

# EXECUTIVE SUMMARY

## EXECUTIVE SUMMARY

### 1.0 INTRODUCTION

The project is entitled “**PEIA FOR MEMBINA JALAN DARI SUNGAI LEMBING KE JERANTUT(REKABENTUK)**” hereinafter referred to as “the Project”. It has been changed from the earlier title of “*Membina Jalan Baru Dari Sg. Lembing Ke Jerantut (Fasa 1), Pahang*” following the instruction from the Project Proponent.

The scope of the Project is to establish a road linkage between Sungai Lembing and Jerantut, via the following:

i. Construction of Sungai Lembing – Felda Lepar Utara Road

This road section represents the missing link between Sungai Lembing and Jerantut; and is the focus of the Project where road construction work will be undertaken.

A preliminary road alignment has been designed where the proposed road will originate at Kuala Kenau in Sungai Lembing (CH:0+000 at E 103° 02' 58.3" and N 03° 55' 56.7"), crosses Sg. Kenau and navigates westerly in tandem with Sg. Kuantan to reach Felda Lepar Utara to join the existing Felda road at E 102° 47' 50.7" and N 03° 53' 34.4" (**Figure ES-1**).

The total road length is about 35 km (reduced from the original length of about 55 km), with right-of-way of 60 m width. The 35 km road is located within the District of Kuantan.

ii. Continual Use of Existing Felda Lepar Utara – Jerantut Road

This section comprises of about 35 km of the existing Felda road from Felda Lepar Utara to Jerantut, passes by Felda Sungai Tekam and Felda Kota Gelanggi. Most of the existing road is located within the District of Jerantut. No developmental activity will be undertaken along this section of the road.

The plan to construct a new road to provide direct linkage between Sungai Lembing and Jerantut has been gazetted in the Kuantan and Jerantut District Local Plans 2004 – 2015. This Project will focus on the construction of about 35 km of new road from Sungai Lembing to Felda Lepar Utara 4.

Gunung-Ganang Corporation Sdn. Bhd. (GGC) has been appointed by the *Ketua Pengarah Kerja Raya Malaysia* via the *Surat Setuju Terima* [Ref. No.: Bil.(43)JKR.CAST(S).060.100/ 006 dated 30 January 2013] to conduct a Preliminary Environmental Impact Assessment (PEIA) study for the abovementioned Project



**a) Project Proponent**

The address and contact details of the Project Proponent are:

***Jabatan Kerja Raya***

Ketua Pengarah Kerja Raya Malaysia  
Cawangan Alam Sekitar dan Tenaga  
Ibu Pejabat JKR Malaysia  
Tingkat 23, Menara PJD  
No. 50, Jalan Tun Razak  
50400 KUALA LUMPUR

Contact Person : Ir. Cheong Pui Keng  
(Pengarah, Cawangan Alam Sekitar dan Tenaga)  
Telephone : 03 – 4041 1979  
Fax : 03 – 4041 1988

**b) EIA Consultant**

The address and contact details of the EIA Consultant are:

***Gunung-Ganang Corporation Sdn. Bhd.***

53-2, Jalan SP 2/1, Seksyen 2  
Taman Serdang Perdana  
43300 Seri Kembangan  
SELANGOR DARUL EHSAN

Contact Person : Mr. Lee Kwong Aik (Senior Project Manager)  
Telephone : 03 – 8941 5308 (Office)  
Fax : 03 – 8942 2469

**c) Land Surveyor**

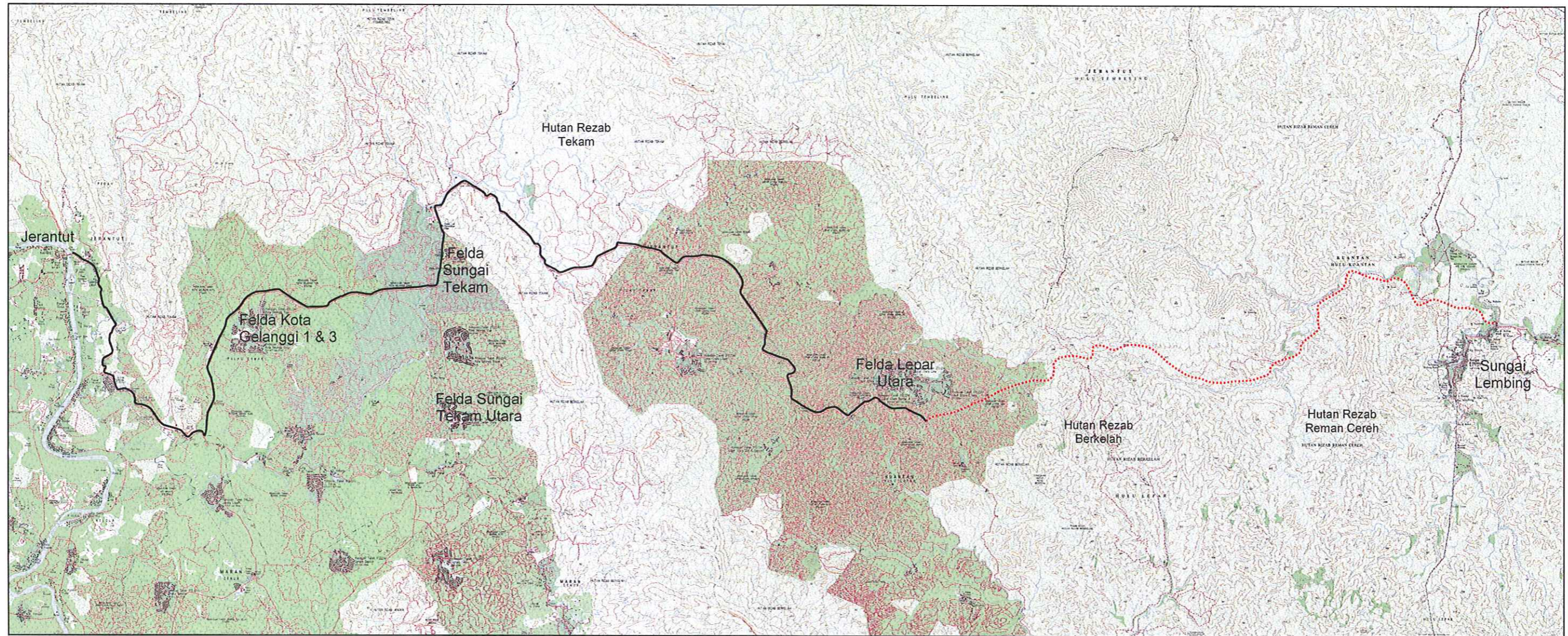
The address and contact details of the Land Surveyor are:

***Jurukur Setia Sdn. Bhd.***

No. 30, Jalan Bandar 2, Taman Melawati,  
53100 KUALA LUMPUR

Contact Person : Sr. Zulnizam Babjan  
Telephone : 03 – 4105 4344  
Fax : 03 – 4106 4571

Figure ES-1: The Sungai Lembing – Jerantut Road



**Legend:**

	Proposed New Road (Sungai Lembing to Felda Lepar Utara)		
	Existing Road (Felda Lepar Utara to Jerantut)		

Source: JKR, 2013; Jurutera Perunding Zaaba Sdn. Bhd., Feasibility Study for the Proposed Jerantut – Sungai Lembing Road, Pahang Darul Makmur, Final Report, Main Volume, July 2002.

## 2.0 STATEMENT OF NEED

It is the intention of the Government of the State of Pahang to construct a new road from Sungai Lembing leading to Jerantut. The Project has been earmarked in the Kuantan District Local Plan 2004 – 2015 for development of efficient and integrated transportation lines within the state as well as in the country.

At the national level, the Project will contribute to develop a national transportation network that complements the national economic and regional development plans of Vision 2020 and for efficient and reliable mobilisation of goods and people throughout the country.

At the regional level, the proposed road will complete the linkages between Kuantan to Cameron Highlands and Kuala Lipis. It will induce a more balanced socio-economic growth between the regional and sub-regional centres in Pahang.

## 3.0 PROJECT OPTION

This PEIA Report includes an analysis of options in the following areas:

- Site Option.
- Technology Option.
- "Without Project" Option.

### (a) Site Option

The site has been identified in the Pahang Structure Plan 2002-2020. Based on the *Feasibility Study for the Proposed Jerantut – Sungai Lembing Road, Final Report* (Perunding Zaaba, 2002), six options for the construction of the proposed Jerantut – Sungai Lembing road have been proposed through three alternative routes; i.e. Northern, Southern and Central Routes. The alternative routes were selected based on the following criteria:

- i. Regional and Local Development Plan;
- ii. Existing road network linkages;
- iii. Topographic conditions;
- iv. Desired line of traffic; and
- v. Possible direct and shortest connection of the existing road network.

The options available for the various alternative routes are as follows:

- **Alternative 1A:** Upgrade of the existing FELDA road and construction of the proposed road from Sungai Lembing to Hulu Lepar.
- **Alternative 1B:** Construction of the proposed road from Sungai Lembing to Felda Lepar Utara.

- **Alternative 2A:** Upgrade the existing FELDA road and construction of the northern bypass and the proposed road from Sungai Lembing to Hulu Lepar.
- **Alternative 2B:** Construction of the northern bypass and the proposed road from Sungai Lembing to Hulu Lepar.
- **Alternative 3A:** Upgrade of the existing FELDA road and construction of the southern bypass and the proposed road from Sungai Lembing to Hulu Lepar.
- **Alternative 3B:** Construction of the northern bypass and the proposed road from Sungai Lembing to Hulu Lepar.

Alternation **1B** is selected as Phase 1 of the Project which is construction of the proposed new road from Sungai Lembing to Felda Lepar Utara. This road is the common missing road link between Jerantut and Sungai Lembing.

#### **(b) Technology Option**

The project implementation may involve construction of bridges across rivers and streams which will provide an opportunity in the usage of advanced technology, which is reliable, green, safe and smart as well as human infrastructure.

#### **(c) “Without Project” Options**

If no project option is adopted, the area will not be disturbed. It will remain in its existing natural conditions. The scenarios predicted are as follows:

- i. No change in land use;
- ii. Conflict with the development plans of the State of Pahang i.e. Pahang Structure Plan 2002-2020; and
- iii. Retard development of rural areas particularly Hulu Kuantan and Hulu Lepar which have the potential to become the State’s natural heritage and agro-tourism zones.

With the no project option, land uses along the proposed road alignment will remain as status quo i.e. largely maintained as naturally forested areas. Communication between Hulu Kuantan and Jerantut will remain remote and accessibility to the potential eco-tourism sites along the proposed road alignment will remain difficult.

## **4.0 PROJECT DESCRIPTION**

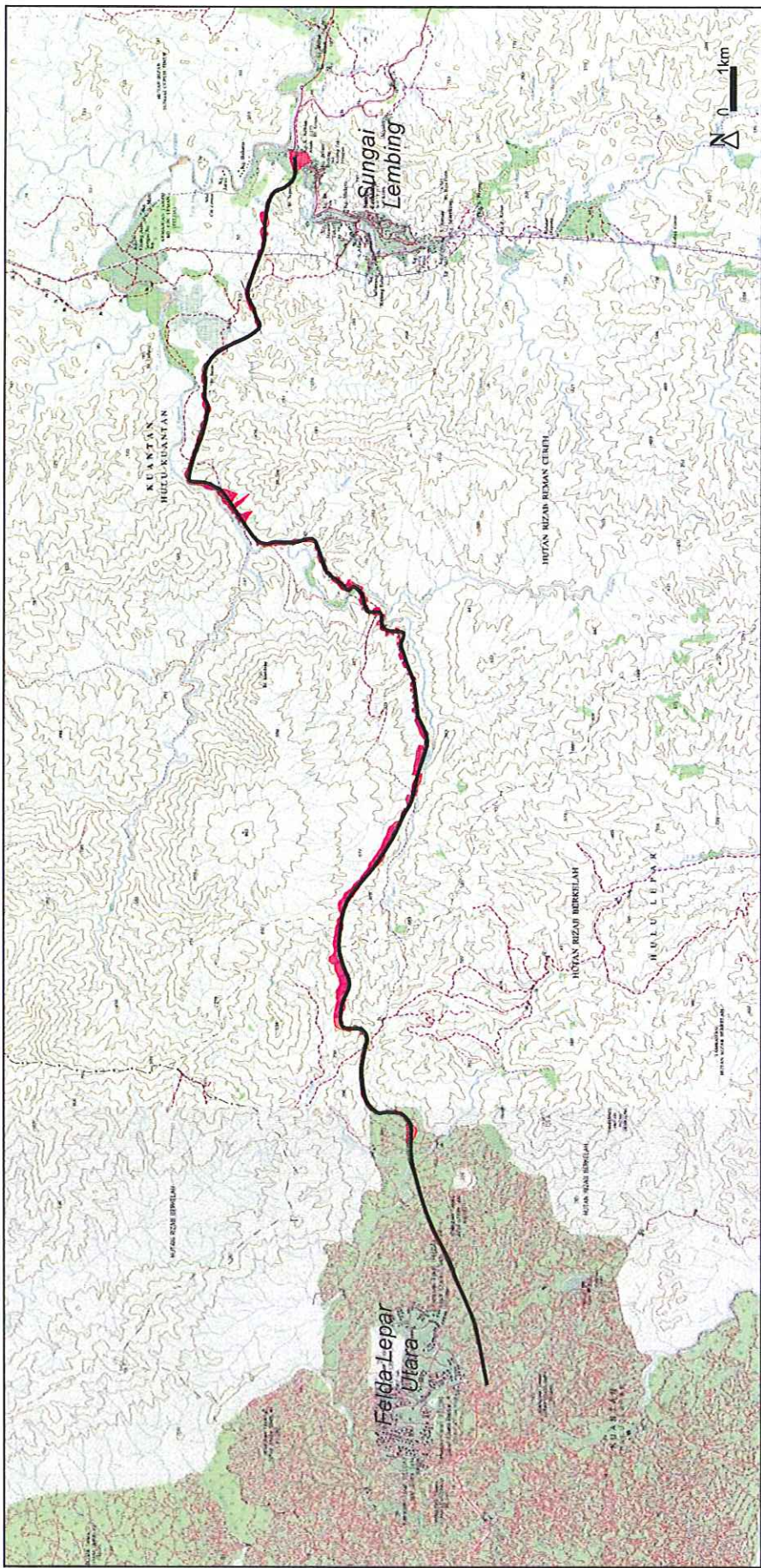
### **(a) Road Alignment**

The road between Sungai Lembing and Felda Lepar Utara will originate from the existing public road near Kuala Kenau, about 3 km before the Sungai Lembing township. The

GPS coordinates of CH: 0+000 are approximately at E 103° 02' 58.3" and N 03° 55' 56.7". The road will cross Sg. Kenau and navigate westerly in tandem with Sg. Kuantan to reach Feida Lepar Utara 4 at around E 102° 47' 50.7" and N 03° 53' 34.4" (**Figure ES-2**).

The total road length is about 35 km, with the average right-of-way (ROW) of about 60 m width. Therefore, a total land area of about 210 hectares will be affected. A large stretch of the road, 26 km more or less, will traverse Reman Cereh Forest Reserve and Berkelah Forest Reserve; and the last stretch of about 7 km is traversing the oil palm plantation in Feida Lepar Utara.

Figure ES-2: Alignment of the new road from Sungai Lembang to Felda Lepar Utara



Source: JUPEM (2012).

## (b) Road Design

The Sungai Lembing – Felda Lepar Utara road will be designed based on JKR R2 design classifications for rural roads. The road shall be aligned within a reserve width, i.e. ROW of 60 m. The geometric design criteria for JKR R2 and R3 roads are shown in **Table ES-1**.

The proposed road is a single 2-lane carriageway, with each lane having a minimum width of 2.75 m. The road shoulder shall be unpaved with a minimum width of 1.50 m. On flat terrain where the general natural ground cross slope gradient is less than 3%, the design speed allowable will be 70 km/hour on maximum grade of 9%. On mountainous terrain where a larger portion of the road will be located, the maximum grade is 12% and the design speed limit will be reduced to 40 km/hour.

A more environmentally stringent design will be adopted in the final design of the road to reduce earthworks and potential instability of soil slopes. The cut and fill slopes will be limited to three slopes (18 m in height) only. This is achievable by the use of tunnels, viaducts and slope stabilisation techniques (Perunding Zaaba, 2002).

**Table ES-1: Geometric Design Criteria for JKR R2 and R3 Rural Roads**

Road Design Standard	R2			R3		
	Flat (<3%)	Rolling (3% - 25%)	Mountainous (>25%)	Flat (<3%)	Rolling (3% - 25%)	Mountainous (>25%)
Average Daily Traffic	150 – 1,000			1,000 – 3,000		
Access Control	Nil			Partial		
Lane Width (m)	2.75			3.00		
Marginal Strip Width (m)	0.00			0.25		
Minimum Reserve Width (m)	20			20		
Terrain (natural ground cross slope (%))	Flat (<3%)	Rolling (3% - 25%)	Mountainous (>25%)	Flat (<3%)	Rolling (3% - 25%)	Mountainous (>25%)
Design Speed (km/hr)	60	50	40	70	60	50
Shoulder Width (m)	2.00	2.00	1.50	2.50	2.50	2.00
Stopping Sight Distance (m)	85	65	45	120	85	65
Passing Sight Distance (m)	450	350	300	500	450	350
Maximum Super-elevation (m)	0.10	0.10	0.10	0.10	0.10	0.10
Minimum Radius (m)	125	85	50	175	125	85
Desirable Maximum Grade (%)	6	7	8	5	6	7
Maximum Grade (%)	9	10	12	8	9	10
Crest Vertical Curve (k value)	15	10	10	22	15	10
Sag Vertical Curve (k value)	15	12	10	20	15	12

Source: Arahan Teknik (Jalan) 8/86 – A Guide on Geometric Design of Roads (Amended 1989). Roads Branch, Public Works Department Malaysia.

### (c) Earthwork Design

Two earthwork design methods were considered at the Detailed Preliminary Engineering Design stage.

- i. Conventional design – Involves the construction of new road with moderate to extensive cut and fill. All cut and fill slopes shall be open-cut or open-fill. Slopes exceeding 6.0 m will be reinforced via soil nailing with sprayed concrete; earth wall; gabion wall or anchored earth wall
- ii. Environmentally Stringent Design – Adopted to minimise environmental impacts, specifically soil erosion. This design involves the use of tunnels and viaducts which straightened the road alignment and reduces its length.

### (d) Project Activities

The project activities include three stages.

#### i. Pre-construction

The pre-construction stage involves all activities pertaining to site surveys and investigations to obtain information with respect to geological and soil investigations, topography, land uses, hydrology, ecological, social characteristics and the like; for the planning and design of the Project.

#### ii. Construction

Construction of the road shall generally follow the specifications and requirements as stipulated in the “*Standard Specification for Road Works*” prepared by the Cawangan Jalan, Ibu Pejabat JKR, Kuala Lumpur.

The construction activities include:

- Provision of temporary construction facilities such as access road, site office, workers’ quarters, workshop and utilities.
- Site clearing including removal of vegetation and unsuitable material or rocks.
- Earthworks involving soil excavation, slope cutting and filling, compaction and grading to desirable formations or levels.
- Construction and installation of associated infrastructures such as culverts, bridges and drainage works.
- Road surface dressing including laying of aggregates and sealing with bitumen.
- Installation of road fitting and fixtures such as side kerbs, railings, signages and markings.

### iii. Post Construction

The post-construction activities involve the routine maintenance and up-keeping of the road in safe and serviceable conditions.

#### (e) Project Implementation Schedule

The Project is planned to be implemented under a three year construction period. The intended commencement date is in early 2014 and is to be completed by the end of 2016.

## 5.0 EXISTING ENVIRONMENT

### (a) Climatology and Meteorology

With an average annual rainfall of approximately 2,983 mm, Sungai Lembing and Jerantut is considered to be located in a relatively wet area. Mean annual minimum and maximum temperatures recorded were 16.8°C and 37.8°C respectively. Mean monthly relative humidity ranged from 83.8 to 89.1 percent.

### (b) Air Quality

Air quality was monitored at two locations, namely at Felda Lepar Utara 4 and Kuala Kenau, Sungai Lembing. The results of the monitored parameters (TSP, PM<sub>10</sub>, NO<sub>2</sub>, SO<sub>2</sub> and CO) were within the limits of the Recommended Malaysian Air Quality Guidelines. TSP levels recorded were 68 µg/m<sup>3</sup> and 73 µg/m<sup>3</sup> while PM<sub>10</sub> levels recorded were 35 µg/m<sup>3</sup> and 39 µg/m<sup>3</sup>. Other parameters were not detected.

### (c) Noise

Noise monitoring was undertaken at two locations, similar to the air quality monitoring. Daytime noise levels L<sub>Aeq</sub> recorded were 64.7 dB(A) and 68.7 dB(A) while night-time noise levels were 45.0 dB(A) and 56.4 dB(A).

### (d) Water Quality

River water samples were collected from seven stations (WQ1 – WQ7) at Sg. Kenau, Sg. Kuantan and Sg. Lepar. Water Quality Indices (WQI) for the stations are classified as clean (Class I and II).

### (e) Topography and Hydrology

The topography of the proposed road alignment varies from flat (<3% slope) that makes up 65% of the area; 30% of rolling (3 - 25% slope) and 5% of steep slope (>25% slope).

The Project area can be delineated into three independent major catchments - Sg. Tekam catchment (approximately 740 km<sup>2</sup>), Sg. Lepar Ulu catchment (approximately 132 km<sup>2</sup>)

and Sg. Kuantan catchment (approximately 585 km<sup>2</sup>). There are three main rivers, namely Sg. Tekam, Sg. Lepar and Sg. Kuantan.

**(f) Geology and Soil**

The eastern part of the proposed road alignment is in Carboniferous Kuantan Group rocks consisting of phyllite, slate, shale and sandstone and in granites. The middle portion of the alignment is in Jurassic-Cretaceous rock of the Tembeling Formation consisting of conglomerate, sandstone and mudstone. The western part of the alignment is in acid to intermediate volcanic rock composed mainly of pyroclastic, rhyolitic to dacitic composition. Along the proposed Sungai Lembing to Jerantut road area, the extension of Lebir Fault Zone can be traced at the boundary of Early Triassic granite and Jurassic to Cretaceous acid volcanic, and sandstone and mudstone of Charu Formation.

**(g) Land Use**

The land use assessment for Sungai Lembing to Jerantut Road indicates that most areas within the alignment and 5 km impact zone of this road (**Figure ES-3**) falls in the category of mostly forest and a small area of agriculture. There will be non-human impact at the forest areas, flora and fauna will be affected due to the cutting of trees for road and bridge constructions. New lands with high potential that may be developed in the future will contribute towards more economic activities within this new corridor.

**(h) Traffic Condition**

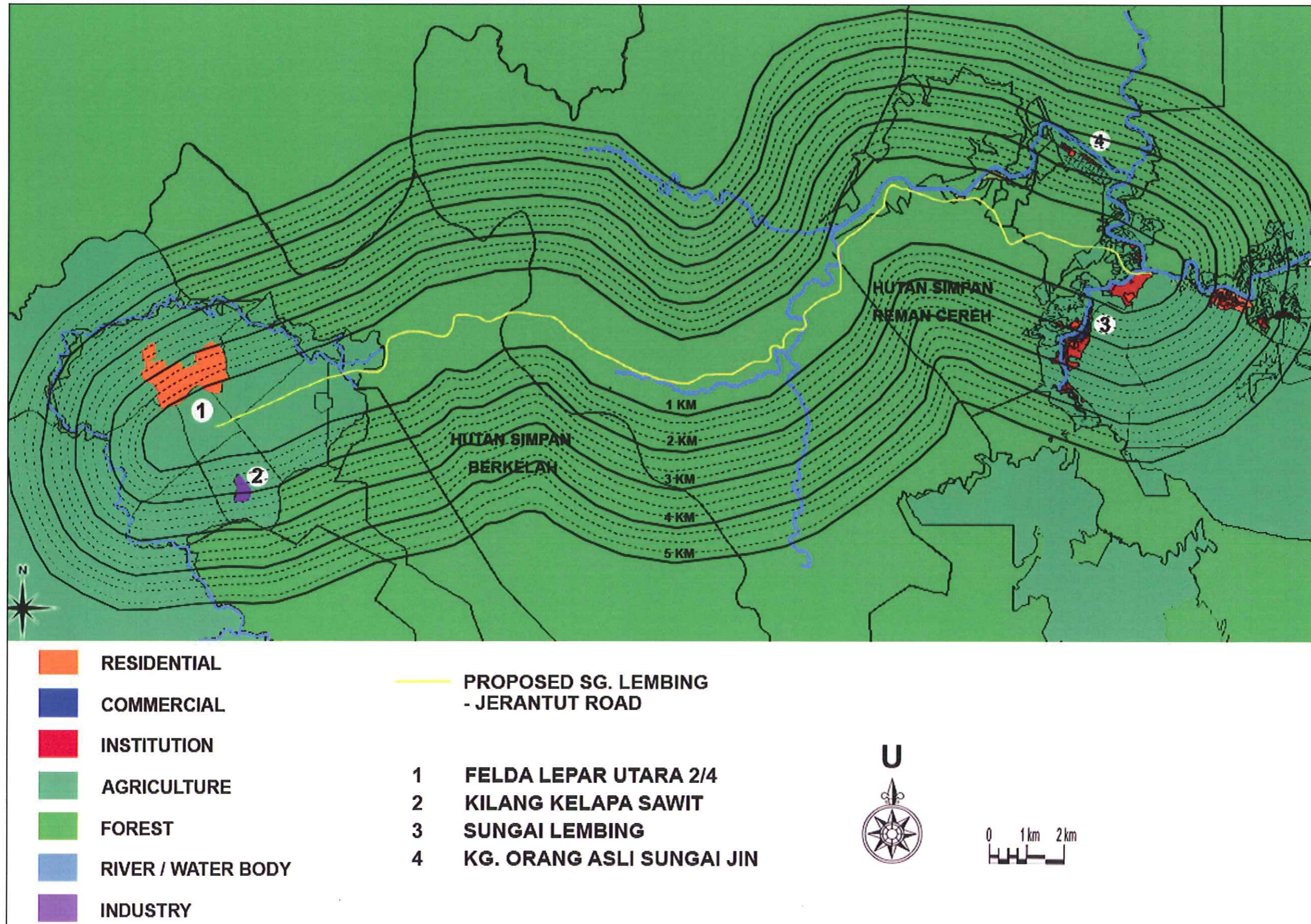
The Sungai Lembing – Kuantan (C4) road is a 2-lane single carriageway with light traffic with an average of 147 vehicles per hour. The morning peak recorded an average of 251 vehicles per hour while the noon peak and evening peak recorded 188 and 167 vehicles per hour, respectively.

**(i) Terrestrial Flora**

Rapid ecological assessment of the forest areas indicated that there are several vegetation types along the corridor of the proposed road alignment - fruit orchards, secondary forest (*belukar*) and oil palm estate. The dominant species observed within the orchards are *belukar Aglaia domestica*, *Artocarpus integer*, *Durio zibethinus*, *Garcinia* spp., *Melastoma malabathricum*, *Nephelium lappaceum* and *Pometia pinnata*. The oil palm estates are dominated with weeds, some being *Ageratum conyzoides*, *Mimosa pudica* and *Sida rhombifolia*.

The lowland Dipterocarp forest is dominated by species of the Dipterocarpaceae family, some being *Dipterocarpus kunstleri*, *D. lowii*, *D. grandiflorus*, *D. rigidus*, *D. costatus*, *Hopea pubescens*, *H. nervosa*, *Shorea parvifolia* and *S. singkawang*. Non-dipterocarp timber species observed include *Alstonia angustifolia*, *Litsea grandis*, *Intsia palembanica* and *Palaquium rostratum*. Non-timber species include *Mangifera griffithii*, *Aralidium pinnatifidum*, *Durio griffithii*, *Garcinia nigrolineata*, *Galearia fulva* and *Flacourtia rukam*. The shrubs are represented by *Mussaenda glabra*, *Lasiathus filiformis*, *L. oblongus*, and *Hedyotis philippinensis*.

Figure ES-3: Land use within 5km “zone of impact”



Source: Jabatan Perancangan Bandar dan Desa, Pahang (February, 2013).

Riparian forest along the banks of rivers and streams are prone to flooding. The plant species observed include *Saraca cauliflora*, *Ficus hypogaea*, *Staenochlaena palustris*, *Clerodendrum deflexum*, *Scaphochlamys biloba*, *Hanguana malayana*, and *Labisia pumila*. Nine species of ferns and its allies were also observed.

## (j) Wildlife

The proposed road alignment traverses a range of habitats which vary from being very rich and diverse in wildlife to monoculture plantations that only support a very low diversity of common wildlife species. The road alignment has been divided into three sections to facilitate the assessment of impacts.

### i. Orchard – Sungai Lembing

The fruit trees and belukar typically support common species of birds, squirrels and lizards. Species recorded include Wild Boar, Long tailed Macaque, Jungle Fowl (in the oil palm estates) and common birds like bulbuls, sunbirds and flowerpeckers. A herd of elephants periodically move along Sg. Kuantan and decimate orchards along the river. It should be noted that the wildlife in this area is severely depleted due to subsistence hunting by the *Orang Asli*.

### ii. Forest – *Reman Cereh* and *Berkelah* Reserve Forests

The *Reman Cereh* and *Berkelah* Reserve Forests are adjacent to and contiguous with the greater *Taman Negara* forest complex (*Taman Negara* is located approximately 70 km to the north) and was found to support abundant wildlife. It is worthy to note that the road alignment cuts through a relatively isolated forest that lies within the core area of the Central Forest Spine (JPBD, 2010a). This stretch is of utmost importance for wildlife.

The original riparian forest stand has been retained along Sg. Lepar and its tributaries within the *Felda Lepar Utara 4* estate. Arboreal species like monkeys and squirrels were observed in the riparian area which has fruiting fig trees.

### iii. Oil Palm Plantations – *Felda Lepar Utara 4*

Oil palm plantations are a markedly different habitat comprising of a monoculture stand of oil palm trees that is relatively a poor species habitat for wildlife. This forest fringe is an area where intrusions by wildlife are common. It is important to note that many of the wildlife species that intrude into the estate from the forest are not resident within the plantation area.

**(k) Aquatic Flora and Fauna**

Aquatic flora and fauna sampling was undertaken at seven locations similar to the water quality locations. Phytoplankton at the study area consist of five major phyla namely Chlorophyta, Bacillariophyta, Euglenophyta, Dinoflagellata, and Cyanophyta with a total of 17 species. The density of phytoplankton at the study area ranged from 9.68 cells/ml to 619.60 cells/ml.

There are three main phyla of zooplankton namely Protozoa, Arthropoda and Rotifera found at the study area. The density of zooplankton at the study area was in the range of 0 – 2.90 ind./l. Macrobenthic invertebrates at the study area indicated that two major phyla were found namely Arthropoda and Annelida. Their densities ranged from 30 – 970 ind./m<sup>2</sup>. A total of 35 fish were caught in the study area, comprising of 13 species from three families – Cyprinidae (11 species), Nandidae (one species) and Belonidae (one species).

**(l) Socio-Economy**

The Felda settlers are made-up of Malays with average income ranging from RM 1,300 to RM 3,000; while Sungai Lembing is made up Malays (60.5%), Chinese (17.7%), Indians (2.2%) and *Orang Asli* (6.3%) with income ranging from RM 1,500 to RM 2,200.

**6.0 POTENTIAL ENVIRONMENTAL IMPACTS, MITIGATION MEASURES AND RESIDUAL IMPACTS**

A summary of potential impacts, mitigation measures and residual impacts is provided in **Table ES-2**.

**Table ES-2: Summary of Potential Impacts, Mitigation Measures and Residual Impacts**

No.	Potential Impacts	Mitigation Measures	Residual Impacts
1.	<p><b>Air Quality</b></p> <ul style="list-style-type: none"> <li>• During construction:                             <ul style="list-style-type: none"> <li>○ With dust control measures, 24-hour average of TSP incremental concentration is below the limit of 260 <math>\mu\text{g}/\text{m}^3</math>.</li> <li>○ Without control measures, the TSP concentration will exceed 260 <math>\mu\text{g}/\text{m}^3</math> up to 1 km from construction area, with a predicted level of 670 <math>\mu\text{g}/\text{m}^3</math> within the Project area.</li> </ul> </li> <li>• Post-construction:                             <ul style="list-style-type: none"> <li>○ CO is most significant with the highest maximum 1-hour average of concentration expected to be about 2,801 <math>\mu\text{g}/\text{m}^3</math> – lower than the MAAQG limit of 35,000 <math>\mu\text{g}/\text{m}^3</math>.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Wet suppression.</li> <li>• Application of suitable dust palliative.</li> <li>• Prohibit open burning.</li> <li>• Conduct regular air quality monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>• Residual impact from fugitive dust during the operational stage is not significant.</li> </ul>
2.	<p><b>Noise</b></p> <p>Impact from noise generation is not expected to be significant.</p>	<p>Although impact is rendered insignificant, the following mitigation measures are proposed:</p> <ul style="list-style-type: none"> <li>• Limit operation of heavy machineries to daytime: 0700 – 2200 hours.</li> <li>• Use acoustic and silencers where applicable.</li> </ul>	<ul style="list-style-type: none"> <li>• Vehicular noises during the post-construction stage may be a nuisance, however the impact is short-term.</li> </ul>
3.	<p><b>Water Quality</b></p> <p>Impacts on water quality are significant during construction.</p> <ul style="list-style-type: none"> <li>○ Sedimentation due to water run-off from exposed area may increase turbidity of water bodies.</li> <li>○ Spillage of oil and grease from workshops and machineries during construction and post construction may pollute soil and water bodies.</li> <li>○ Sewage and sillage discharges into water bodies may increase <i>E. coli</i> and coliform bacteria.</li> </ul>	<ul style="list-style-type: none"> <li>• Install proper toilets and septic tanks at workers' camp and site office.</li> <li>• Provide secondary containment for oil and chemical storage.</li> <li>• Scheduled wastes should be handled in accordance to requirements of Environmental Quality (Scheduled Wastes) Regulations 2005.</li> <li>• Practice good housekeeping.</li> <li>• Water quality monitoring should be conducted.</li> </ul>	<ul style="list-style-type: none"> <li>• Residual impact is expected during construction.</li> </ul>

**Table ES-2: Summary of Potential Impacts, Mitigation Measures and Residual Impacts (Cont.)**

No.	Potential Impacts	Mitigation Measures	Residual Impacts										
4.	<p><b>Soil Erosion</b></p> <ul style="list-style-type: none"> <li>Impacts from soil erosion are anticipated which will cause sedimentation of receiving waterways and deterioration of water quality.</li> <li>Estimated soil loss: <table border="1" data-bbox="533 1234 751 1966"> <thead> <tr> <th>Peringkat</th> <th>Magnitude (tonne/ha/yr)</th> </tr> </thead> <tbody> <tr> <td>Pre-development</td> <td>266.8</td> </tr> <tr> <td>Construction (with mitigation)</td> <td>90.723</td> </tr> <tr> <td>Construction (without mitigation)</td> <td>1,067</td> </tr> <tr> <td>Post-development</td> <td>106.7</td> </tr> </tbody> </table> </li> </ul>	Peringkat	Magnitude (tonne/ha/yr)	Pre-development	266.8	Construction (with mitigation)	90.723	Construction (without mitigation)	1,067	Post-development	106.7	<ul style="list-style-type: none"> <li>Site clearing and earthwork should be conducted in phases.</li> <li>Erosion and Sediment Control Plan (ESCP) should be prepared in accordance with the DID 2010 Guidelines entitled "Guideline for Erosion and Sediment Control in Malaysia".</li> <li>Best Management Practices (BMPs) should be put in place prior to commencement of site clearing and earthwork. The BMPs should be inspected and maintained regularly to ensure effectiveness.</li> <li>Conduct sampling of suspended solids from discharge points of BMPs such as silt trap/ sediment retention pond.</li> </ul>	<ul style="list-style-type: none"> <li>If proper measures are not taken, siltation and sedimentation may occur in downstream waterways.</li> </ul>
Peringkat	Magnitude (tonne/ha/yr)												
Pre-development	266.8												
Construction (with mitigation)	90.723												
Construction (without mitigation)	1,067												
Post-development	106.7												
5.	<p><b>Aquatic Biological Resources</b></p> <ul style="list-style-type: none"> <li>During construction: <ul style="list-style-type: none"> <li>Loss of riparian habitat from site-clearing and earthwork.</li> <li>Soil erosion could increase sedimentation in receiving rivers which exert negative impact to the aquatic species.</li> <li>Road construction affects river water flow which could restrict the passage of fish.</li> </ul> </li> <li>Post-construction: <ul style="list-style-type: none"> <li>Following rain events, organisms below stormwater outfalls are exposed to contaminants from road surface.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Demarcate and maintain project boundary and restrict all construction activities within the boundary limit.</li> <li>Hunting of wildlife, including fishing, and collection of forest produce within the Reserve Forests is prohibited.</li> </ul>	<ul style="list-style-type: none"> <li>If proper measures are not taken, depletion of natural resources may occur.</li> </ul>										

**Table ES-2: Summary of Potential Impacts, Mitigation Measures and Residual Impacts (Cont.)**

No.	Potential Impacts	Mitigation Measures	Residual Impacts
6	<p><b>Flora</b></p> <ul style="list-style-type: none"> <li>• During construction:                             <ul style="list-style-type: none"> <li>○ Total loss of vegetation within ROW of 60 m width at length of 35 km and width of 60 m for the road construction.</li> </ul> </li> <li>• Post-Construction                             <ul style="list-style-type: none"> <li>○ Increased access for poachers into the remote forest areas for hunting or collection of forest produces.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Demarcate and maintain project boundary and restrict all construction activities within the boundary limit.</li> </ul>	<ul style="list-style-type: none"> <li>• If proper measures are not taken, depletion of natural resources may occur.</li> </ul>
7	<p><b>Wildlife</b></p> <ul style="list-style-type: none"> <li>• Impact on wildlife is expected in the following aspects:                             <ul style="list-style-type: none"> <li>○ Loss of habitat</li> <li>○ Forest fragmentation</li> <li>○ Barrier to wildlife movement and risk of road kills</li> <li>○ Increase hunting pressure for game animals</li> <li>○ Risk of poaching</li> <li>○ Subsistence hunting by orang asli</li> <li>○ Increase human – wildlife conflict</li> </ul> </li> <li>• Impact to the wildlife within the orchard at Sungai Lembang and oil palm plantations at Felda Lepar Utara 4 is not significant.</li> <li>• Impact to the wildlife within Reman Cereh and Berkelah Forest Reserves is significant.</li> </ul>	<ul style="list-style-type: none"> <li>• Pre-construction:                             <ul style="list-style-type: none"> <li>○ Allocate designated crossings for wildlife.</li> <li>○ Ensure the riparian buffer zone is adequate.</li> </ul> </li> <li>• During construction and post-construction:                             <ul style="list-style-type: none"> <li>○ Prohibition of hunting, trapping and poaching.</li> <li>○ Maintain a Wildlife Record Book to record sightings, locations, dates, times, numbers as well as behaviour.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• If proper measures are not taken, loss of wildlife may occur.</li> </ul>
8	<p><b>Socio-Economy</b></p> <ul style="list-style-type: none"> <li>• Positive impact is perceived from this Project which provides shorter travel distance between Kuantan and Jerantut.</li> <li>• Negative impact is perceived that the foraging areas for <i>Orang Asli</i> may be disturbed and reduced.</li> </ul>	<ul style="list-style-type: none"> <li>• Award the construction contracts to local contractors</li> <li>• Limit the employment of foreign workers</li> </ul>	-

## 7.0 ENVIRONMENTAL MANAGEMENT PLAN

Framework for an Environmental Management Plan (EMP) to facilitate the planning, control and monitoring of mitigation measures and activities during the construction stage is provided. The EMP emphasises on the following:

- Environmental Policy;
- Organisational Structure;
- Environmental Requirements;
- Environmental Monitoring and Inspection Programmes; and
- Emergency Response Plan.