the area. • The timber family Dipterocarpaceae is the most dominant plant family observed at the project site and represented by nine species, i.e. <i>Dipterocarpus costulatus</i>, <i>D.crinitus</i>, <i>D.kunstleri</i>, <i>D.grandiflorus</i>; <i>Hopea coriacea</i>, <i>H. dyeri</i>; <i>Shorea leprosula</i>, <i>S.guiso</i> and <i>Vatica maingayi</i>.
Terrestrial Fauna	<ul style="list-style-type: none"> • The survey was carried out in November 2015 using line transect and random survey methods in the proposed construction site and all the secondary signs on the left and right of the paths were recorded. • Survey conducted by the consultant team has recorded 11 species of mammals and 1 species of reptile. • A total of 46 species from 21 families of birds were recorded at the survey sites. • Out of the total number recorded, 34 bird species are listed as totally protected and 4 bird species are protected under the Wildlife Conservation Act 2010 [Act 716], while another 8 bird species are not listed under the act.
Socioeconomic	<ul style="list-style-type: none"> • A socio-economic survey on the population living near the alignment was conducted on October 2015. The study was conducted on the population living within the 5 km corridor from the proposed new road. The assessments were made based on the primary data collected using the survey sampling technique and on-site observations. A total of 146 individuals were interviewed from 16 villagers within the project zone of influence.
Traffic	<ul style="list-style-type: none"> • Overview of the key traffic and transport implications associated with implementation of the proposed project. • Traffic volume study is based on Traffic Volume Malaysia, HPU 2013 (the latest available) at relevant traffic census stations. • Surely, the provision of the new highway will induce development intensity within the study area in particular and Kota Bharu - Kuala Krai corridor in general. Limiting additional traffic is computed to be 15% before the proposed highway reaching it limiting capacity by 2035.

6.0 POTENTIAL IMPACT AND MITIGATING MEASURES

COMPONENT	SIGNIFICANT ENVIRONMENTAL IMPACT	MITIGATING MEASURES
CONSTRUCTION PHASE		
Soil Erosion	<ul style="list-style-type: none"> • Soil erosion and sediment pollution. • Earthwork activities. 	<ul style="list-style-type: none"> • Implement Erosion and Sediment Control Plan (ESCP) • Minimise soil erosion - Earthwork activities must be avoided during the rainy season or during heavy rainfall events. • Access Route and Site Management - Access routes and internal roads shall be immediately paved or stabilised by gravel upon achieving the required level. • Earth Channel/ Drain - The proposed earth drain is used to divert runoff from stabilised areas around disturbed areas, and direct runoff into sediment traps. • Sediment Prevention - Silt Traps are provided to control the sediment. • Earthworks and Erosion Control - Once land construction is completed, land covers both structural and vegetative, shall be immediately employed. • Wash Trough - A wash trough is proposed to be provided at the main entrance to site to ensure that any vehicle tyres are free from dirt before entering the main road. • Inspection and Maintenance of Control Measures - It is very important that all control measures and best management practices are employed.
Water Quality	<ul style="list-style-type: none"> • Turbidity and high concentration of suspended solid due to the waterway disturbance, erosion and surface runoff. • Accidental oil and grease spillage from vehicles and machinery. 	<ul style="list-style-type: none"> • Implement soil erosion control measures as indicated in this report. • Earthworks must be scheduled and carried out as much as possible during dry weather periods and done in stage or phasing. • Maintenance works of machinery must be centralised to one location to prevent pollution of the waterways. • Store all unused oils in drums for disposal or recycling.
Air Quality	<ul style="list-style-type: none"> • Clearing of land and related excavation and compaction activities. • Operation of heavy machinery and related equipment for earthmoving and construction purposes. 	<ul style="list-style-type: none"> • All loaded vehicles going to and leaving the construction sites should be adequately covered to prevent spillage of materials from the vehicle during transport. • Deterioration of the air quality caused by dust generated from vehicular movements can be minimised by cleaning the wheels of the vehicles prior to exiting the site and entering the main road.

COMPONENT	SIGNIFICANT ENVIRONMENTAL IMPACT	MITIGATING MEASURES
	<ul style="list-style-type: none"> • Generation of solid wastes from land clearing. • Transport of building materials and supplies onto the site, and transport of wastes off site. 	<ul style="list-style-type: none"> • Regular maintenance of vehicles especially lorries would help in reducing the emissions of smoke and soot into the atmosphere. • Piling method which contributes less air pollution such as hydraulic piling is recommended over hammer piling.
Noise and Vibration	<ul style="list-style-type: none"> • Pilling Work. • Transportation of Construction Materials and Equipment. • Earthwork and Construction of Access Road. 	<ul style="list-style-type: none"> • The noise intrusion due to the piling activities during highway construction can be reduced by using a more silent piling method such as hydraulic jack-in spun piles. • The activities should be minimised during public holiday and weekend when working close to noise sensitive and residential areas. • Overall noise level emitted from the transportation of equipment and material activities can be controlled by scheduling the movement of the heavy vehicles during day-time only, when working close to residential areas. • All noisy equipment and vehicles be checked for proper installation of noise control measures such as noise insulator and enclosure to reduce the emitted noise level.
Waste Management	<ul style="list-style-type: none"> • Biomass • Solid Waste • Scheduled Waste 	<ul style="list-style-type: none"> • Apply zero burning technique for biomass management. • Provide the proper containers and garbage bins at the base camp workers. • Implement the recycling campaign at the base camp. • Contractors to monitor the base camp workers to ensure there is no offence to open burning. • Storage area of schedule waste must be placed far from the river to avoid spillage. • Contractor is responsible to monitor the transport of waste to its approved destination and the waste shall be disposed only at the licensed facility.
Terrestrial Flora and Fauna	<ul style="list-style-type: none"> • The impact on the flora would be permanent as all of the individual plant species would be lost along the intended road alignments. • Habitat destruction will have adverse impact upon the existing fauna. 	<ul style="list-style-type: none"> • Re-turfing of exposed areas, especially slopes should be initiated as early as possible in the last phase of the construction phase. • Site clearance and Earthworks are to be carried out in phases to minimize the size of exposed areas at any particular time. • Any sighting of endangered wildlife within the area or adjacent to work area must be reported to PERHILITAN.

COMPONENT	SIGNIFICANT ENVIRONMENTAL IMPACT	MITIGATING MEASURES
Socio-economy	<ul style="list-style-type: none"> • Influx of foreign workers. • Enhance the local economies. 	<ul style="list-style-type: none"> • All foreign workers need to be educated with local culture. • Job priority need to be given to the people.
Traffic	<ul style="list-style-type: none"> • Road improvement. • The local flow interruption. 	<ul style="list-style-type: none"> • Road upgrading with signalised. • Road upgrading to R3 or above. • The project developer should be able to provide a traffic management plan and traffic control especially around the places where this project will directly increase the number of traffic flows as well as influencing the flow of local traffic.
OPERATION PHASE		
Soil Erosion	<ul style="list-style-type: none"> • The rate of soil erosion will decrease with an increase in the rate of cover crops due to soil conservation activities such as closed turving, hydroseeding and slope stabilization works. 	<ul style="list-style-type: none"> • At this stage, no additional measure is recommended apart from what has been carried out in the construction phase. • Normally the rate of erosion will decrease with increasing maturity of crops and other plant growth along the alignment, especially in the undulating terrain and sloping.
Air Quality	<ul style="list-style-type: none"> • Highway and good road with high number of motor vehicles has potential to produce air pollutants such as nitrogen dioxide (NO₂), sulfur dioxide (SO₂), carbon monoxide (CO) and volatile organic carbons (VOCs). 	<ul style="list-style-type: none"> • Regular air quality monitoring needs to be conducted to determine the level of air pollutants and emission from motor vehicles from the proposed project. • To eliminate the pollutants distribute directly to the residential areas, proper fence need to be built at the sensitive areas.
Water Quality	<ul style="list-style-type: none"> • Degradation of river water quality during the operational stage is mainly related to inappropriate treatment of sewage and poor maintenance of sewage treatment facility. 	<ul style="list-style-type: none"> • The sewage treatment system must be properly operated and maintained to ensure that the quality of the effluent meet the required treatment standards.
Socio - economy	<ul style="list-style-type: none"> • There will be a major increase in employment associated with the operation of the Project especially Rest & Service Area (R&R). • The local population must be given the first opportunity when suitable employment positions arise. 	<ul style="list-style-type: none"> • No mitigating measure is required.

COMPONENT	SIGNIFICANT ENVIRONMENTAL IMPACT	MITIGATING MEASURES
Noise	<ul style="list-style-type: none"> Noise level in areas around the proposed alignment will increase. 	<ul style="list-style-type: none"> No mitigating measure is required since the total predicted new level is within the stipulated limit.

7.0 ENVIRONMENTAL MANAGEMENT PLAN

Issues have been identified that have a significant impact and that may arise along the entire construction could be addressed by the Environmental Management Plan (EMP). EMP serves as an effective tool to reduce the environmental impact caused by the construction project. The EMP comprises a structured plan for the mitigation measures of predicted environmental impacts, Environmental Monitoring Program, Environmental Audit and remedial actions. To ensure that control measures are implemented effectively in term of time and place, the EMP can be developed in conjunction with the planning and coordination of construction work. The EMP will be applicable to the contractor and employees who work in the project site.

8.0 CONCLUSION

The construction of new road project contribute to a positive impact compared with the negative impact which increasing the socio-economic status, increased employment opportunities, upgrade transport infrastructure and decrease the traffic congestion. If all recommended mitigation measures has been implement, this project is not expected to have any significant impacts on the environment and the implementation of the project is recommended.