CHAPTER 3

CHAPTER 3:
PROJECT DESCRIPTIONS AND ACTIVITIES

This chapter provides further descriptions of the proposed new road from Sungai Lembing to Felda Lepar Utara with respect to its alignment, design criteria, as well as the construction activities.

3.1 ROAD ALIGNMENT

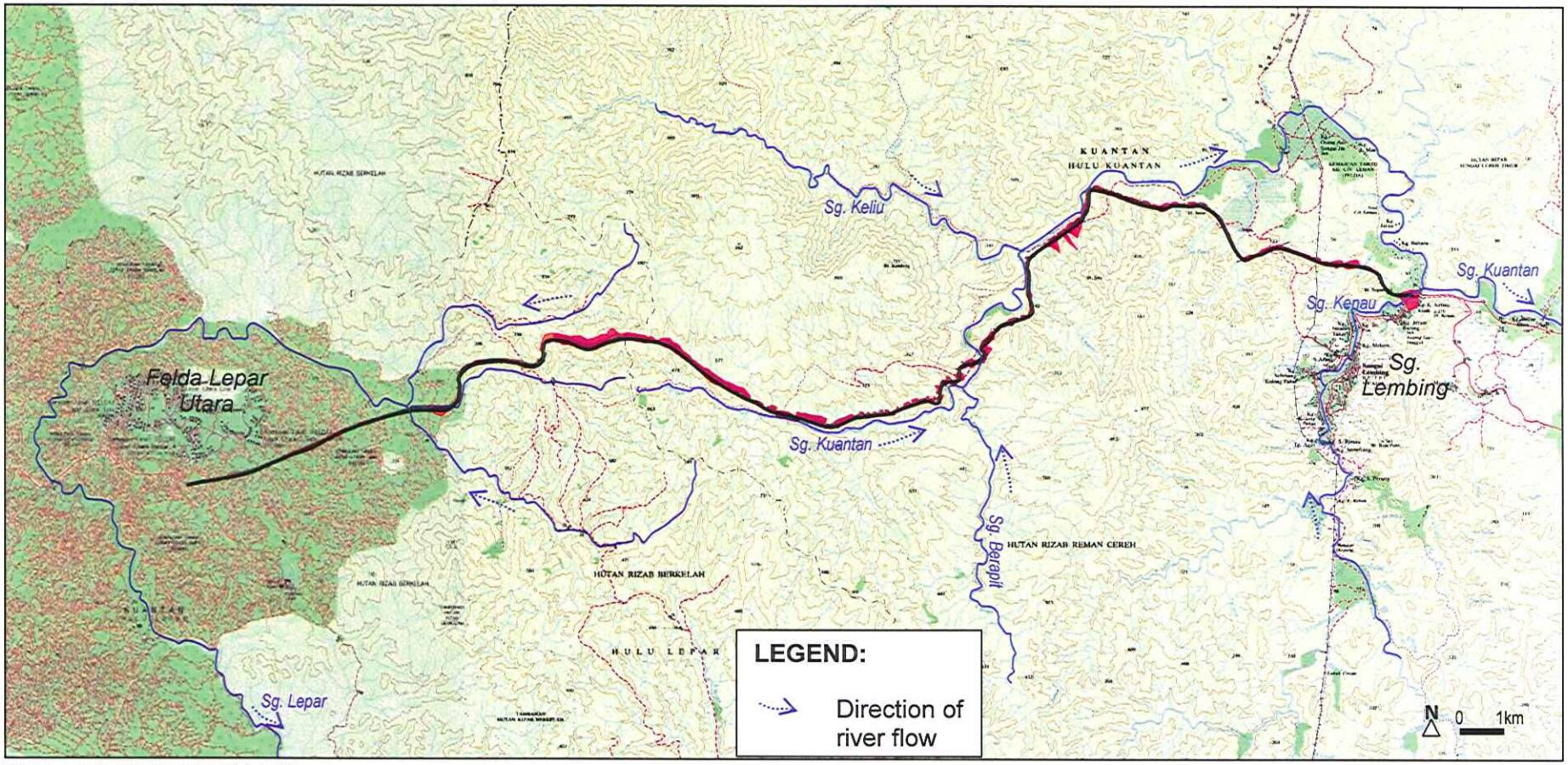
A preliminary road alignment has been designed. The proposed new road from Sungai Lembing to Felda Lepar Utara will originate from the existing public road near Kuala Kenau, about 3 km before the Sungai Lembing township. The GPS coordinates of Chainage 0+000 are approximately at E 103° 02' 58.3" and N 03° 55' 56.7".

The road will cross Sg. Kenau and navigate north-westerly for about 8.5 km and then turns into south-westerly direction in tandem with Sg. Kuantan. The road then crosses Sg. Kuantan at about Chainage 14+000, then traverse westerly along Sg. Kuantan towards the headwater. The road crosses the hydrological divide between Sg. Kuantan and Sg. Lepar basins at about Chainage 23+500, continuing westerly and crosses Sg. Lepar at about Chainage 19+500 and thereof into Felda Lepar Utara and meets the existing Felda road at around E 102° 47' 50.7" and N 3° 53' 34.4" (**Figure 3.1.1**).

The total length of road to be constructed is about 35 km and the right-of-way is of 60 m width. Therefore, the total land area that will be affected by the road construction work is about 210 hectares. The first two kilometres of the road will traverse farmlands and secondary forest; the subsequent 26 km more or less will cut through the Reman Cereh Forest Reserve and Berkelah Forest Reserve; and the last stretch of about 7 km is traversing the oil palm plantation in Felda Lepar Utara.

The Project Proponent has commissioned ground survey to verify site terrain condition and to ascertain the actual alignment on ground. The ground survey is still in progress at the time of this reporting.

Figure 3.1.1: Alignment of the new road from Sungai Lembing to Felda Lepar Utara



Source: JKR (2013); JUPEM (2012).

3.2 ROAD DESIGN

The Sungai Lembing – Felda Lepar Utara road will be designed based on JKR R2 design classification for rural roads. The road shall be aligned within a reserve width (i.e. Right-Of-Way) of 60 m. The geometric design criteria for JKR R2 and R3 roads are shown in **Table 3.2.1**.

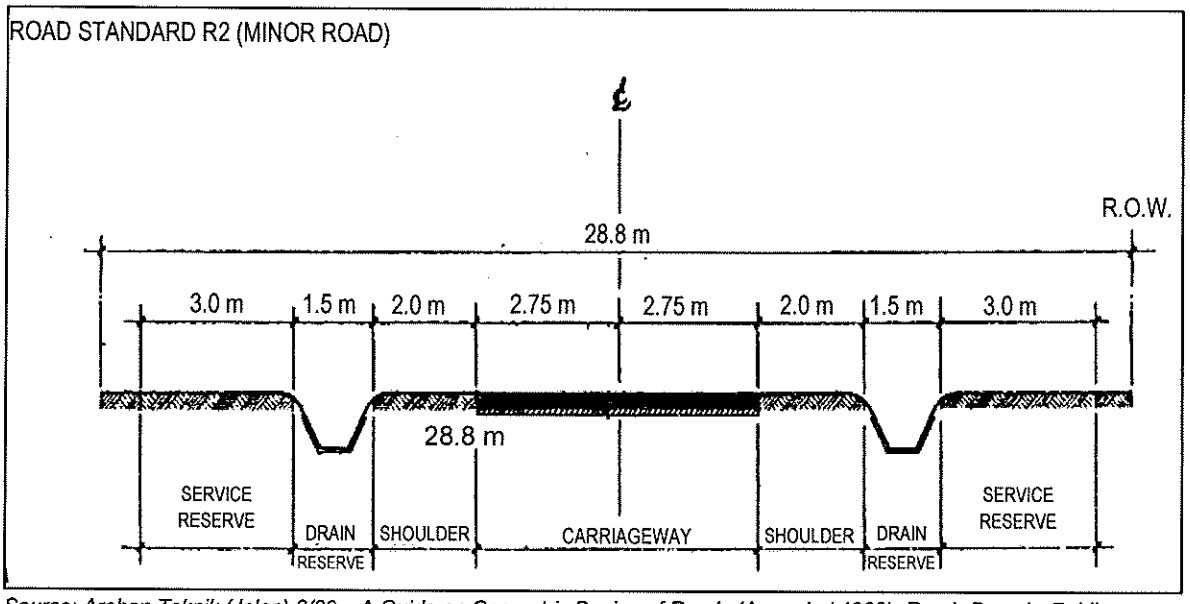
The proposed road is a single 2-lane carriageway, with each lane having a minimum width of 2.75 m (**Figure 3.2.1**). The road shoulder shall be unpaved with a minimum width of 1.50 m. On flat terrain where the general natural ground cross slope gradient is less than 3%, the design speed allowable will 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.

Table 3.2.1: Geometric Design Criteria for JKR R2 and R3 Rural Roads

Road Design Standard	R2			R3		
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.

Figure 3.2.1: Typical Cross Section Profile for JKR R2 Rural Minor Road



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

A more environmentally stringent design will be adopted in the final design of the road. This is aimed at reducing earthworks and potential instability of soil slopes thereby minimising impacts to the environment. As much as possible, 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 as follows (Perunding Zaaba, 2002):

- **Slope stabilisation**: An anchorage system will be employed to effectively transmit an applied force to load bearing stratum to resist instability forces. The slope stabilisation structures normally used are soil nailing in cut slopes, anchored earth wall in fill slopes, as well as earth wall and gabion walls.
- **Structure**: A reinforced concrete structure e.g. viaduct, designed to carry a road over a ravine or to minimise cut and fill.
- **Tunnels**: A total physical enclosure of a road intruding into the ground and will minimise disturbance to the surrounding environment.

3.3 EARTHWORK DESIGN

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

A. Conventional Design

The conventional design involves the construction of new road with moderate to extensive cut and fill. Height of each cut and fill slope will be limited to 6.0 m. The inclination of cut slopes is 1:1 (vertical : horizontal) up to 36 m (six slopes) while the inclination of fill slopes is 1:1.5 up to 24 m (four slopes). All cut and fill slopes shall be closed turf immediately after completion.

All cut and fill slopes shall be open-cut or open-fill. Structures will be introduced for cut and fill slopes exceeding the height mentioned above; and these structures include soil nailing with sprayed concrete; reinforced earth wall; gabion wall or anchored earth wall.

The earthworks volume (cut and fill) extracted from Feasibility Study Report (Perunding Zaaba, 2002) are summarised below:

Earthworks	Earthwork Volume (m^3)
Cut (rock)	993,620
Cut (Soil)	5,630,515
Fill (Soil)	4,313,183
Excess cut (Soil)	1,317,332

B. A More Environmentally Stringent Design

A more environmentally stringent design was adopted to minimise environmental impacts whilst reducing cuts and fills and minimise soil erosion. The design involves the use of tunnels and viaducts, and earthwork design for cut and fill slopes is limited to three slopes only (18 m in height). By introducing tunnels and viaducts, the horizontal alignment is straightened and the length of road is reduced.

3.4 PROJECT ACTIVITIES

The Project activities include three stages i.e.:

i. Pre-construction stage;

ii. Construction stage; and

iii. Post-construction stage.

3.4.1 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.

3.4.2 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:

i. Provision of temporary construction facilities such as access road, site office, workers' quarters, workshop and utilities.

ii. Site clearing including removal of vegetation and unsuitable material or rocks.

iii. Earthworks involving soil excavation, slope cutting and filling, compaction and grading to desirable formations or levels.

iv. Construction and installation of associated infrastructures such as culverts, bridges and drainage works.

v. Road surface dressing including laying of aggregates and sealing with bitumen.

vi. Installation of road fitting and fixtures such as side kerbs, railing, signage and markings.

3.4.3 POST-CONSTRUCTION

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

3.5 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 to be completed by the end of 2016.