

Section 4

Existing Environment

SECTION 4 : EXISTING ENVIRONMENT

4.1 INTRODUCTION

The LRT3 Line traverses highly developed areas in Selangor, passing through multiple residential, commercial, industrial and institutional areas. The 36 km stretch of the alignment will traverse major highways and roads within Petaling Jaya, Shah Alam and Klang. The existing environment along the alignment is described in the following sections.

4.2 TOPOGRAPHY

The LRT3 Line traverses along the terrain with elevation ranges from RL 0 m to RL 50 m. The lowest terrain is located at Klang while the highest point is recorded around Tropicana Station (**Figure 4-1**).

4.2.1 Segment 1 (One Utama Station – Persada PLUS Station)

The existing ground level at One Utama Station is about RL 35 m and it declines to approximately RL 26 m at Damansara Utama Station. The ground level rises to RL 50 m as it reaches the Tropicana Station. The elevation then declines as it approaches the Lien Hoe Station at RL 40 m. From the Lien Hoe Station, the ground descends and rises occasionally until the Dataran Prima Station at RL 40 m. From there onwards, the elevation starts to decline to about RL 20 m to RL 24 m at Persada PLUS Station.

4.2.2 Segment 2 (Station 3 – Bukit Raja Station)

The terrain at Station 3 Station is relatively flat at elevation about RL 20 m and rises gradually as it reaches the Temasya Station at RL 35 m. The elevation starts to decline to around RL 11 m to RL 20 m where the Glenmarie Station is located and further reduces to RL 10 m at Stadium (Grand Central) Station.

The stretch from Persiaran Hishamuddin and Persiaran Dato' Menteri will be underground. The existing ground level at Persiaran Hishamuddin is about RL 35 m to RL 37 m. After the Persiaran Hishamuddin Station, the ground reduces to RL 17 m at Section 14 Station and then sloping up to RL 22 m at SIRIM Station. The terrain at UiTM Station, I-City Station and Bukit Raja Station are relatively flat, with existing ground level of RL 12 m, RL 5 m and RL 10 m, respectively.

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4.2.3 Segment 3 (Kawasan 17 Station – Johan Setia Station)

For Segment 3, the Kawasan 17 Station area is located at elevation that ranges from RL 7 m to RL 8 m. The elevation then descends to RL 5 m where the Jalan Meru Station is located. The existing ground level at Klang Station ranges from RL 4 m to RL 12 m. The ground level around Taman Selatan Station and Sri Andalas Station ranging from RL 6 m to RL 8 m. After Sri Andalas Station, the elevation rises to RL 10 m at Tesco Bukit Tinggo Station. The stretch from AEON Bukit Tinggi Station to Johan Setia Station is flat with elevation of RL 5 m.

4.3 GEOLOGY, SOIL AND GROUNDWATER

4.3.1 Geology

The LRT3 will traverses through two geological formations, namely the Kuala Lumpur Granite and Kenny Hill Formation (**Figure 4-2**). Kuala Lumpur Granite is part of the Main Range Granite that has intruded into folded and regionally metamorphosed clastic and calcareous Palaeozoic rocks. The granite texture generally varies from coarse to medium grained, porphyritic to slightly porphyritic with colors ranging from white to pale grey. The granite is predominantly megacrystic consisting of K-Feldspar megacrysts. The major minerals are K-Feldspar, Plagioclase, Quartz, Biotite, Muscovite and occasionally Tourmaline.

Kenny Hill Formation consists mainly of interbedded sequences of phyllite and quartzite, shale and siltstone and sandstone with isolated lenses of schist with gentle dips less than 30°. Kenny Hill Formation is tightly folded, faulted and weathered into predominantly silt and clay.

4.3.1.1 Geology along Segment 1 (One Utama Station – Persada PLUS Station)

The whole Segment 1 area is located within the Petaling Jaya district. Based on the geotechnical investigation, the alignment from One Utama station to Persada PLUS station is underlain by granitic rock (**Table 4-1a**). This alignment stretches for up to 7 km.

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Table 4-1a Geological Formation along One Utama – Persada PLUS

Station	Geological Formation
One Utama Station	Granite
Damansara Utama Station	Granite
Tropicana Station	Granite
Lien Hoe Station	Granite
Dataran Prima Station	Granite
Persada PLUS Station	Granite

Source: Feasibility Study for the Proposed Light Rail Transit Line 3 (Bandar Utama to Klang), 2014

4.3.1.2 Geology along Segment 2 (Station 3 – Bukit Raja Station)

Generally, this segment area is split into two types of geological formations. The alignment from Station 3 to Glenmarie station consists of granitic rock formation. While, the stretch from Stadium (Grand Central) station to Bukit Raja station consists of Kenny Hill Formation (**Table 4-1b**). In total, the length of alignment within this segment will be around 15 km (which 13 km of elevated section plus 2 km of underground section).

Table 4-1b Geological Formation along Station 3 – Bukit Raja

Station	Geological Formation
Station 3 Station	Granite
Temasya Station	Granite
Glenmarie Station	Granite
Stadium (Grand Central) Station	Kenny Hill Formation
Persiaran Hishamuddin Station	Kenny Hill Formation
Seksyen 14 Station	Kenny Hill Formation
SIRIM Station	Kenny Hill Formation
UiTM Station	Kenny Hill Formation
I-City Station	Kenny Hill Formation
Bukit Raja Station	Kenny Hill Formation

Source: Feasibility Study for the Proposed Light Rail Transit Line 3 (Bandar Utama to Klang), 2014

4.3.1.3 Geology along Segment 3 (Kawasan 17 Station – Johan Setia Station)

The whole Segment 3 stations are located within the Klang district. Kenny Hill Formation has been identified as the type of geological formation along the proposed alignment (**Table 4-1c**). The alignment along this segment will have a length of approximately 14 km.

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Table 4-1c Geological Formation along Kawasan 17 – Johan Setia

Station	Geological Formation
Kawasan 17 Station	Kenny Hill Formation
Jalan Meru Station	Kenny Hill Formation
Klang Station	Kenny Hill Formation
Taman Selatan Station	Kenny Hill Formation
Sri Andalas Station	Kenny Hill Formation
Tesco Bukit Tinggi Station	Kenny Hill Formation
AEON Bukit Tinggi Station	Kenny Hill Formation
Bandar Botanik Station	Kenny Hill Formation
Johan Setia Station	Kenny Hill Formation

Source: Feasibility Study for the Proposed Light Rail Transit Line 3 (Bandar Utama to Klang), 2014

4.3.2 Soil Investigation

A total of 13 boreholes were carried out along the proposed alignment (**Figure 4-3**).

4.3.2.1 Subsoil Profile along Segment 1 (One Utama Station – Persada PLUS Station)

For this segment, the boreholes had been carried out in two locations (BH7A and BH21). In general, the top soil layer up to a depth between 7.5 m and 13.5 m below the existing ground level comprise very loose to loose silty sand/very soft to firm sandy silt underlain by medium dense to dense silty sand/stiff to very stiff sandy silt up to depth of 15 m to 21 m.

4.3.2.2 Subsoil Profile along Segment 2 (Station 3 Station – Bukit Raja Station)

There were eight boreholes located within this segment. The top soil layer up to a depth between 6 m and 18 m below the existing ground level comprise very loose to loose silty sand/very soft to firm sandy silt underlain by medium dense to dense silty sand/stiff to very stiff sandy silt up to depth of 6 m to 33 m. Hard sandy silt/dense silty sand were encountered up to a depth from 9 m to 40.5 m.

For the underground alignment, the top soil layer up to a depth 9 m below the existing ground level comprised stiff to very sandy sil/clay up to depth 21 m. The sandstone bedrock is encountered in this area.

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4.3.2.3 Subsoil Profile along Segment 3 (Kawasan 17 Station – Johan Setia Station)

Segment 3 has three boreholes along the alignment which include BH15A, BH14A and BH19. The top soil layer up to a depth between 6 m and 31.5 m below the existing ground level comprise very loose to loose silty sand/very soft to firm sandy silt underlain by medium dense to dense silty sand/stiff to very stiff sandy silt up to depth of 15 m to 60 m.

4.3.3 Groundwater

Groundwater monitoring is critical particularly for the tunneling and underground works. Monitoring was carried out by installing standpipe and piezometers. The highest groundwater level was recorded at Seksyen 7 (Shah Alam), Kawasan 17 (Klang) and Jalan Langat (AEON Bukit Tinggi) (**Table 4-2**). The groundwater was found at the surface level for those three locations. The lowest groundwater level was found at Temasya station (8.7 m below ground level).

Table 4-2 Groundwater Level

No	Station/Area	Depth where groundwater was found (from the surface) (m)
1	Lien Hoe	4.7
2	Persada PLUS	2.8
3	Temasya	8.7
4	Near Stadium (Grand Central) Station (Persiaran Kerjaya)	3.9
5	Persiaran Hishamuddin	4.3
6	Seksyen 14	4.6
7	Seksyen 7, Shah Alam	Groundwater found at surface level
8	I-City	0.6
9	Kawasan 17	Groundwater found at surface level
10	Jalan Meru Station	1.7
11	Jalan Langat (right after Hospital Tengku Ampuan Rahimah)	1.2
12	Jalan Langat (right after AEON Bukit Tinggi)	Groundwater found at surface level
13	Jalan Langat (right after Kota Bayuemas)	5.7

Source: Feasibility Study for the Proposed Light Rail Transit Line 3 (Bandar Utama to Klang), 2014

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4.4 LAND USE

4.4.1 Land Use along the LRT3 Line

As the alignment passes through Petaling Jaya, Shah Alam and Klang, it passes residential, commercial and industrial areas as well as public facilities and institutions. The following tables describe the land use, detailing buildings and areas within 50 m and 100 m of the alignment. It is to be noted, however, that this list is not exhaustive due to the large number of buildings located along the alignment.

4.4.1.1 Segment 1A: One Utama Station – Tropicana Station

This segment follows the alignment from the beginning near Sri Pentas until Merchant Square Business Centre by the Damansara Toll Plaza. The land use along this segment is mostly residential and commercial with public facilities and institutions (**Table 4-3a** and **Figure 4-4a**).

Table 4-3a Land Use along Segment 1A (Sg Kayu Ara, SPRINT Highway)

Station	One Utama – Damansara Utama – Tropicana				
Landmark	Sri Pentas, Flat Kayu Ara, 10 Boulevard				
Land Use	Residential, commercial and public facilities/institutions				
Right Corridor		Road/Highway/ River	Left Corridor		
100 m	50 m		50 m	100 m	
<u>Residential Areas</u>	<u>Residential Areas</u>	<ul style="list-style-type: none"> • Sg Kayu Ara (~ 1.5 km) • SPRINT Highway 	<u>Residential Areas</u>	<u>Residential Areas</u>	<u>Residential Areas</u>
<ul style="list-style-type: none"> • Taman Kayu Ara Indah • Flat Kayu Ara • Puncak Damansara Condominium • Kg Sg Kayu Ara 	<ul style="list-style-type: none"> • Taman Kayu Ara Indah • Flat Kayu Ara • Puncak Damansara Condominium • Kg Sg Kayu Ara 		<ul style="list-style-type: none"> • Damansara Utama • Squatters next to Sg Kayu Ara 	<ul style="list-style-type: none"> • Fella Design • AGMA Sdn Bhd • Merchant Square Business Centre 	<ul style="list-style-type: none"> • Damansara Utama • Squatters next to Sg Kayu Ara • Kuarters Institusi Pendidikan Bandar Utama
<u>Public Facilities/ Institutions</u>	<u>Commercial Areas</u>		<u>Commercial Areas</u>	<u>Commercial Areas</u>	<u>Commercial Areas</u>
<ul style="list-style-type: none"> • IWK Treatment Plant 	<ul style="list-style-type: none"> • Mylanohaus • A.G. Tropicana Furniture Centre • Petron • W. Furnishing Sdn Bhd 		<ul style="list-style-type: none"> • 10 Boulevard • Shell • BHP • AGMA Sdn Bhd • Merchant Square 	<ul style="list-style-type: none"> • SK Bandar Utama 	

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Table 4-3a Land Use along Segment 1A (Sg Kayu Ara, SPRINT Highway) (Cont'd)

Station	One Utama – Damansara Utama – Tropicana			
Landmark	Sri Pentas, Flat Kayu Ara, 10 Boulevard			
Land Use	Residential, commercial and public facilities/institutions			
Right Corridor		Road/Highway/ River	Left Corridor	
100 m	50 m		50 m	100 m
				<u>Public Facilities/ Institutions</u> <ul style="list-style-type: none"> • SK Bandar Utama • SJK (T) Effingham

4.4.1.2 Segment 1B: Lien Hoe Station – Persada PLUS Station

This segment follows the alignment from near the Lien Hoe Tower along the NKVE until the Subang toll. The land use along this segment is mostly residential and commercial (**Table 4-3b** and **Figure 4-4b**).

Table 4-3b Land Use along Segment 1B (NKVE and Jalan Lapangan Terbang Subang)

Station	Lien Hoe – Dataran Prima – Persada PLUS			
Landmark	Ambank Bhd Building, Lien Hoe Tower, Persada PLUS			
Land Use	Residential and commercial			
Right Corridor		Road/Highway	Left Corridor	
100 m	50 m		50 m	100 m
<u>Residential Areas</u> <ul style="list-style-type: none"> • Damansara Lagenda • Villa Idaman • Vista Subang Apartment • Ara Damansara Winschester • D'Aman Crimson Apartment • Eve Suite • Suria Damansara Condominium • Kelana Idaman 	<u>Residential Areas</u> <ul style="list-style-type: none"> • Damansara Lagenda • Villa Idaman • Vista Subang Apartment • Ara Damansara Winschester • D'Aman Crimson Apartment • Eve Suite 	<ul style="list-style-type: none"> • NKVE (until Subang toll) • Jalan Lapangan Terbang Subang 	<u>Residential Areas</u> <ul style="list-style-type: none"> • Kelana D'Putra Condominium 	<u>Residential Areas</u> <ul style="list-style-type: none"> • Taman Bukit Mayang Emas • Aman Suria Damansara • Taman Mayang • Taman Megah Emas • Kelana D'Putra Condominium

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Table 4-3b Land Use along Segment 1B (NKVE and Jalan Lapangan Terbang Subang) (Cont'd)

Station	Lien Hoe – Dataran Prima – Persada PLUS			
Landmark	Ambank Bhd Building, Lien Hoe Tower, Persada PLUS			
Land Use	Residential and commercial			
Right Corridor		Road/Highway	Left Corridor	
100 m	50 m		50 m	100 m
<u>Commercial Areas</u> <ul style="list-style-type: none">• Persoft Tower• Lien Hoe Tower• Shell• Persada PLUS	<u>Commercial Areas</u> <ul style="list-style-type: none">• Ambank Bhd Building• Lien Hoe Tower	<ul style="list-style-type: none">• NKVE (until Subang toll)• Jalan Lapangan Terbang Subang		<u>Commercial Areas</u> <ul style="list-style-type: none">• Shoplots at Taman Bukit Mayang Emas• Parklane Commercial Hub• Kelana Square

Segment 1A and 1B are located under the area of MBPJ jurisdiction. The alignment will traverse through three of five “*Blok Perancangan Kecil*” (BPK) namely BPK 2.1 (PJU 1, PJU 1A, PJU 3), BPK 2.2 (PJU 6) and BPK 2.3 (SS 7, SS 21, SS 22 and SS 25)¹. In general, the land uses along the alignment are made up of residential areas (60%), commercial areas (25%) and institutional and public facilities (15%).

Table 4-3c Areas under MBPJ Traverses by LRT3 Line

Petaling Jaya Municipal Council		
Blok Perancangan Kecil (BPK)	Zone	Area/Place
BPK 2.1	PJU 1	Aman Suria
		Dataran Prima
		Kg Cempaka
	PJU 1A	Ara Damansara
		Lembah Subang
	PJU 3	Tropicana
BPK 2.2	PJU 6	Kg Kayu Ara
		Bandar Utama
BPK 2.3	SS 7	Kelana Jaya
	SS 21	Damansara Utama
	SS 22 & SS 22A	Damansara Jaya
	SS 25	Taman Mayang
		Taman Emas

¹ Draf Rancangan Tempatan Majlis Bandaraya Petaling Jaya (Peti Cadangan dan Pernyataan Bertulis) 2020

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4.4.1.3 Segment 2A: Station 3 Station – Persiaran Hishamuddin Station

This segment follows the alignment from near the Kelana Business Centre until Persiaran Hishamuddin. The land use along this segment is mostly residential, commercial and industrial with public facilities and institutions (**Table 4-4a** and **Figure 4-4c**).

Table 4-4a Land Use along Segment 2A (Persiaran Kerjaya, Persiaran Sukan and Persiaran Hishamuddin)

Station	Station 3 – Temasya – Glenmarie – Stadium – Persiaran Hishamuddin			
Landmark	Sultan Salahuddin Abdul Aziz Shah Polytechnic, Stadium Shah Alam, Shah Alam Club			
Land Use	Residential, commercial, public facilities/institutions and industrial			
Right Corridor		Road/Highway	Left Corridor	
100 m	50 m		50 m	100 m
<u>Residential Areas</u> <ul style="list-style-type: none"> Glenmarie Gardens Temasya Anggun Seksyen 9 Seksyen 11 <u>Commercial Areas</u> <ul style="list-style-type: none"> Accentra Glenmarie Wisma DRB-HICOM Palm Grove Seksyen 9 <u>Public Facilities/ Institutions</u> <ul style="list-style-type: none"> Sultan Salahuddin Abdul Aziz Shah Polytechnic Malawati Indoor Stadium <u>Industrial Areas</u> <ul style="list-style-type: none"> HICOM Glenmarie Industrial Park 	<u>Residential Areas</u> <ul style="list-style-type: none"> Temasya Anggun <u>Commercial Areas</u> <ul style="list-style-type: none"> Seksyen 9 Palm Grove Toshiba Sales & Services Sdn Bhd <u>Public Facilities/ Institutions</u> <ul style="list-style-type: none"> Sultan Salahuddin Abdul Aziz Shah Polytechnic <u>Industrial Areas</u> <ul style="list-style-type: none"> HICOM Glenmarie Industrial Park 	<ul style="list-style-type: none"> Persiaran Kerjaya Persiaran Sukan Persiaran Hishamuddin 	<u>Residential Areas</u> <ul style="list-style-type: none"> D'Kayangan Section 12 <u>Commercial Areas</u> <ul style="list-style-type: none"> BMW Auto Bavaria Glenmarie Caltex Shell <u>Industrial Areas</u> <ul style="list-style-type: none"> Temasya Industrial Park Batu Tiga Industrial Park 	<u>Residential Areas</u> <ul style="list-style-type: none"> D'Kayangan Section 12 <u>Public Facilities/ Institutions</u> <ul style="list-style-type: none"> Shah Alam Club Management and Science University <u>Industrial Areas</u> <ul style="list-style-type: none"> Temasya Industrial Park Batu Tiga Industrial Park

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4.4.1.4 Segment 2B: Section 14 Station – Bukit Raja Station

This segment follows the alignment from the roundabout after Persiaran Hishamuddin to the Bukit Raja industrial area. The land use along this segment is mostly residential, commercial and industrial with public facilities and institutions (Table 4-4b and Figure 4-4d).

Table 4-4b Land Use along Segment 2B (Persiaran Dato' Menteri, Federal Highway, Persiaran Kayangan, Persiaran Permai, Lebuh Keluli)

Station	Section 14 – SIRIM – UiTM – I-City – Bukit Raja			
Landmark	UiTM, SIRIM, I-City			
Land Use	Residential, commercial, public facilities/institutions and industrial			
Right Corridor		Road/Highway	Left Corridor	
100 m	50 m		50 m	100 m
<u>Residential Areas</u> <ul style="list-style-type: none"> • Seksyen 11 • Vista Alam • PKNS Apartments <u>Commercial Areas</u> <ul style="list-style-type: none"> • Seksyen 14 <u>Public Facilities/ Institutions</u> <ul style="list-style-type: none"> • SIRIM • UiTM <u>Industrial Areas</u> <ul style="list-style-type: none"> • Bukit Raja Selatan Industrial Area 	<u>Residential Areas</u> <ul style="list-style-type: none"> • Seksyen 11 <u>Commercial Areas</u> <ul style="list-style-type: none"> • Shell • Petronas • Seksyen 7 Commercial Centre <u>Industrial Areas</u> <ul style="list-style-type: none"> • Bukit Raja Selatan Industrial Area 	<ul style="list-style-type: none"> • Persiaran Dato' Menteri • Federal Highway • Persiaran Kayangan • Persiaran Permai • Lebuh Keluli 	<u>Residential Areas</u> <ul style="list-style-type: none"> • Kejiran Jalan Plumbum 7/101 & 103 <u>Commercial Areas</u> <ul style="list-style-type: none"> • BHP • Seksyen 7 Commercial Centre <u>Public Facilities/ Institutions</u> <ul style="list-style-type: none"> • Pejabat Pos Besar Shah Alam • Tasik Seksyen 7 <u>Industrial Areas</u> <ul style="list-style-type: none"> • Bukit Raja Selatan Industrial Area 	<u>Residential Areas</u> <ul style="list-style-type: none"> • Seksyen 12 • Kejiran Jalan Plumbum 7/101 & 103 <u>Commercial Areas</u> <ul style="list-style-type: none"> • Seksyen 7 Commercial Centre • I-City <u>Public Facilities/ Institutions</u> <ul style="list-style-type: none"> • Pejabat Pos Besar Shah Alam • Tasik Seksyen 7 <u>Industrial Areas</u> <ul style="list-style-type: none"> • Bukit Raja Selatan Industrial Area

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According to *Rancangan Tempatan MBSA 2020*, the area of Shah Alam is divided into five BPKs. The LRT3 will traverse two BPKs, which are BPK 1 (Seksyen U1) and BPK 3 (Seksyen 1, 2, 7, 11, 12, 13 and 14) areas². Overall, the alignment will traverse a large part of industrial areas (55%) followed by residential (20%), public institution (15%) and commercial (10%).

Table 4-4c Areas under MBSA Traversed by LRT3 Line

Shah Alam Municipal Council		
Blok Perancangan Kecil (BPK)	Section	Area/Place
BPK 1	Seksyen U1	Glenmarie
BPK 3	Seksyen 1	UiTM Shah Alam
	Seksyen 2	SIRIM
	Seksyen 7	Seksyen 7 Commercial Centre I-City
	Seksyen 11	Residential Area
	Seksyen 12	Residential Area
	Seksyen 13	Stadium Shah Alam D'Kayangan
	Seksyen 14	Shah Alam Convention Centre
		Pejabat Pos Besar Shah Alam

4.4.1.5 Segment 3A: Kawasan 17 Station – Sri Andalas Station

This segment follows the alignment from Kawasan 17 to Taman Sri Andalas. The land use along this segment is mostly residential and commercial with public facilities and institutions (**Table 4-5a** and **Figure 4-4e**).

²Rancangan Tempatan MBSA (Pengubahan 1) 2020

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Table 4-5a Land Use along Segment 3A (Lebuhraya Selat Klang, Persiaran Bukit Raja, Jalan Meru, Jalan Jambatan Kota, Persiaran Tengku Ampuan Rahimah)

Station	Kawasan 17 – Jalan Meru – Klang – Taman Selatan – Sri Andalas			
Landmark	Klang Parade, Masjid Jamek Al-Rahimah, Hospital Tengku Ampuan Rahimah			
Land Use	Residential, commercial and public facilities/institutions			
Right Corridor		Road/Highway	Left Corridor	
100 m	50 m		50 m	100 m
<u>Residential Areas</u> <ul style="list-style-type: none"> • Palm Garden Apartment • Kawasan 19 • Rumah Pegawai MPK • Taman Selatan • Taman Palm Grove • Taman Bayu Perdana <u>Commercial Areas</u> <ul style="list-style-type: none"> • Kawasan 17 • Klang Town Centre • Taman Selatan Commercial Area 	<u>Residential Areas</u> <ul style="list-style-type: none"> • Flat Dahlia • Palm Garden Apartment • Kawasan 19 • Taman Selatan • Taman Palm Grove <u>Commercial Areas</u> <ul style="list-style-type: none"> • Kawasan 17 • Shoplots in Kawasan 19 • Klang Town Centre <u>Public Facilities/ Institutions</u> <ul style="list-style-type: none"> • Hospital Tengku Ampuan Rahimah 	<ul style="list-style-type: none"> • Lebuhraya Selat Klang • Persiaran Bukit Raja • Jalan Meru • Jalan Jambatan Kota • Persiaran Tengku Ampuan Rahimah 	<u>Residential Areas</u> <ul style="list-style-type: none"> • Bandar Baru Klang • Flat Cempaka • Flat Mawar • Taman Eng Ann • Taman Meru Klang • Taman Worthington • Taman Merak • Taman Sri Andalas • Taman Desa Utama <u>Commercial Areas</u> <ul style="list-style-type: none"> • Commercial area along Jalan Tiara • Bukit Raja Shopping Centre • Commercial area along Jalan Kelicap • BHP • Taman Sri Andalas Commercial Area 	<u>Residential Areas</u> <ul style="list-style-type: none"> • Bandar Baru Klang • Flat Cempaka • Flat Mawar • Taman Eng Ann • Taman Meru Klang • Taman Worthington • Taman Merak • Taman Sri Andalas • Taman Desa Utama <u>Commercial Areas</u> <ul style="list-style-type: none"> • Commercial area along Jalan Tiara • Bukit Raja Shopping Centre • Plaza Metro • Plaza MPK • Prima Avenue Klang • Taman Sri Andalas Commercial Area

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Table 4-5a Land Use along Segment 3A (Lebuhraya Selat Klang, Persiaran Bukit Raja, Jalan Meru, Jalan Jambatan Kota, Persiaran Tengku Ampuan Rahimah) (Cont'd)

Station	Kawasan 17 – Jalan Meru – Klang – Taman Selatan – Sri Andalas			
Landmark	Klang Parade, Masjid Jamek Al-Rahimah, Hospital Tengku Ampuan Rahimah			
Land Use	Residential, commercial and public facilities/institutions			
Right Corridor		Road/Highway	Left Corridor	
100 m	50 m		50 m	100 m
<u>Public Facilities/ Institutions</u> <ul style="list-style-type: none"> • SMK Meru • Chinese Graveyard • SMK Meru • SMK Tinggi Klang • Mewah Club • Majlis Perbandaran Klang (MPK) • Pejabat Pertahanan Awam Klang • Guan Yin Temple • Ibu Pejabat Polis Traffik Klang • Sekolah Khas Klang • SMK Tengku Ampuan Rahimah • Hospital Tengku Ampuan Rahimah 			<u>Public Facilities/ Institutions</u> <ul style="list-style-type: none"> • Surau Bandar Baru Klang • Ibu Pejabat Polis Daerah Klang Selatan • Banting Road Chinese and Christian Cemeteries • Tanah Perkuburan Islam Lipat Kajang 	<u>Public Facilities/ Institutions</u> <ul style="list-style-type: none"> • KPJ Klang Specialist Hospital • SMK Kuang Hua • Kompleks Baru Pejabat Daerah Klang • SK/SMK Convent 1 & 2 • Wisma Lourdes • Taman Bandar Diraja Klang • Banting Road Chinese and Christian Cemeteries • Tanah Perkuburan Islam Lipat Kajang • Masjid Jamek Al-Rahimah • Sekolah Rendah Agama Taman Sri Andalas Klang

4.4.1.6 Segment 3B: Tesco Bukit Tinggi Station to Johan Setia Station

This segment follows the alignment from after Taman Desa Utama to the last station and depot at Johan Setia. The land use along this segment is mostly residential and commercial with public facilities and institutions (**Table 4-5b** and **Figure 4-4f**).

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Table 4-5b Land Use along Segment 3B (Jalan Langat, Jalan Klang Banting)

Station	Tesco Bukit Tinggi – AEON Bukit Tinggi – Bandar Botanik – Johan Setia			
Landmark	Tesco Bukit Tinggi, AEON Bukit Tinggi, GM Klang			
Land Use	Residential, commercial and public facilities/institutions			
Right Corridor		Road/Highway	Left Corridor	
100 m	50 m		50 m	100 m
<u>Residential Areas</u> <ul style="list-style-type: none"> • Taman Bayu Tinggi • Bandar Bukit Tinggi 1 • Bandar Bukit Tinggi 2 • Bandar Parklands <u>Commercial Areas</u> <ul style="list-style-type: none"> • Tesco Bukit Tinggi • Bandar Bukit Tinggi 2 Commercial Centre • AEON Bukit Tinggi Shopping Centre <u>Public Facilities/ Institutions</u> <ul style="list-style-type: none"> • Klang District Health Office Complex 	<u>Commercial Areas</u> <ul style="list-style-type: none"> • Petron <u>Public Facilities/ Institutions</u> <ul style="list-style-type: none"> • Kuil Shree Muniswaran, Highlands • Kuil Arulmigu Mariamman 	<ul style="list-style-type: none"> • Jalan Langat • Jalan Klang Banting 	<u>Commercial Areas</u> <ul style="list-style-type: none"> • Shoplots along Jalan Mahogani 5 	<u>Residential Areas</u> <ul style="list-style-type: none"> • Taman Desa Utama • Taman Desawan • Bandar Botanic <u>Commercial Areas</u> <ul style="list-style-type: none"> • Commercial area in Taman Desawan • Shoplots along Jalan Mahogani 5 • GM Klang – Wholesale City • Botanic Capital • Shell

Based on the Local Plan, the area is divided into *Blok Perancangan Klang Utara (BPKU)* and *Blok Perancangan Klang Selatan (BPKS)*³. The LRT3 will traverse BPKU 3, BPKS 4, BPKS 5 and BPKS 6 areas. Basically, the dominant land uses along the alignment are residential (50%), commercial (35%) and institutional and public facilities (15%).

³ Rancangan Tempatan Majlis Perbandaran Klang (Pengubahan 1) 2020

SECTION 4 : EXISTING ENVIRONMENT

Table 4-5c Areas under MPK Traversed by LRT3 Line

Klang Municipal Council	
<i>Blok Perancangan (BP)</i>	Area/Place
BPKU 3	Bandar Baru Klang
	Taman Eng Ann
	Kawasan 17
	Taman Meru
	Taman Berkeley
	Bandar Klang (Kawasan 15 and Kawasan 18)
BPKS 4	Taman Selatan
	Taman Chi Liung
	Taman Sri Andalas
	Taman Bayu Perdana
	Taman Desawan
	Pusat Bandar Klang Selatan
BPKS 5	Bandar Botanic 2
	Kg Johan Setia
BPKS 6	Bukit Tinggi 1
	Bukit Tinggi 2
	Bandar Botanic
	Kota Bayuemas
	Bandar Parkland

4.4.2 Land Use at Depot Area

The depot area in Johan Setia will be located at the area of 28 ha. The current land use for the proposed depot area is agriculture. The land use within the 3 km radius is a mixture of residential, commercial (**Table 4-6**) (**Figure 4-5**).

SECTION 4 : EXISTING ENVIRONMENT

Table 4-6 Land Use within 3 km from the Depot Area

Within 1 km	Within 2 km	Within 3 km
Residential <ul style="list-style-type: none"> • Taman Setia Mulia • Taman Johan Setia Permai • Laman Greenville • Bandar Puteri • Taman Setia Permai • Taman Dato' Setia • Taman Johan 	Residential <ul style="list-style-type: none"> • Taman Johan Setia • Taman Sentosa • Laman Greenville • Bandar Puteri • Bandar Botanic 	Residential <ul style="list-style-type: none"> • Taman Sentosa • Bukit Naga • Taman Millenium Sentosa • Taman Desa Idaman 2 • Taman Desawan 2 • Taman Desa Ablelink • Bandar Botanic • Taman Sri Pendamar • Kg Pendamar • Kg Batu Tujuh • Kg Sijangkang
Commercial <ul style="list-style-type: none"> • None 	Commercial <ul style="list-style-type: none"> • Sazean Business Park 	Commercial <ul style="list-style-type: none"> • AEON Bukit Tinggi • Botanic Avenue 2 • Sazean Business Park
Mixed Development <ul style="list-style-type: none"> • Bandar Parklands • Kota Bayuemas 	Mixed Development <ul style="list-style-type: none"> • Bandar Bestari (under construction) • Kota Bayuemas • Ambang Botanic 	Mixed Development <ul style="list-style-type: none"> • Ambang Botanic • Bandar Putera Klang • Bandar Bukit Tinggi 2
Industrial <ul style="list-style-type: none"> • None 	Industrial <ul style="list-style-type: none"> • Taman Perindustrian Air Hitam 	Industrial <ul style="list-style-type: none"> • None

SECTION 4 : EXISTING ENVIRONMENT



SECTION 4 : EXISTING ENVIRONMENT

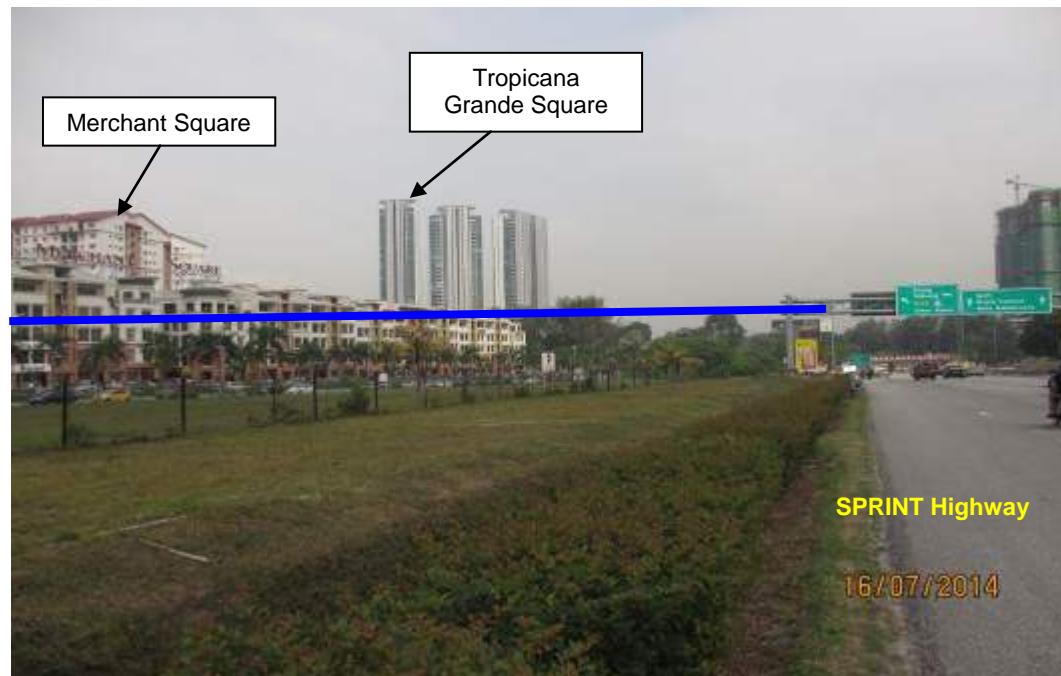


Plate 4-3

The alignment will run along the green spaces in front of the Merchant Square building and the Tropicana Station is located at this area. View taken along SPRINT Highway heading towards NKVE interchange.

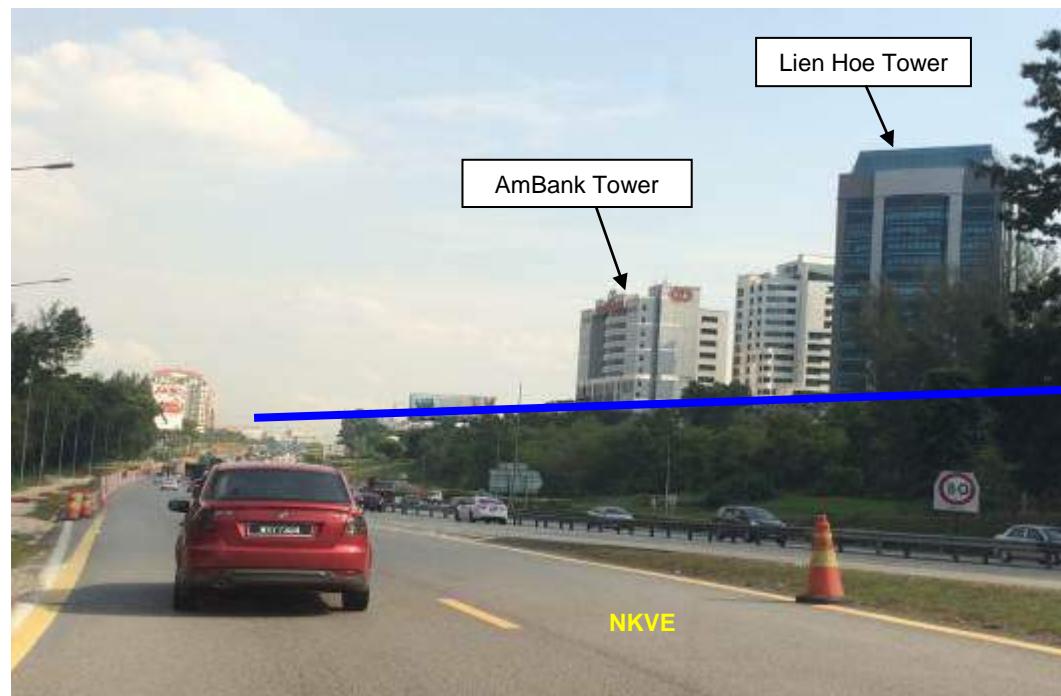


Plate 4-4

The alignment will run along right side of NKVE and Lien Hoe Station will be located next to the Ambank Tower. View along NKVE towards Persada PLUS.

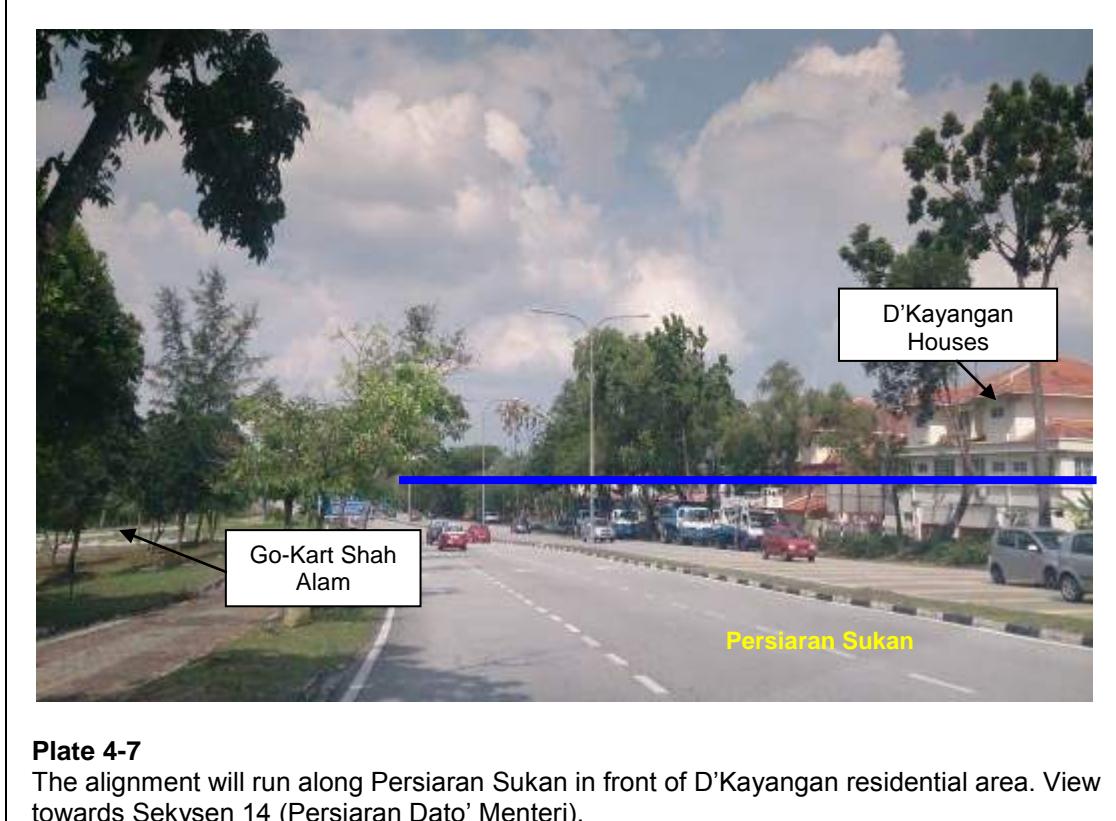
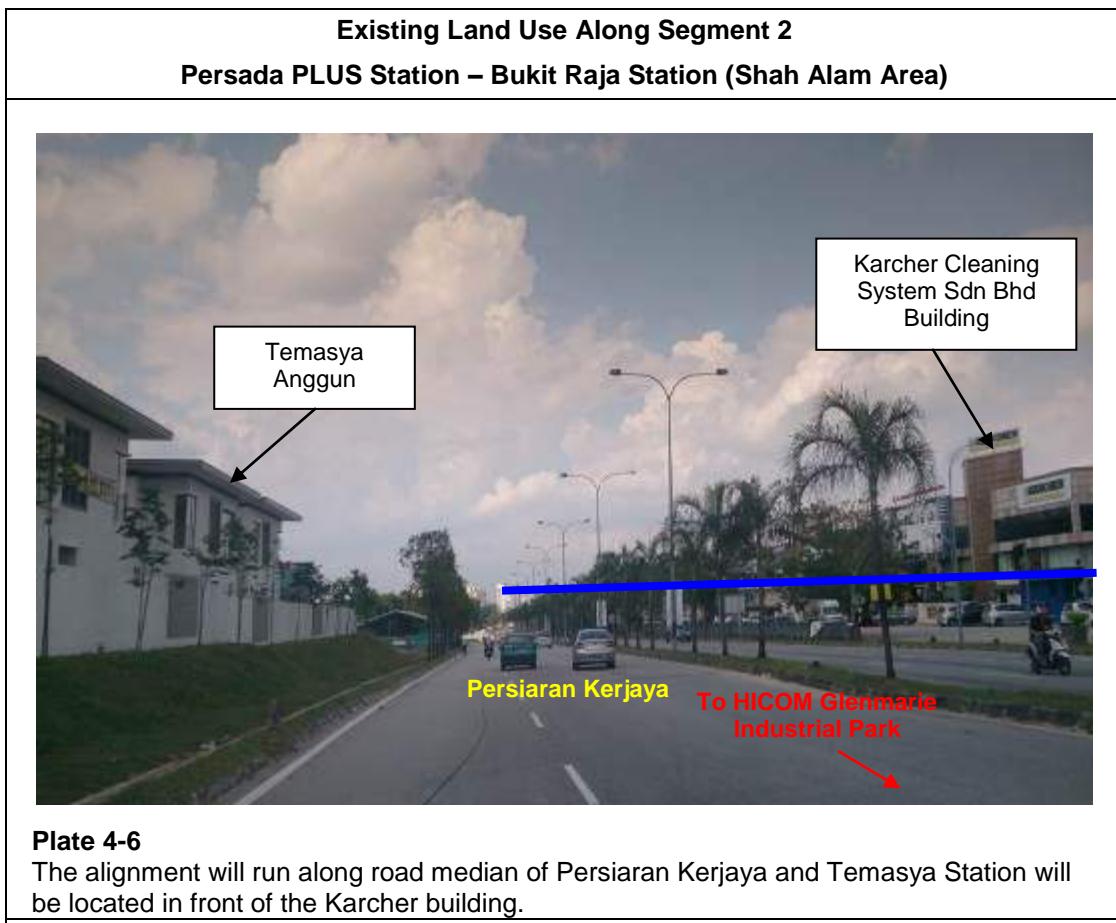
SECTION 4 : EXISTING ENVIRONMENT



Plate 4-5

The alignment will run inside the vicinity of Persada PLUS area and Persada PLUS Station will be located in front of Persada PLUS office. View towards Jalan Lapangan Terbang Subang.

SECTION 4 : EXISTING ENVIRONMENT



SECTION 4 : EXISTING ENVIRONMENT



Plate 4-8

The alignment will run along right side of Persiaran Dato' Menteri before entering the underground stretch along Persiaran Hishamuddin and Persiaran Dato' Menteri.



Plate 4-9

The alignment will run along the right side of the Federal Highway and UiTM Station will be located at the green area in front of Shell Station. View towards Seksyen 7 (Persiaran Kayangan)

SECTION 4 : EXISTING ENVIRONMENT



Plate 4-10

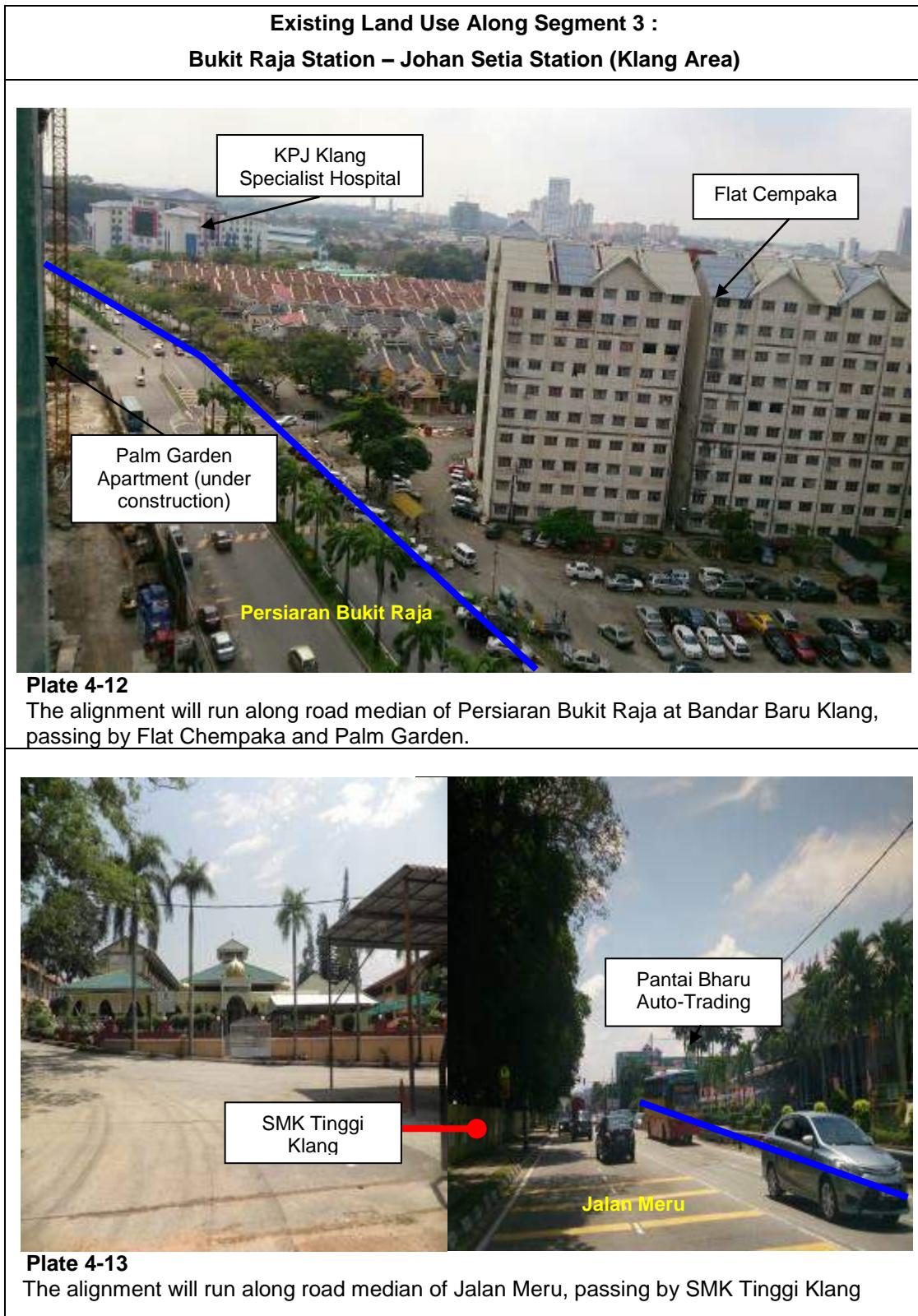
The alignment will run along Persiaran Permai heading towards Lebuh Keluli. View taken at Seksyen 7 of Shah Alam



Plate 4-11

The alignment will run along the road median of Lebuh Keluli. View towards Persiaran Bukit Raja.

SECTION 4 : EXISTING ENVIRONMENT



SECTION 4 : EXISTING ENVIRONMENT

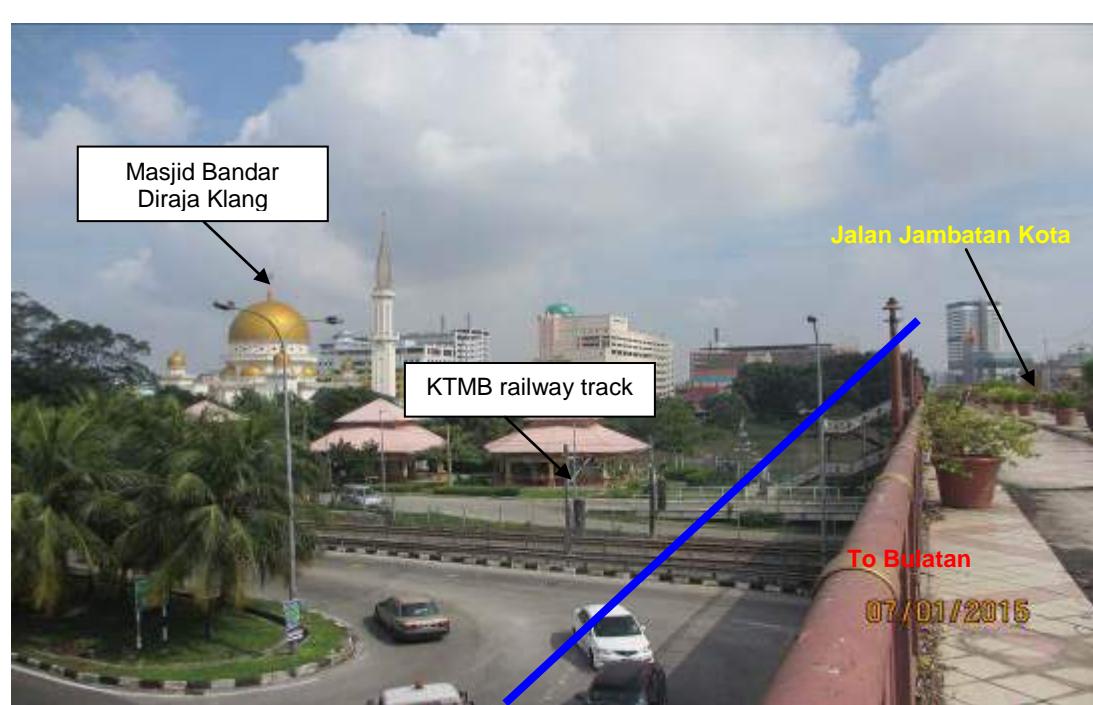


Plate 4-14

The Klang Station will be located adjacent to the KTMB railway track.

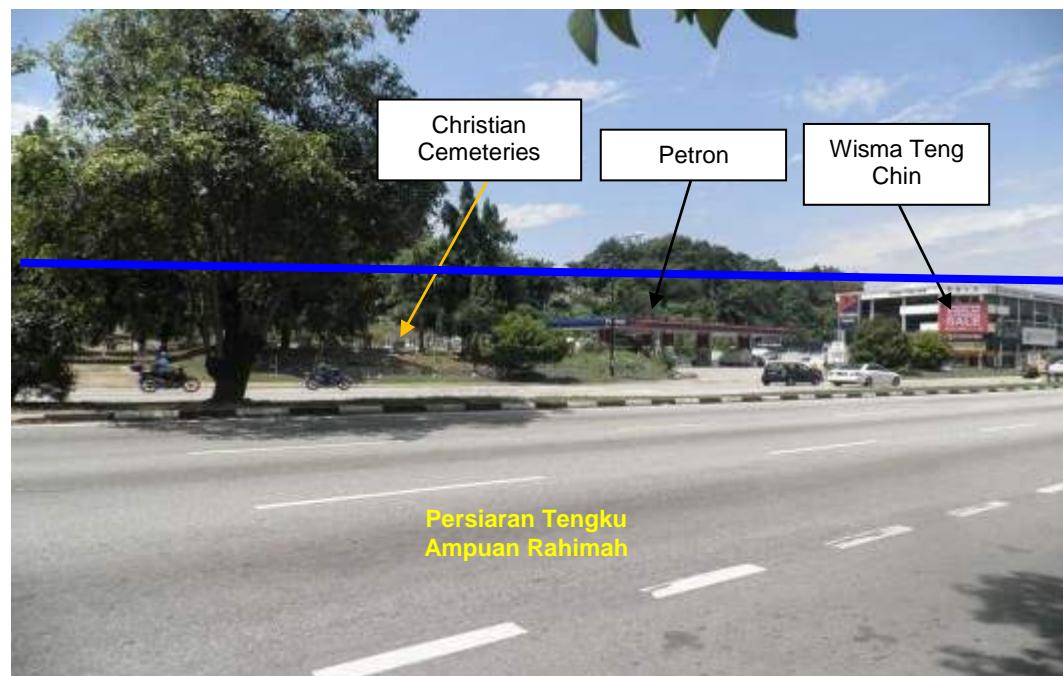


Plate 4-15

The alignment will run along the road median of Persiaran Tengku Ampuan Rahimah. View taken at Taman Selatan, Klang.

SECTION 4 : EXISTING ENVIRONMENT



Plate 4-16

The alignment will run along road median of Persiaran Tengku Ampuan Rahimah passing by Hospital Tengku Ampuan Rahimah. View towards Jalan Langat.



Plate 4-17

The alignment will run along the vicinity of the parking space area of AEON Shopping Centre Bukit Tinggi.

SECTION 4 : EXISTING ENVIRONMENT



Plate 4-18

The alignment will run along left side of Jalan Langat. View along Jalan Langat heading towards agricultural land (the proposed location of the LRT3 depot) in Kg Johan Setia.

4.4.3 Bandar Klang Selatan – The Proposed Tourist Attraction Zone

Klang is considered as one of the oldest towns in the State of Selangor. Sg Klang which flows through the town separates Klang into two division; Klang Utara and Klang Selatan. Klang town is crowned as the present Royal Capital of Selangor due to its heritage and historical background. Bandar Klang Selatan especially holds a very rich historical value and features lots of old heritage buildings. Some of these buildings have been gazetted under Senarai Warisan by Jabatan Warisan Negara which indicates the significant value of these places and shows the intention by the government in terms of preserving these heritage buildings for a long foreseeable future.

According to the Local Plan, MPK intends to highlight some part of Bandar Klang Selatan especially around the area of Jalan Tengku Kelana and Klang Railway Station as “Zon Pemeliharaan Warisan Budaya dan Diraja Selangor”⁴. MPK has sets out a plan to redevelop this area into becoming a tourism spot and aim to maintain or preserve the old buildings within this zone area. Each of the old buildings which have been identified as significant will be undergoing some restoration process in order to revitalise these places which hope to attract local and foreign tourists in the coming years.

⁴ Rancangan Tempatan MP Klang (Pengubahan 1) 2020

SECTION 4 : EXISTING ENVIRONMENT

Meanwhile, “Klang Heritage Walk” is one initiative by MPK to develop Bandar Klang Selatan as an attractive heritage tourism spot. This move aims to enable people from all ages to appreciate the value of these historical buildings, make them understand its importance of shaping the town as well as aiming to conserve a place of worship and a cluster of colonial sights around the area. MPK has proposed a walking trail around these heritage sites to enable pedestrian to have a better view of the buildings while helping people to understand the history behind these old structures which have impacted the economic, socio-cultural and political of the state of Selangor over the years. Among the buildings along the Klang Heritage Walk are Klang Railway Station, Fort Raja Mahadi, Raja Abdullah Warehouse, Our Lady of Lourdes Church, Klang Convent School and Kuan Yin Temple (**Figure 4-6**).

Raja Mahadi Fort is one of the heritage sites to be gazetted under *Senarai Warisan*. This fort was built by Raja Mahadi Ibni Almarhum Sultan Sulaiman in 1866⁵. Today, this fort which is located next to the Klang Municipal Council Hall serves as an impressive landmark of the state. MPK has classified Fort Raja Mahadi as Class 1A building which signifies the important of preserving this site for the future generation to embrace the history of Klang Town. Kuan Yin Temple was one of the oldest temples in Selangor and it was built in 1892. The temple can be seen along Jalan Jambatan Kota near the Simpang Lima Roundabout.

Table 4-7 Category of Heritage Building and Description

Category	Description
Class 1A	Institutional, agency or private building that have been gazetted as heritage building under Akta Benda Purba 1976 and is considered very significant in terms of architectural, historical value, culture and lifestyle.
Class 1B	Institutional, agency or private building that have been identified to be gazetted under Akta Benda Purba 1976 and is considered very significant in terms of architectural, historical value, culture and lifestyle.
Class 2	Institutional, agency or private building which have its own historical value and the architectural element highlights the character and image of the Heritage City.
Class 3	Institutional, agency or private building which is significant in terms of the streetscape for the continuity of the surrounding area.

From the LRT3 project perspective, the alignment will enter this area of Bandar Klang Selatan by crossing Sg Klang where the viaduct structure is built next to the old Kota Bridge. The alignment then continues along Jalan Jambatan Kota until it reaches Simpang Lima Roundabout. The viaduct structure will be sited at close proximity of two heritage sites namely Fort Raja Mahadi and Kuan Yin Temple. It is important to note that these two places are highlighted in Klang Heritage Walk as significant historical sites for the tourist's attraction.

⁵ www.mpklang.gov.my

SECTION 4 : EXISTING ENVIRONMENT

Furthermore, any development in this case the LRT structure should not obstruct the view of the front façade of the buildings. Some of the buildings hold a very high aesthetic and sentimental value among the local community especially around the place of worship while MPK also regards these buildings as significant in terms of historical and architectural value. The LRT3 Line will somehow provide an alternative access to this area while helping to boost the tourism sector within the Klang Town.

4.4.4 Proposed Land Use

The proposed land use for each of the local authority area as stated in the local plans is as described below.

4.4.4.1 Segment 1 (One Utama Station – Persada PLUS Station)

Segment 1 is located within MBPJ area; a highly developed area within Klang Valley which has gone through a rapid development over the last few years. **Table 4-8a** shows some of the major proposed projects which are located within certain distance from the proposed alignment.

Table 4-8a Proposed Projects along Segment 1

Proposed Development	Status of the Development	Existing Land Use	Future Land Use	Nearest Station	Distance from the Station
Empire City, Damansara Perdana	Under Construction	Green Area	Mixed Development	One Utama	Within 2.6 km
Tropicana Avenue	Under Construction	Vacant Land	Mixed Development	Tropicana	Within 570 m
Eve Suite (PJU 1A)	Under Construction	Vacant Land	Residential and Commercial Centre	Dataran Prima	Within 1 km
Icon City, Sungai Way	Under Construction	Former Matsushita Group Plant	Mixed Development	Station 3	Within 2.9 km

Source: Draf Rancangan Kawasan Khas Zon Perancangan PJU 1, PJU 2, SS & PJS, Petaling Jaya 2020

SECTION 4 : EXISTING ENVIRONMENT

4.4.4.2 Segment 2 (Station 3 Station – Bukit Raja Station)

Table 4-8b shows various proposed projects located within certain distance from the alignment in Shah Alam.

Table 4-8b Proposed Developments along Segment 2

Proposed Development	Status of the Development	Existing Land Use	Future Land Use	Nearest Station	Distance from the Station
Kencana Square, Glenmarie	Under Construction	Vacant Land	Commercial Centre	Station 3	Within 1 km
TTDI Sentralis (Seksyen 13)	Has Not Started	Vacant Land	Mixed Development	Stadium (Grand Central)	Within 330 m
TTDI Gateway (Seksyen 13)	Has Not Started	Vacant Land	Mixed Development	Stadium (Grand Central)	Within 550 m
Vista Alam (Seksyen 14)	Under Construction	Vacant Land	Mixed Development	Seksyen 14	Within 50 m
I-City (Seksyen 7)	Under Construction	Vacant Land	Mixed Development	I-City	Within 120 m

Source: Rancangan Tempatan MBSA (Pengubahan 1) 2020

4.4.4.3 Segment 3 (Kawasan 17 Station – Johan Setia Station)

Table 4-8c shows various major proposed projects located within certain distance from the alignment in Klang.

Table 4-8c Proposed Developments along Segment 3

Proposed Development	Status of the Development	Existing Land Use	Future Land Use	Nearest Station	Distance from the Station
The Lead Residences	Has Not Started	Vacant Land	Mixed Development	AEON Bukit Tinggi	Within 400 m
Bandar Bestari	Under Construction	Vacant Land	Mixed Development	Johan Setia	Within 1.7 km

Source: Rancangan Tempatan MPK (Pengubahan 1) 2020

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4.5 CLIMATE

Climate data was obtained from the meteorological stations located within the Klang Valley area. The data was taken from the two stations operated by the Malaysian Meteorological Department; which are:

- Subang (Latitude: N 3° 7', Longitude: E 101° 33', 16.5 m above MSL);
- Petaling Jaya (Latitude: N 3° 6', Longitude: E 101° 39', 60.8 m above MSL)

In general, the data obtained from Subang station will be used to analyse the climate conditions within the area of Shah Alam and Klang while the Petaling station will provide the data of climate conditions within the district of Petaling.

4.5.1 Rainfall

The rainfall and rain days data was taken from the year 1990 up to 2013. The mean annual rainfall at Petaling and Subang are 3,190 mm and 2,766 mm respectively. The average total annual raindays for these two areas are 207 days and 204 days respectively.

The wettest month of the year is in November for both the stations, with average values of 397 mm (Petaling) and 343 mm (Subang). The total rain days during the month of November are 23 days for both Petaling and Subang areas (**Figure 4-7a**).

4.5.2 Temperature

The mean annual 24-hour temperature at Petaling and Subang for the period of 1990 to 2013 was 27.7 °C. The highest average temperature for Petaling and Subang is in May with the value of 28.4 °C.

Meanwhile, the lowest temperature recorded in Petaling was during the month of November and December with a value of 26.9 °C. On the other hand, December recorded the lowest temperature for the area of Subang with the value of 26.9 °C (**Figure 4-7a**).

4.5.3 Relative Humidity

The average annual mean 24-hour humidity in Petaling and Subang was recorded at 78.1% and 79.3% respectively. The highest humidity was recorded in November for both stations, with value of around 82% and 82.6% respectively. The month of July recorded the lowest humidity for both stations with value of 76.1% (Petaling) and 77.3% (Subang) (**Figure 4-7a**).

SECTION 4 : EXISTING ENVIRONMENT

4.5.4 Surface Wind

Based on the annual windrose (1969 – 2013) for Petaling and Subang area, the dominant wind is blowing from the east (9%) and northwest (> 12%) respectively. The percentage of calm conditions occurrences for Petaling and Subang is about 24% and 34% of the time. The annual mean speed for Petaling was recorded around 1.1 m/s and as for Subang area, the mean speed was 1.4 m/s (**Figure 4-7b**).

4.6 HYDROLOGY AND WATER RESOURCES

4.6.1 River Catchment Area

The proposed LRT3 alignment traverses Sg Klang Basin. Sg Klang Basin is the most urbanised basin in Malaysia, with most of its tributaries are classified as slightly polluted as in 2013. Sg Klang Basin has a total catchment area of about 1,297 km² and spans across two states which are Selangor and Federal Territory of Kuala Lumpur. Some tributaries of Sg Klang Basin include Sg Kayu Ara, Sg Damansara, Sg Renggam, Sg Rasau and Sg Aur. These tributaries are located in close proximity of the proposed LRT3 project.

4.6.2 Drainage System and River System

The drainage system has been well constructed along the line since the Project alignment traverses along the highway and densely built up areas in Kuala Lumpur and Selangor. Most of the rivers in Kuala Lumpur and Selangor have been channelised as part of the urban drainage system.

The early stretch of the alignment is running along the river reserve area of Sg Kayu Ara starting from CH 0 until CH1+500. Two proposed stations namely One Utama and Damansara Utama are situated at this river reserve land.

The LRT3 Line will also cross some of the rivers flowing within the Klang. In total, there are nine river crossing locations identified along the 36 km stretch of the alignment including one crossing over drainage system in Johan Setia (**Table 4-9** and **Figure 4-8**).

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Table 4-9 Major River Crossings

Segment	River	Description
Segment 1 One Utama – Persada PLUS Station	Sg Kayu Ara (CH0+340 – CH0+500)	Alignment crosses Sg Kayu Ara at the bridge near the housing areas of Taman Kayu Ara Indah in Jalan SS 21/34
	Sg Kayu Ara (CH1+010 – CH1+090)	Alignment crosses Sg Kayu Ara, adjacent to Puncak Damansara Condominium
	Sg Kayu Ara (CH1+470)	Alignment crosses Sg Kayu Ara, adjacent to Fella Design Sdn Bhd building
	Sg Kayu Ara (CH6+190)	Alignment crosses Sg Kayu Ara, adjacent to the Kelana Jaya LRT Line Depot
Segment 2 Station 3 – Bukit Raja Station	Sg Damansara (CH12+590)	Alignment crosses Sg Damansara, near the Management & Science University
	Sg Renggam (CH17+290)	Alignment crosses Sg Renggam, adjacent to SIRIM
	Sg Rasau (CH20+970)	Alignment crosses Sg Rasau, adjacent to the SK Tamil Seksyen 7
Segment 3 Kawasan 17 – Johan Setia	Sg Klang (CH27+340 – CH27+470)	Alignment crosses Sg Klang, adjacent to the old Kota Bridge
	Sg Aur (CH 32+840)	Alignment crosses Sg Aur, adjacent to the Hindu Temple
	Parit Johan Setia (CH35+680)	Alignment crosses Parit Johan Setia, near the crossroad of Jalan Langat and Jalan Johan Setia – Pendamaran

4.6.3 Flood Prone Area

Some of the places which are located near to the alignment have been identified as flood prone areas. Any major construction on these areas could be quite challenging due to the fact that these areas have suffered flood problems in the past. Based on DID records, flooding are mainly caused by blocked drainage system or over-spilling due to heavy rain.

SECTION 4 : EXISTING ENVIRONMENT

4.6.3.1 Flood Prone Areas in Petaling Jaya

According to DID record, Kg Cempaka (PJU 1) suffered frequent flooding (2001, 2006, 2008 and 2010) and the last event which occurred in 2010 was caused by overflow from Sg Kayu Ara and the main drain due to heavy rain⁶. However, DID has since came out with a few mitigation measures which included works to deepen the existing Sg Kayu Ara and creating a “flood plain” area by cleaning the riverbank. These efforts seem to have nullified the flood risk at this area as there is no recurrence of flood event recorded by DID after 2010.

MBPJ meanwhile have also identified flood area which include Simpang Jalan Lapangan Terbang – Jalan SS 7/2⁷. The cause for the flood is mainly due to drainage problem. The distance between this area to the nearest station (Station 3) is approximately within 100 m radius. **Table 4-10a** shows the summary of notable flood profile of areas within a close proximity to LRT3 Line (**Figure 4-9**).

Table 4-10a Flood Prone Areas in Petaling Jaya

Flood Area	Distance from the Alignment (m)
Kg Cempaka	Within 400 m
Simpang Jalan Lapangan Terbang – Jalan SS 7/2	Within 100 m

4.6.3.2 Flood Prone Areas in Shah Alam

Based on previous DID record, Section 13 of Shah Alam is susceptible to flooding due to several issues concerning the clogged drainage and the overflow of Sg Damansara caused by heavy rain. The carpark area of Shah Alam Stadium suffered flooding in year 2006 and 2012⁸. The line will traverse right into this carpark area (Tapak Bazarena) and the proposed Stadium (Grand Central) Station is located within 50 m from the carpark area.

Other recorded flood events is located at Giant Seksyen 7; approximately within 150m from the alignment (Persiaran Permai). The flood occurred in year 2011 and 2014⁹. (**Table 4-10b** and **Figure 4-9**).

⁶ Laporan Banjir Kg Cempaka Daerah Petaling (20 Mei 2010)

⁷ Draf Rancangan Kawasan Khas Zon Perancangan PJU 1, PJU 2, SS & PJS (Petaling Jaya) 2020

⁸ Laporan Banjir Daerah Petaling 2006 & 2012

⁹ Badan Pengurusan Bersama (JMB) Pusat Komersil Seksyen 7 Committee

SECTION 4 : EXISTING ENVIRONMENT

Table 4-10b Flood Prone Areas in Shah Alam

Flood Area	Distance from the Alignment (m)
Shah Alam Stadium	Within 100 m
Giant Seksyen 7	Within 150 m

4.6.3.3 Flood Prone Areas in Klang

Some flood areas in Klang include Kg Johan Setia, Taman Chi Liung, Taman Bayu Perdana, Taman Melawis and SMK Convent Klang.

Kg Johan Setia can be considered as flood prone area. The recorded flood event occurred in year 2003, 2004, 2006, 2008 and 2012. DID reported that the cause for the flood was due to drainage problem¹⁰.

Table 4-10c shows the flood profile of areas located within close distance from the LRT3 Line (**Figure 4-9**).

Table 4-10c Flood Prone Areas in Klang

Flood Area	Year of Flood Occurrence
Kg Johan Setia	2003, 2004, 2006, 2008 & 2012
SMK Convent Klang	2004
Taman Chi Liung	2010 & 2012
Taman Bayu Perdana	2004, 2008 & 2012
Taman Melawis	2003, 2006 & 2012

4.7 NOISE AND VIBRATION

4.7.1 Noise

Noise level monitoring was carried out at 60 locations from 16 May 2014 to 24 July 2014. The measurement locations were selected on a basis of potential noise sensitive areas in accordance to the DOE Environmental Noise Guidelines; typically:

- i) nearest residential area;
- ii) nearest school;
- iii) nearest institution; and/or
- iv) nearest place of worship.

¹⁰ Laporan Banjir Seangor Daerah Klang (1 November 2012)

SECTION 4 : EXISTING ENVIRONMENT

The noise parameters used are the L_{eq} , L_{10} , L_{90} and L_{max} levels. The meanings of these parameters are explained below:

L_{eq} – The equivalent continuous noise over time

L_{10} – The level of noise exceeded 10% of the time

L_{90} – The level of noise exceeded 90% of the time

L_{max} – The maximum noise level reading

Monitoring Locations

The monitoring was conducted for 24 hours during typical working days for all the stations. At four locations identified as sensitive, monitoring was also conducted continuously over a working day and weekends. Measurement was undertaken at monitoring stations with existing human and road traffic activities or at the mixed land use which includes the typical commercial activities. The measurements were typically without major construction activities except for Station N1 where there are MRT construction works about 500 m away.

The monitoring locations are tabulated in **Table 4-11** and shown in **Figure 4-10a**, **Figure 4-10b** and **Figure 4-10c**.

Table 4-11 Noise Level Monitoring Points

Station	Location	Description
N1	Jalan SS 21/42	Commercial
N2	Jalan SS 21/28	Commercial
N3	Jalan SS 21/13	Commercial
N4	Flat/Condominium Puncak Damansara	Residential
N5	Jalan Tropicana Selatan 1	Residential
N6	Persiaran Tropicana	Residential
N7	Jalan Lagenda Puteri 1	Residential
N8	Jalan PJU 1a/ 43	Residential
N9	D'Aman Crimson Apartments	Residential
N10	Suria Damansara Condominium	Residential
N11	Kelana D'Putera Condominium	Residential
N12	Persiaran Kerjaya 1	Residential

SECTION 4 : EXISTING ENVIRONMENT

Table 4-11 Noise Level Monitoring Points (Cont'd)

Station	Location	Description
N13	Persiaran Kerjaya 2	Residential
N14	Jalan Kerjaya/Persiran Kerjaya	Residential
N15	Persiaran Kerjaya 3	Residential
N16	Politeknik Sultan Sallehuddin	Residential
N17	Building/Education Section 13	School
N18	Jalan Akuatik 13/77	Residential
N19	Jalan Bola Sepak Lima 13/11e	Residential
N20	Jalan Opu Daeng Chelak 9/2	Residential
N21	Persiaran Dato' Menteri 1	Residential
N22	Persiaran Dato' Menteri 2	Residential
N23	SIRIM	Office
N24	Persiaran Raja Muda	School
N25	Jalan Sarjana 1/2 -2	School
N26	SJK (T)- I-City station	School
N27	Persiaran Permai	Residential
N28	Jalan Plumbum 7/97	Residential
N29	Jalan Plumbum 7/101	Residential
N30	Persiaran Permai/Keluli	Residential
N31	Bukit Raja Station	Commercial
N32	BBK Banglows Kawasan 17	Residential
N33	Hospital KPJ Klang	Hospital
N34	Lorong Mahkota 2d	Residential
N35	Flat Mawar	Residential
N36	SMK Hwa Kua	School
N37	Apartment Pelangi	Residential
N38	Jalan Pekan Baru 38	Commercial
N39	Jalan Kelicap 41	Residential
N40	Jalan Kelicap 45	Residential
N41	Jalan Meru 1	Residential
N42	SMK Meru	School
N43	SK Jalan Meru	School
N44	Pangsapuri Perumahan MPK	Residential
N45	SMK Convent	Residential

SECTION 4 : EXISTING ENVIRONMENT

Table 4-11 Noise Level Monitoring Points (Cont'd)

Station	Location	Description
N46	Jalan Jelutong	School
N47	Sekolah Khas Klang	School
N48	Masjid Al-Rahimah	Worship place
N49	Hospital Besar Tengku Rahimah	Hospital
N50	Jalan Sri Siantan 43	Residential
N51	Jalan Langat	Residential
N52	Jalan Sri Sarawak 1	Residential
N53	Jalan Serunai 3	Residential
N54	BBt Hotel	Hotel
N55	Jalan Gambus 2	Residential
N56	Jalan Gambus 3/Jalan Solok Gambus 4a	Residential
N57	Klinik Kesihatan Bandar Botanik	Clinic
N58	Hotel 99, Bandar Botanik/Jalan Cassia	Residential
N59	Bandar Park Land/Bayuemas	Residential
N60	Taman Johan Setia Permai	Residential

Monitoring Results

The measured hourly L_{eq} , L_{90} and L_{10} levels give the 24 hour description of the existing noise climate. Computations were undertaken to obtain the day time (0700 to 2200 hours), night time (2200 to 0700 hours) and 24 hours (0700 to 0700) levels for L_{Aeq} , L_{90} and L_{10} levels.

Table 4-12 Noise Level Monitoring Results

Ref.	Location	Time	L_{eq}	L_{10}	L_{90}	L_{max}	Remarks
			dBA	dBA	dBA	High	
N1	Jalan SS 21/42a	Day	58.9	59.9	56.4	84.4	Raining
		Night	54.3	56.1	50.8	73.0	
		24 Hrs	57.7	58.9	55.0	84.4	
N2	Jalan SS 22/28	Day	54.7	56.5	47.8	82.8	Raining
		Night	47.1	47.8	43.6	68.1	
		24 Hrs	53.1	54.8	46.7	82.8	
N3	Jalan SS 21/13	Day	58.6	60.7	51.4	84.8	Raining
		Night	52.0	50.6	48.0	80.8	
		24 Hrs	57.1	58.9	50.4	84.8	

SECTION 4 : EXISTING ENVIRONMENT

Table 4-12 Noise Level Monitoring Results (Cont'd)

Ref.	Location	Time	L_{eq}	L_{10}	L_{90}	L_{max}	Remarks
			dBA	dBA	dBA	High	
N4	Puncak Damansara Apartment	Day	62.5	64.6	57.5	85.3	
		Night	58.3	61.3	53.9	78.1	
		24 Hrs	61.4	63.6	56.5	85.3	
N5	Jalan Tropicana Selatan 1	Day	66.6	68.4	63.6	95.7	
		Night	65.0	67.1	61.1	81.2	
		24 Hrs	66.1	67.9	62.8	95.7	
N6	Persiaran Tropicana	Day	71.6	74.3	62.9	95.9	
		Night	66.9	69.6	56.6	95.1	
		24 Hrs	70.4	73.1	61.5	95.9	
N7	Jalan Lagenda Puteri 1, Damansara Idaman	Day	75.2	76.8	72.4	96.3	Raining
		Night	73.9	76.4	68.6	94.4	
		24 Hrs	74.7	76.6	71.3	96.3	
N8	Jalan PJU 1a/ 43, Damansara Idaman	Day	70.6	71.8	68.6	89.5	
		Night	68.1	70.2	63.9	84.9	
		24 Hrs	69.8	71.3	67.4	89.5	
N9	D'Aman Crimson Apartments	Day	71.0	72.3	69.0	90.2	
		Night	68.5	70.9	64.1	86.5	
		24 Hrs	70.3	71.8	67.7	90.2	
N10	Suria Damansara Condominium	Day	68.5	70.1	66.0	82.7	
		Night	67.5	69.9	62.8	85.2	
		24 Hrs	68.1	70.0	65.0	85.2	
N11	Kelana D'Putera Condominium	Day	61.3	62.3	58.5	97.8	
		Night	56.8	58.8	52.8	85.4	
		24 Hrs	60.1	61.3	57.1	97.8	
N12	Persiaran Kerjaya 1	Day	69.0	70.2	66.5	101.6	
		Night	66.5	68.6	62.1	85.8	
		24 Hrs	68.2	69.7	65.3	101.6	
N13	Persiaran Kerjaya 2	Day	70.3	71.1	66.7	100.8	
		Night	65.9	68.0	62.1	81.3	
		24 Hrs	69.1	70.1	65.5	100.8	
N14	Jalan Kerjaya/Persiaran Kerjaya	Day	73.3	75.8	66.1	99.4	
		Night	67.2	69.9	52.8	96.8	
		24 Hrs	71.9	74.4	64.2	99.4	
N15	Persiaran Kerjaya 3	Day	73.5	76.1	66.0	96.1	
		Night	66.5	69.6	52.7	90.8	
		24 Hrs	72.0	74.6	64.1	96.1	

SECTION 4 : EXISTING ENVIRONMENT

Table 4-12 Noise Level Monitoring Results (Cont'd)

Ref.	Location	Time	L_{eq}	L_{10}	L_{90}	L_{max}	Remarks
			dBA	dBA	dBA	High	
N16	Politeknik Sultan Sallehuddin	Day	73.4	76.3	64.4	96.9	
		Night	66.6	69.9	52.0	90.7	
		24 Hrs	71.9	74.8	62.5	96.9	
N17	MUST Building, Section 13	Day	70.6	72.7	62.4	94.0	
		Night	63.6	66.6	54.6	86.3	
		24 Hrs	68.9	71.1	60.6	94.0	
N18	Jalan Akuatik 13/77	Day	74.7	77.0	68.0	102.5	
		Night	70.1	73.7	58.1	93.8	
		24 Hrs	73.3	75.9	66.0	102.5	
N19	Jalan Bola Sepak Lima 13/11e	Day	68.9	70.4	64.7	94.9	
		Night	64.7	67.1	56.0	86.0	
		24 Hrs	67.7	69.4	63.0	94.9	
N20	Jalan Opu Daeng Chelak 9/2	Day	64.4	66.0	59.5	86.4	
		Night	61.5	63.2	54.6	85.5	
		24 Hrs	63.5	65.2	58.2	86.4	
N21	Persiaran Dato' Menteri - 1	Day	71.9	74.2	61.2	104.3	
		Night	64.9	67.0	48.2	97.3	
		24 Hrs	70.3	72.6	59.3	104.3	
N22	Persiaran Dato' Menteri - 2	Day	65.4	67.9	56.9	93.0	
		Night	60.1	63.3	51.1	84.0	
		24 Hrs	63.9	66.5	55.3	93.0	
N23	SIRIM	Day	73.3	75.8	66.1	99.4	
		Night	67.2	69.9	52.8	96.8	
		24 Hrs	71.9	74.4	64.2	99.4	
N24	Persiaran Raja Muda	Day	61.3	62.5	59.2	75.3	
		Night	60.2	61.7	57.2	77.0	
		24 Hrs	61.0	62.2	58.5	77.0	
N25	Jalan Sarjana 1/2 -2	Day	70.0	71.2	67.8	90.0	
		Night	67.1	68.7	63.3	90.6	
		24 Hrs	69.1	70.4	66.6	90.6	
N26	SJK (T)- I-City station	Day	70.2	72.9	63.6	90.3	
		Night	67.6	69.4	57.0	102.1	
		24 Hrs	69.4	71.9	62.1	102.1	
N27	Persiaran Permai	Day	67.1	70.0	59.6	95.5	
		Night	63.3	65.5	53.3	98.0	
		24 Hrs	66.0	68.8	58.2	98.0	

SECTION 4 : EXISTING ENVIRONMENT

Table 4-12 Noise Level Monitoring Results (Cont'd)

Ref.	Location	Time	L_{eq}	L_{10}	L_{90}	L_{max}	Remarks
			dBA	dBA	dBA	High	
N28	Jalan Plumbum 7/97	Day	67.9	71.1	57.7	92.9	
		Night	64.0	66.9	49.4	96.5	
		24 Hrs	66.8	69.9	56.1	96.5	
N29	Jalan Plumbum 7/101	Day	67.4	70.5	58.9	89.6	
		Night	64.1	65.0	51.6	98.5	
		24 Hrs	66.4	69.2	57.4	98.5	
N30	Persiaran Permai/Keluli	Day	71.0	73.5	63.8	97.4	
		Night	68.0	70.1	58.7	98.1	
		24 Hrs	70.1	72.5	62.5	98.1	
N31	Bukit Raja Station	Day	68.1	70.7	62.1	90.2	
		Night	64.0	66.8	54.5	91.3	
		24 Hrs	67.0	69.6	60.5	91.3	
N32	Banglo BBK, Klang	Day	68.4	70.7	59.2	91.9	
		Night	64.5	68.0	52.0	86.5	
		24 Hrs	67.3	69.8	57.6	91.9	
N33	Hospital KPJ Klang	Day	63.3	65.3	59.4	87.3	
		Night	60.3	62.6	57.1	78.0	
		24 Hrs	62.4	64.5	58.7	87.3	
N34	Lorong Mahkota 2d	Day	62.4	64.1	57.8	83.6	
		Night	57.6	60.2	52.2	78.3	
		24 Hrs	61.1	63.0	56.4	83.6	
N35	Flat Cempaka/ Mawar	Day	63.9	65.5	60.6	86.9	Construction nearby
		Night	61.0	63.6	56.7	79.6	
		24 Hrs	63.0	64.9	59.5	86.9	
N36	SMK HwaKua	Day	62.1	64.5	58.0	78.9	
		Night	55.3	56.9	52.1	75.4	
		24 Hrs	60.5	62.9	56.6	78.9	
N37	Apartment Pelangi	Day	58.6	60.1	53.4	90.5	
		Night	55.3	55.5	46.0	92.0	
		24 Hrs	57.6	58.9	51.8	92.0	
N38	Jalan Pekanbaru 38	Day	56.3	58.1	52.1	86.4	
		Night	53.6	54.6	50.2	80.8	
		24 Hrs	55.5	57.0	51.5	86.4	
N39	Jalan Kelicap 41	Day	55.2	57.5	45.8	85.5	
		Night	55.3	57.5	43.3	77.9	
		24 Hrs	55.2	57.5	45.0	85.5	

SECTION 4 : EXISTING ENVIRONMENT

Table 4-12 Noise Level Monitoring Results (Cont'd)

Ref.	Location	Time	L_{eq}	L_{10}	L_{90}	L_{max}	Remarks
			dBA	dBA	dBA	High	
N40	Jalan Kelicap 45	Day	64.1	66.5	56.3	88.5	
		Night	58.6	60.4	44.6	89.8	
		24 Hrs	62.7	65.0	54.5	89.8	
N41	Jalan Meru - 1	Day	56.6	58.1	52.1	81.7	
		Night	53.6	54.6	50.2	80.8	
		24 Hrs	55.7	57.1	51.5	81.7	
N42	SMK Meru/Gereja	Day	64.1	66.5	56.3	88.5	
		Night	58.6	60.4	44.6	89.8	
		24 Hrs	62.7	65.0	54.5	89.8	
N43	SK Jalan Meru	Day	71.9	74.4	64.5	92.9	
		Night	68.0	71.0	54.4	96.7	
		24 Hrs	70.8	73.4	62.7	96.7	
N44	Pangsapuri	Day	64.1	65.6	61.2	82.6	
		Night	60.9	62.9	56.3	91.5	
		24 Hrs	63.1	64.8	59.9	91.5	
N45	SMK Convent	Day	62.0	63.9	58.4	80.9	
		Night	58.6	60.2	54.6	80.3	
		24 Hrs	61.0	62.9	57.4	80.9	
N46	Jalan Jelutong	Day	54.7	56.3	50.2	80.1	
		Night	55.9	54.9	49.4	79.4	
		24 Hrs	55.2	55.9	49.9	80.1	
N47	Sekolah Khas Klang	Day	73.0	75.6	65.2	98.3	
		Night	70.0	73.7	58.6	93.2	
		24 Hrs	72.1	74.9	63.7	98.3	
N48	Masjid Al-Rahimah	Day	66.5	68.5	58.2	88.7	
		Night	64.2	66.9	53.1	87.4	
		24 Hrs	65.7	68.0	56.9	88.7	
N49	Hospital Besar Tengku Rahimah	Day	66.5	68.5	58.2	88.7	
		Night	64.2	66.9	53.1	87.4	
		24 Hrs	65.7	68.0	56.9	88.7	
N50	Jalan Sri Siantan 43	Day	67.1	68.9	60.3	94.5	
		Night	64.5	66.7	54.1	92.4	
		24 Hrs	66.3	68.2	58.9	94.5	
N51	Jalan Langat	Day	68.1	70.7	61.0	92.8	
		Night	66.4	68.5	55.5	94.2	
		24 Hrs	67.6	70.0	59.7	94.2	

SECTION 4 : EXISTING ENVIRONMENT

Table 4-12 Noise Level Monitoring Results (Cont'd)

Ref.	Location	Time	L_{eq}	L_{10}	L_{90}	L_{max}	Remarks
			dBA	dBA	dBA	High	
N52	Jalan Sri Sarawak 1	Day	69.5	71.7	63.6	98.2	
		Night	66.6	69.6	58.4	87.5	
		24 Hrs	68.6	71.0	62.3	98.2	
N53	Jalan Serunai 3	Day	63.5	64.7	58.2	86.0	
		Night	58.4	60.7	51.2	81.6	
		24 Hrs	62.2	63.6	56.7	86.0	
N54	BBt Hotel	Day	71.5	73.1	67.8	92.2	
		Night	68.4	70.9	61.8	90.5	
		24 Hrs	70.6	72.4	66.4	92.2	
N55	Jalan Gambus 2	Day	66.2	66.8	62.0	87.5	
		Night	61.1	63.5	54.0	89.2	
		24 Hrs	64.9	65.9	60.4	89.2	
N56	Jalan Gambus 3	Day	57.2	59.0	52.5	84.0	
		Night	54.1	55.5	49.0	83.0	
		24 Hrs	56.3	58.0	51.5	84.0	
N57	Klinik Kesihatan Bandar Botanik	Day	64.3	64.5	57.5	97.5	
		Night	59.3	62.3	53.7	83.9	
		24 Hrs	63.0	63.8	56.4	97.5	
N58	Houses Jalan Cassia, Bandar Botanik	Day	57.3	59.9	51.0	82.4	
		Night	55.1	55.5	48.2	94.1	
		24 Hrs	56.7	58.9	50.3	94.1	
N59	Bandar Park Land	Day	54.7	56.3	50.2	80.1	
		Night	55.9	54.9	49.4	79.4	
		24 Hrs	55.2	55.9	49.9	80.1	
N60	Taman Johan Setia Permai	Day	52.8	54.6	45.5	79.2	
		Night	53.0	57.5	46.2	69.6	
		24 Hrs	52.9	56.0	45.8	79.2	

Noise levels measured at monitoring locations were well reflecting the local land use, local activities and local/surrounding traffic pattern. In general, major noise sources at these monitoring locations were local traffic, traffic from adjacent expressway and local/daily activities of residence. There were no extraneous noise (noise level which atypical from normal condition of the monitoring stations) being measured.

In essence the noise monitoring points can be divided into two categories to assess against limiting noise level, i.e.:

SECTION 4 : EXISTING ENVIRONMENT

- i) urban/high density area
- ii) suburban/medium density area

Based on Schedule 1, Maximum Permissible Sound Level (L_{eq}) by Receiving Land Use for Planning and New Development, Annex A of the *Planning Guidelines for the Environmental Noise Limits and Control*, published by the Department of Environment in 2004; the recommended (target) noise limit in accordance to the land use categories are:

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am
Noise Sensitive Areas, Low Density Residential, Institutional (School, Hospital), Worship Areas.	50 dBA	40 dBA
Suburban Residential (Medium Density) Areas, Public Spaces, Parks, Recreational Areas.	55dBA	45 dBA
Urban Residential (High Density) Areas, Designated Mixed Development Areas (Residential - Commercial).	60 dBA	50 dBA
Commercial Business Zones	65 dBA	55 dBA
Designated Industrial Zones	70 dBA	60 dBA

Source: DOE Planning Guidelines for Environmental Noise Limits and Control 2007

Noise levels at most of the monitored areas exceeded the recommended limits for suburban residential area (55 dBA for daytime and 45 dBA during nighttime) and urban residential area (60 dBA during daytime and 50 dBA during nighttime).

The measured noise levels were more consistent with (and in many locations exceeding) limits recommended in the DOE Planning Guidelines for highways and road traffic Schedule 4: Limiting Sound Level (L_{eq}) From Road Traffic (For Proposed New Roads and/or Redevelopment of Existing Roads).

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Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am
Noise Sensitive Areas Low Density Residential Areas	55 dBA	50 dBA
Suburban Residential (Medium Density)	60 dBA	55 dBA
Urban Residential (High Density)	65 dBA	60 dBA
Commercial, Business	70 dBA	60 dBA
Industrial	75 dBA	65 dBA

Source: DOE Planning Guidelines for Environmental Noise Limits and Control 2007

The existing noise levels exceeded the DOE Planning Guidelines for Highways, therefore it is necessary to establish noise limits at the respective monitoring locations. The recommended noise limit shall be maintained as close as possible to the current noise level when the Project is in operation. This is to limit the noise impact arising by the Project to its surrounding environment and nearest sensitive noise recipients is not significant.

In summary, the noise climate along the proposed Project was successfully established at these monitoring stations. The measured levels were typical reflecting prevailing highways and road traffic conditions as well as local activities at the monitoring stations. The resulted noise levels shall then be used as a basis of establishing recommended noise limit at the monitoring stations and subsequently, noise impact assessment during construction and operation of Project.

4.7.2 Vibration Level

Vibration monitoring was undertaken to establish existing vibration levels from 17 June 2014 to 24 July 2014 at the same locations for noise monitoring (**Table 4-13** and **Figure 4-10a, Figure 4-10b and Figure 4-10c**).

SECTION 4 : EXISTING ENVIRONMENT

Measurement Locations

Baseline vibration measurements at the selected locations were measured on the ground (ground borne vibrations) in the open area. Measurements were undertaken during three different periods of the day (morning, afternoon and evening) at each location. The intent of the measurements was to obtain typical vibration levels at the receivers of concern from existing road traffic and activities (primarily human pedestrian traffic and road works away from the measurement site).

At Station N22 and N33 located along the Persiaran Dato' Menteri, vibration monitoring was undertaken continuously over 24 hours day night cycle. This is to anticipate the future issues of concern from the cut and cover underground works.

Monitoring Results

For vibration monitoring, it was assumed that the vibration levels at monitoring stations were of steady states and it was also assumed that the vibration levels during the day and night are the same (or with negligible difference).

The Planning Guidelines for Vibration Limits and Control Annex A: Schedule 5 (DOE, 2007) recommends limits for human comfort from steady state vibration for residential land use to be below Curve 2 to 4 (0.2 mm/s to 0.4 mm/s) during daytime and Curve 2 (0.2 mm/s) at night for vibration assessed against Human Response and Annoyance Curves.

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am
Vibration Sensitive Areas	Curve 1	Curve 1
Residential	Curve 2 to Curve 4	Curve 2
Commercial, Business	Curve 4 to Curve 8	Curve 4
Industrial	Curve 8 to Curve 16	Curve 8 to Curve 16

Source: DOE Planning Guidelines for Environmental Vibration Limits and Control 2007

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Table 4-13 Vibration Monitoring Results

Station	Location	mm/s (vertical)	
		Day	Evening
N1	Jalan SS 21/42a	0.190	0.143
N2	Jakan SS 22/28	0.20	0.140
N3	Jalan SS 21/13	0.190	0.145
N4	Puncak Damansara Apartment	0.175	0.095
N5	Jalan Tropicana Selatan 1	1.76	1.0
N6	Persiaran Tropicana	0.365	0.222
N7	Jalan LagendaPuteri 1	0.556	0.381
N8	Jalan PJU 1a/ 43, Damasara Indaman	0.206	0.159
N9	D'Aman Crimson Apartments	0.333	0.254
N10	Suria Damansara Condo	0.302	0.285
N11	Kelana D'Putera Condo	0.238	0.206
N12	Persiaran Kerjaya 1	0.190	0.143
N13	Persiaran Kerjaya 2	0.206	0.222
N14	Jalan Kerjaya/Persiaran Kerjaya	0.349	0.429
N15	Persiaran Kerjaya 3	0.603	0.384
N16	Politeknik Sultan Sallehuddin	0.714	0.416
N17	MUST Building Section 13	0.429	0.556
N18	Jalan Akuatik 13/77	0.429	0.190
N19	Jalan Bola Sepak Lima 13/11e	0.190	0.159
N20	Jalan Opu Daeng Chelak 9/2	0.397	0.381
N21	Persiaran Dato' Menteri 1	0.317	0.349
N22	Persiaran Dato' Menteri 2	0.270	0.254
N23	SIRIM	0.714	0.556
N24	Persiaran Raja Muda	0.0635	0.0594
N25	Jalan Sarjana 1/2 -2	0.0476	0.0476
N26	SJK (T)- I-City station	3.940	0.968
N27	Persiaran Permai	0.270	0.254
N28	Jalan Plumbum 7/97	0.206	0.206
N29	Jalan Plumbum 7/101	0.571	0.444
N30	Persiaran Permai/Keluli	0.556	0.206
N31	Bukit Raja Station	1.33	0.270
N32	Banglo BBK at Kawasan 17	0.349	0.556
N33	Hospital KPJ Klang	0.250	0.252
N34	Lorong Mahkota 2d	0.175	0.143
N35	Flat Mawar	0.175	0.143
N36	SMK Hwa Kua	0.222	0.384
N37	Apartment Pelangi	0.275	0.259
N38	Jalan Pekan Baru 38	0.222	0.206
N39	Jalan Kelicap 41	0.667	0.508
N40	Jalan Kelicap 45	0.317	0.275
N41	Jalan Meru - 1	0.492	0.365
N42	SMK Meru/ Gereja	0.508	0.556
N43	SK Jalan Meru	0.714	0.476
N44	Perumahan MPK	0.280	0.215
N45	SK Convent	0.270	0.420

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Table 4-13 Vibration Monitoring Results (Cont'd)

Station	Location	mm/s (vertical)	
		Day	Evening
N46	Jalan Jelutong	0.302	0.270
N47	Sekolah Khas Klang	0.127	0.190
N48	Masjid Al-Rahimah	1.670	0.397
N49	Hospital Besar Tengku Rahimah	0.238	0.365
N50	Jalan Sri Siantan 43	0.714	0.206
N51	Jalan Langat	0.508	1.490
N52	Jalan Sri Sarawak 1	0.127	0.190
N53	Jalan Serunai 3	1.240	0.333
N54	BBt Hotel	0.0794	0.254
N55	Jalan Gambus 2	0.556	0.381
N56	Jalan Gambus 3/Jalan Solok Gambus 4a	0.254	0.857
N57	Klinik Kesihatan Bandar Botanik	0.714	0.397
N58	Hotel 99, Bandar Botanik/Jalan Cassia	0.111	0.159
N59	Bandar Park Land/Bayuemas	0.190	0.143
N60	Taman Johan Setia Permai	0.222	0.206

Measured levels were representative of the existing vibration environment at the monitoring locations were fairly dependent on local activities. The vibration levels as measured were well below levels of potential concern for building structural integrity.

Measurement results showed that overall vibration levels at monitoring locations were in the range of 0.0476 to 3.94 mm/s. At all areas except for the case at location N27 (I-City) vibration levels were typically below 1.0 mm/s. The high vibrations measured at Station N27 (I-City) were due to construction activities and heavy vehicles passing by the monitoring location.

Results from the vibration measurement exercise confirmed that vibrations at the monitoring locations to be well below human comfort levels as assessed against recommendations of the DOE Guidelines, except for a particular location in I-City (Station N27).

4.8 AIR QUALITY

Air quality monitoring was carried out at 8 locations (**Table 4-14**, **Figure 4-10a**, **Figure 4-10b** and **Figure 4-10c**) from 30 June to 11 July 2014 and 13 January 2015 – 15 January 2015. The detailed laboratory report is in **Appendix D**.

Parameters that were sampled include the following:

- Total Suspended Particulates (TSP)
- Particulate Matter 10 μm (PM_{10})

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- Nitrogen Dioxide NO₂
- Carbon Monoxide CO

Table 4-14 Air Quality Monitoring Locations

Station	Description	Coordinates
A1	Surau Darul Falah, Jalan Tanjung	N 3° 8'8.32" E 101°37'1.34"
A2	Open space at Shell (Nearby Taman Damansara Lagenda Puteri 3)	N 3°7'24.46" E 101°35'39.03"
A3	Open space adjacent to Syarikat SRS Bumimotors Sdn Bhd, Jalan Kerjaya, Glenmarie	N 3°5'28.71" E 101°34'43.6"
A4	Nearby D' Kayangan residential	N 3° 4'41.74" E 101°32'28.99"
A5	Park adjacent to SJK (T) Ladang Midlands	N 3° 4'3.50"E 101°29'13.48"
A6	Playground at Jalan Kelicap	N 3° 3'40.75" E 101°27'12.64"
A7	Open space nearby Petronas station and Masjid Al-Rahimiah (Opposite Hospital Tengku Ampuan Rahimah, Klang)	N 3° 1'15.99" E 101°26'32.89"
A8	Taman Johan Setia	N 2° 58'40.15" E 101°27'59.7"
A9	Sekolah Sri Acmar Football Field	N 3° 3'41.11" E 101°27'44.87"
A10	Klang Municipal Council (MPK) Quarters	N 3° 2'28.08" E 101°26'30.18"

Table 4-15 Air Quality Monitoring Results

Parameter	Unit	Station										MAAQG
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	
TSP	µg/m ³	83	86	85	83	79	78	84	75	88	86	260 (24-hour)
PM ₁₀	µg/m ³	64	72	77	77	68	72	74	71	69	68	150 (24-hour)
Ratio PM ₁₀ to TSP	-	77	84	91	93	86	92	88	95	78	79	-
NO ₂	µg/m ³	ND (<2)	70 (24-hour)									
CO	ppm	ND (0)	30 (1-hour)									

SECTION 4 : EXISTING ENVIRONMENT

Based on the **Table 4-15**, it can be observed that the concentrations of the parameters monitored namely TSP (ranging from 75 to 86 $\mu\text{g}/\text{m}^3$), PM_{10} (ranging from 68 to 77 $\mu\text{g}/\text{m}^3$), NO_2 (below detection limit of 2 $\mu\text{g}/\text{m}^3$) and CO (not detectable) in the ambient air were within the recommended limit set in the Malaysian Ambient Air Quality Guidelines (MAAQG).

4.9 WATER QUALITY

Water samples from the rivers were collected on 12 June 2014 and 28 January 2015 at nine locations (**Table 4-16**, **Figure 4-10a**, **Figure 4-10b** and **Figure 4-10c**) along the proposed alignment in order to obtain baseline data for the existing water quality. The lab analysis will determine the physico-chemical and biological characteristics of the water. The detailed laboratory report is attached in **Appendix D**.

Table 4-16 Location of Water Sampling Points

Station	River	Description	Coordinates
W1	Sg Kayu Ara (Point 1)	Near the residential area of Damansara Utama (SS 21)	N 3° 08' 41.9" E 101° 37' 9.5"
W2	Sg Kayu Ara (Point 2)	Near the residential area of Taman Kayu Ara Indah	N 3° 08' 7.6" E 101° 36' 59.7"
W3	Sg Kayu Ara (Point 3)	Adjacent to Taman Megah Emas residential area	N 3° 6' 39" E 101° 35' 37.4"
W4	Sg Damansara	Along Persiaran Sukan near the Giant Hypermarket Seksyen 13	N 3°5' 11.5" E 101° 33' 5.6"
W5	Sg Renggam	Located near the proposed alignment along Persiaran Dato' Menteri and adjacent to SIRIM	N 3° 4' 7.1" E 101° 31' 0.5"
W6	Sg Rasau	Located in front of the SJK (T) Ladang Midlands	N 3° 4' 6.3" E 101° 29' 17.2"
W7	Sg Klang	Located near the KTM Depot	N 3° 2' 20.9" E 101° 27' 20.5"
W8	Sg Aur	Located near Taman Desawan residential area	N 3° 00' 1.7" E 101° 26' 32.9"
W9	Parit Johan Setia	Located adjacent to Kota Bayuemas	N 2°58' 45.9" E 101° 27' 32.9"

SECTION 4 : EXISTING ENVIRONMENT

4.9.1 Water Quality Results

Station W1 – Sg Kayu Ara

Station W1 is located at Sg Kayu Ara near residential areas of Damansara Utama (SS 21). The water quality at Station W1 can be classified as Class III under the National Water Quality Standards (NWQS). It can be said that the river is slightly polluted. Based on six parameters of water quality index; the measurements of dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD) and total suspended solids (TSS) are relatively low with the measurement values of 5 mg/l, 4 mg/l, 22 mg/l and 27 mg/l respectively. Ammoniacal nitrogen is high with the value of 1.12 mg/l.

Most of the heavy metals are low with cadmium (0.001 mg/l), manganese (0.043 mg/l) and zinc (0.036 mg/l). Some of the parameters were not detected such as Oil & Grease, arsenic, lead, mercury and nickel. Iron was slightly high at 1.367 mg/l (**Table 4-17a**).

Station W2 – Sg Kayu Ara

Station W2 is located at Sg Kayu Ara near residential areas of Puncak Damansara Condominium. It can be said that the river is slightly polluted. Based on six parameters of water quality index; the measurements of DO, BOD, COD are relatively low with the measurement values of 6.2 mg/l and 3 mg/l. Ammoniacal nitrogen is high with the value of 0.05 mg/l. TSS level was detected high at 4mg/l.

Most of the heavy metals are low with cadmium (0.005 mg/l), manganese (0.046 mg/l) and zinc (0.189 mg/l). Some of the parameters were not detected such as Oil & Grease, arsenic, lead, mercury and nickel (**Table 4-17a**).

Station W3 – Sg Kayu Ara

Station W3 is located near residential area of Taman Megah Emas. The Water Quality Index (WQI) recorded a value of 64.31. The water quality at this station can be classified as slightly polluted as it falls into Class III of NWQS. DO, COD and TSS recorded a low value with 5 mg/l, 32 mg/l and 22 mg/l level of concentration respectively. The reading of NH₃-N had a high value with 1.58 mg/l. Heavy metals were mostly low (**Table 4-17a**).

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Station W4 – Sg Damansara

Station W4 is located at Sg Damansara near Giant Hypermarket Seksyen 13 and Puncak Niaga (M) Sdn Bhd along Jalan Monfort. The water quality at Station W3 can be classified as slightly polluted as it falls into Class III of NWQS. Both BOD and Ammoniacal Nitrogen recorded high values with 7 mg/l and 0.96 mg/l respectively. For the rest of WQI parameters, the DO (3.6 mg/l), COD (35 mg/l) and TSS (50 mg/l) recorded low values at this station.

Heavy metals such as arsenic, lead, mercury and nickel were not detected and the likes of cadmium (0.001 mg/l), chromium (0.005 mg/l), copper (0.004 mg/l), manganese (0.066 mg/l) and zinc (0.049 mg/l) were low (**Table 4-17a**).

Overall, based on the Malaysian Environmental Quality Report 2012 published by DOE, the Damansara River falls into Class III of NWQS. So, the laboratory analysis is consistent with the DOE 2012 report.

Station W5 – Sg Renggam

Station W5 is located at Sg Renggam near SIRIM. The WQI measurement recorded a value of 79.39. This means that the river is slightly polluted as it falls into Class II of NWQS. The TSS was low at 14 mg/l while NH₃-N recorded a high value with 0.64 mg/l. For DO, COD and BOD, the values were low at 4.8 mg/l, 19 mg/l and 3 mg/l respectively.

Most of the heavy metals such as cadmium, chromium, copper, manganese and zinc were very low at Sg Renggam with measurements of 0.001 mg/l, 0.005 mg/l, 0.006 mg/l, 0.081 mg/l and 0.03 mg/l respectively. The rest of heavy metals such as lead, arsenic and mercury were not found at this point (**Table 4-17a**).

Station W6 – Sg Rasau

Station W6 is located at Sg Rasau in front of the SK Tamil Ladang Midlands, Shah Alam. This river falls into Class II of NWQS and is slightly polluted with a WQI value of 78.03. NH₃-N recorded a high value with measurement of 0.60 mg/l. For the rest of DOE Water Quality Index parameters; DO, BOD, COD and TSS, the values were low at 4.5 mg/l, 3 mg/l, 19 mg/l and 14 mg/l respectively.

Heavy metals such as arsenic, cadmium, lead and mercury were not found at this point. Chromium, copper, nickel and zinc were low at 0.004 mg/l, 0.005 mg/l, 0.007 mg/l and 0.028 mg/l respectively. Manganese (0.178 mg/l) and iron (1.055 mg/l) were the two metals that recorded a high value (**Table 4-17b**).

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Based on the Malaysian Environmental Quality Report 2012, Sg Rasau falls into Class II of NWQS and was categorised as slightly polluted as the WQI reading recorded the value of 77. The result of laboratory analysis is consistent with the DOE report which indicates that the river falls into Class II.

Station W7 – Sg Klang

Station W7 is located at Sg Klang near the KTM depot. The water quality at this point can be classified as slightly polluted as it falls into Class II of NWQS. The BOD and NH₃-N reading recorded a high value with 4 mg/l and 0.46 mg/l respectively. The reading for COD and TSS were found at low level at measurements around 22 mg/l and 36 mg/l respectively. Meanwhile, the values of DO and pH were intermediate at 5.5 mg/l and 6.8 respectively.

Most of the heavy metals recorded a low value with cadmium (0.002 mg/l), chromium (0.004 mg/l), copper (0.006 mg/l), manganese (0.026 mg/l), nickel (0.007 mg/l) and zinc (0.024 mg/l). A few parameters were not detected at this station which includes oil and grease, mercury and lead. Only iron had a high value with 0.450 mg/l (**Table 4-17b**).

Overall, the result obtained from the laboratory analysis indicates that it is consistent with the DOE's Malaysian Environmental Quality Report in 2012. According to this report, the river water quality in Sg Damansara in year 2012 (most recent report) is recorded as slightly polluted and falls into Class III of NWQS.

Station W8 – Sg Aur

Sg Aur is one of the rivers located at close proximity from the location of the proposed alignment. The measurement of NH₃-N, TSS and COD were found at a low level with values of 0.62 mg/l, 27 mg/l and 32 mg/l respectively. For BOD, DO and pH; the readings of measurement were intermediate at values of 6 mg/l, 4.8 mg/l and 6.6 respectively.

Heavy metals with low reading of measurement include cadmium (0.001 mg/l), chromium (0.007 mg/l), nickel (0.024 mg/l) and zinc (0.118 mg/l). Iron and manganese were two parameters with a high value of measurement with 3.401 mg/l and 0.548 mg/l respectively. The likes of arsenic, lead, mercury and oil and grease were not detected at this station (**Table 4-17b**).

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Station W9 – Parit Johan Setia

Station W9 is located at Parit Johan Setia near the Kota Bayuemas. The water quality at this station falls within Class III with the value of WQI around 75.84. Based on six parameters of WQI; NH₃-N, COD and TSS had a low reading of measurement with the value of 0.20 mg/l, 38 mg/l and 23 mg/l. DO and water pH had an intermediate value and fall within range of Class III range.

Heavy metals such as cadmium, chromium, copper, manganese, nickel and zinc recorded a low value with 0.001 mg/l, 0.006 mg/l, 0.014 mg/l, 0.064 mg/l, 0.008 mg/l and 0.054 mg/l.

Table 4-17a Water Quality at Station W1 to W5

Parameter	Unit	Result				
		W1	W2	W3	W4	W5
pH	-	7.0	6.8	7.1	6.6	7.0
Temperature	°C	32	29	32	31	32
DO	mg/l	5.0	6.2	5.0	3.6	4.8
COD	mg/l	22	3	32	35	19
BOD ₅	mg/l	4	ND (<1)	6	7	3
TSS	mg/l	27	4	22	50	14
Oil & Grease	mg/l	ND (<1)				
NH ₃ -N	mg/l	1.12	0.05	1.58	0.96	0.64
E.coli	CFU/ 100 ml	430	ND (<1)	290	310	360
Arsenic, As	mg/l	ND (<0.01)	ND (<0.01)	ND (<0.01)	ND (<0.01)	ND (<0.01)
Cadmium, Cd	mg/l	0.001	0.005	0.001	0.001	0.001
Chromium, Cr	mg/l	0.003	0.011	0.005	0.005	0.005
Copper, Cu	mg/l	0.003	0.022	0.008	0.004	0.006
Iron, Fe	mg/l	1.367	0.454	1.197	1.456	1.385
Lead, Pb	mg/l	ND (<0.006)	ND (<0.006)	ND (<0.006)	ND (<0.006)	ND (<0.006)
Mercury, Hg	mg/l	ND (<0.001)	ND (<0.001)	ND (<0.001)	ND (<0.001)	ND (<0.001)
Manganese, Mn	mg/l	0.043	0.046	0.081	0.066	0.081
Nickel, Ni	mg/l	ND (<0.006)	ND (<0.006)	ND (<0.006)	ND (<0.006)	ND (<0.006)
Zinc, Zn	mg/l	0.036	0.189	0.072	0.049	0.030

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Table 4-17b Water Quality at Station W6 to W9

Parameter	Unit	Result			
		W6	W7	W8	W9
pH	-	6.4	6.8	6.6	6.3
Temperature	°C	31	30	30	30
DO	mg/l	4.5	5.5	4.8	5.0
COD	mg/l	19	22	32	38
BOD ₅	mg/l	3	4	6	7
TSS	mg/l	14	36	27	23
Oil & Grease	mg/l	ND (<1)	ND (<1)	ND (<1)	ND (<1)
NH ₃ -N	mg/l	0.60	0.46	0.62	0.20
E.coli	CFU/ 100 ml	320	430	340	480
Arsenic, As	mg/l	ND (<0.01)	ND (<0.01)	ND (<0.01)	ND (<0.01)
Cadmium, Cd	mg/l	ND (<0.001)	0.002	0.001	0.001
Chromium, Cr	mg/l	0.004	0.004	0.007	0.006
Copper, Cu	mg/l	0.005	0.006	0.010	0.014
Iron, Fe	mg/l	1.055	0.450	3.401	2.951
Lead, Pb	mg/l	ND (<0.006)	ND (<0.006)	ND (<0.006)	ND (<0.006)
Mercury, Hg	mg/l	ND (<0.001)	ND (<0.001)	ND (<0.001)	ND (<0.001)
Manganese, Mn	mg/l	0.178	0.026	0.548	0.064
Nickel, Ni	mg/l	0.007	0.007	0.024	0.008
Zinc, Zn	mg/l	0.028	0.024	0.118	0.054

4.10 ECOLOGY

The LRT3 project passes through areas of multiple types of land use which include residential, commercial, industrial, public facilities and institutions. This project is located wholly within the state of Selangor. The surroundings along the alignment are typical of urban areas. Overall, the LRT3 does not pass through any ecologically sensitive areas.

SECTION 4 : EXISTING ENVIRONMENT

4.11 SOCIO ECONOMIC ENVIRONMENT

This section describes the current socio-economic environment along the alignment. The description is based on secondary data for population, economic activities that were sourced from various sources such as Department of Statistics Malaysia, local authorities, Structure Plans, Local Plans as well as information gathered from field surveys.

4.11.1 Regional Context

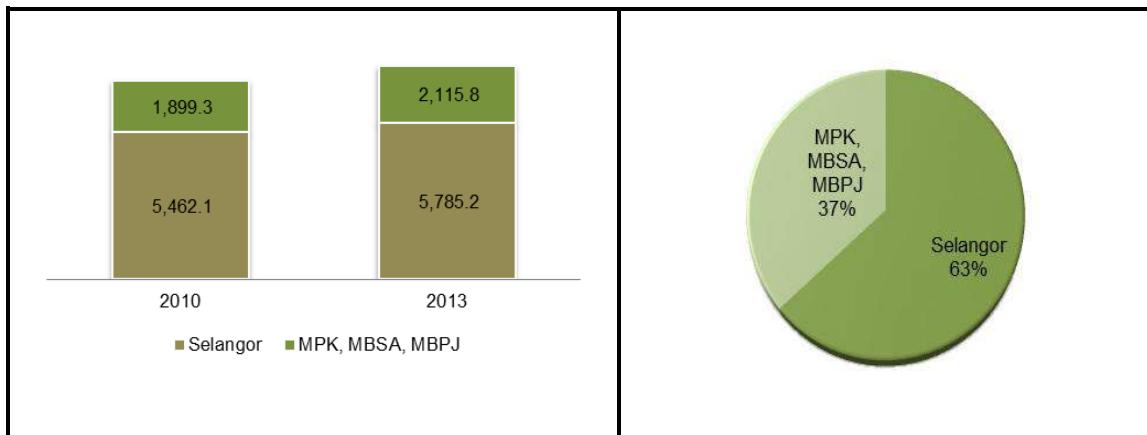
The proposed LRT3 falls in the State of Selangor, one of the most dynamic states in the country. Selangor enjoys a high GDP of RM 176, 239 million (constant 2005 prices), the highest in the country. It contributes significantly (23%) to national GDP in 2012. Despite having a large population, Selangor's robust growth enables it to have a high per capita GDP of RM 36,135, which is among the highest in the country. Its strong economic growth is also translated into higher incomes for its people. The mean monthly household income in 2012 is estimated at RM 7, 023, the highest in the country and 1.4 times that of the average for Malaysia.

Selangor's vibrant and strong economic performance depends much on its ability to maintain its economic competitiveness. It requires a good network of public transportation of different modes that would facilitate easy movements of people and workers, enabling businesses to thrive and to be highly productive. Such a network would give Selangor a strong competitive edge. Among its objective, the proposed LRT3 will enhance connectivity among the three major cities – Klang, Shah Alam and Petaling Jaya and between them and Kuala Lumpur.

The three cities or towns are under different local authorities, namely, Majlis Perbandaran Klang (MPK), Majlis Bandaraya Shah Alam, and Majlis Bandaraya Petaling Jaya (MBPJ). Two of them have been accorded city status while Klang is still considered a township. Nevertheless, each, under its respective local authority has a substantial population size in 2010. The three towns have a combined population of 1.9 million in 2010 and by 2013, their population is estimated to increase above 2 million (**Chart 4-1a**). This represents more than a third of Selangor population. With such a large agglomeration of population here, it highlights the importance of having seamless connectivity between the cities to support economic growth and improve the quality of life of the people.

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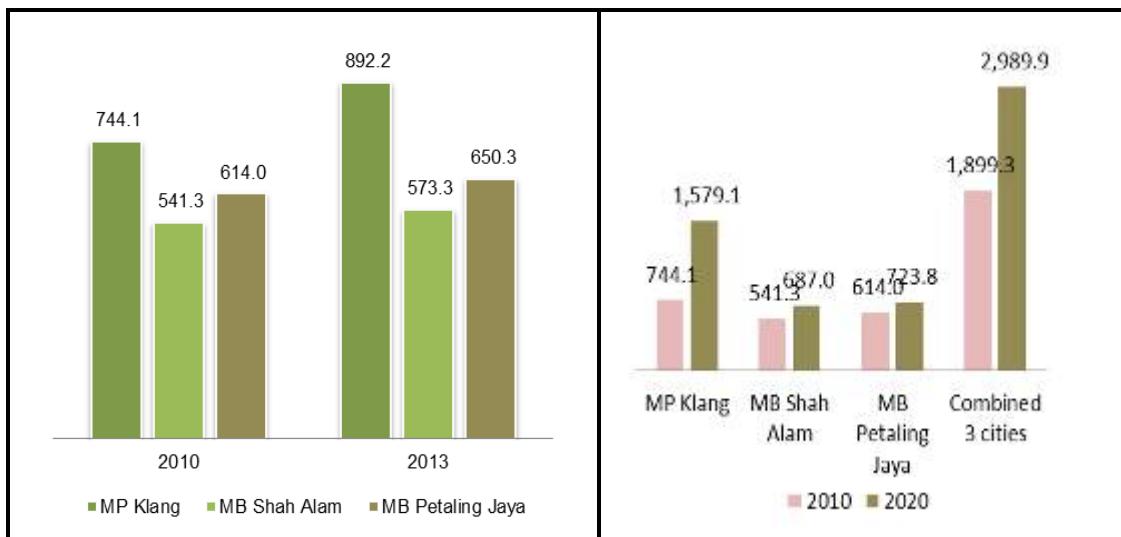
Chart 4-1a Population in Selangor and MPK, MBSA & MBPJ, 2010 – 2013 (in '000)



Notes: Local authorities' population for 2013 are estimated.

Each town's population has risen above half a million. In 2013, Klang population is estimated to reach 900,000, followed by Petaling Jaya with 650,000 people and Shah Alam which is close to 600,000 (Chart 4-1b).

Chart 4-1b Population in MPK, MBSA & MBPJ, 2010 – 2013 and in 2020 (in '000)



Notes: Local authorities' population for 2013 are estimated.

Sources:

1. Population and Housing Census of Malaysia, Population Distribution by Local Authority Areas and Mukims 2000 (Department of Statistics Malaysia)
2. Population and Housing Census of Malaysia, Population Distribution by Local Authority Areas and Mukims, 2010 (Department of Statistics Malaysia)

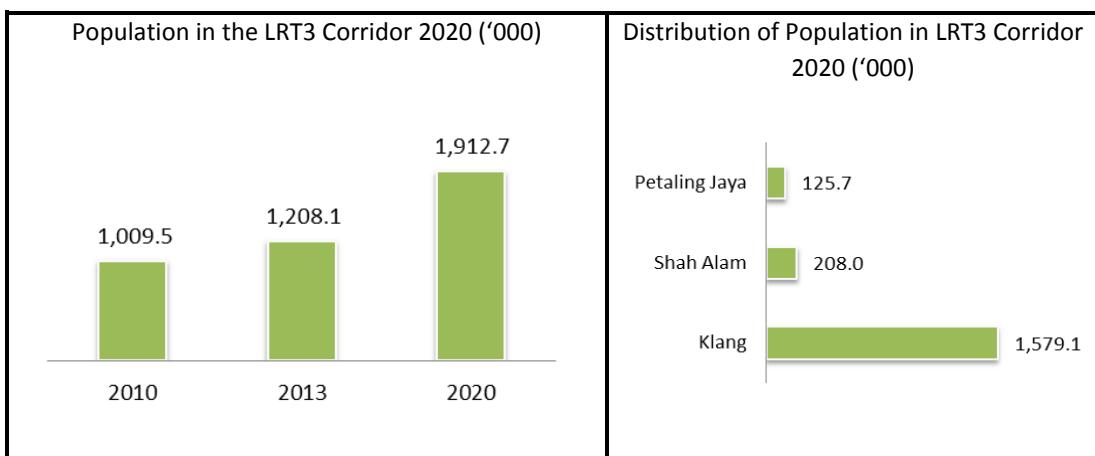
SECTION 4 : EXISTING ENVIRONMENT

Prospects for future population growth in the three cities are expected to be good. The Klang Local Plan forecasted that by 2015, Klang population would surpass a million. MBSA, under its local plan, forecasted its population would rise to almost 700,000 by 2020. From 2000 to 2010, MBPJ population growth increased by 41%. Although such growth may not be sustainable in the long term, it is anticipated that with more new developments proposed in Sungai Buloh area, its population would continue to rise to reach 723,800 by 2020. By 2020, the three cities, combined, could have a population of almost 3 million and they would benefit from proposed rail connection or link between the three cities and to Kuala Lumpur.

Within LRT3 Corridor

The Feasibility Study completed in February 2014 has identified the corridor for the proposed LRT3. The LRT3 corridor extends from Bandar Utama all the way to Klang, covering a corridor size of about 36 km (length) by 10km (wide). The LRT corridor was a preliminary step taken to narrow the regional reach of the proposed LRT3 in order to draw up a preferred alignment that could be feasible. This resulted in a smaller regional population threshold for the LRT3 at about one million in 2010, and estimated to increase to 1.2 million in 2013. By 2020, the population within the LRT3 corridor is projected to increase to almost 2 million (**Chart 4-2**). The distribution of population in the LRT3 corridor is concentrated mostly in Klang area.

Chart 4-2 Population in the LRT3 Corridor, 2010 – 2013 and in 2020 (in '000)



Notes: The shares of local authority population for Shah Alam and Petaling Jaya for 2010 are estimated based on areas within the local authorities. Klang's is based on the planning blocks under the local plan study.

Sources:

1. Population and Housing Census of Malaysia, Population Distribution by Local Authority Areas and Mukims 2010 (Department of Statistics Malaysia)
2. MPK, Local Plan 2015
3. MBSA, Local Plan MBSA (Review 1) 2020
4. Feasibility Study for the Proposed LRT3 – Bandar Utama to Johan Setia
5. Consultant's Estimates

SECTION 4 : EXISTING ENVIRONMENT

4.11.2 Social Profile within the Impact Zone

For this study, the impact zone for the LRT3 is identified as the area that extends 400 m from each side of the LRT3, from Bandar Utama through Shah Alam to Johan Setia. The impact zone is divided into three subzones which include:-

- a) Sub-zone 1: Bandar Utama to Jalan Lapangan Terbang Subang;
- b) Sub-zone 2: Jalan Lapangan Terbang Subang to Shah Alam and Bukit Raja Industrial Estate/Lebuhraya Selat Klang; and,
- c) Sub-zone 3: Lebuhraya Selat Klang through Klang town to Jalan Langat and Johan Setia

The analysis on the social profile within each subzones are described in the following sub-sections.

4.11.2.1 Population, Households and Living Quarters

Total population in the impact zone in 2010 was 92,336. The breakdown into subzones shows 41% is in Klang, 31% in Bandar Utama – Jalan Lapangan Terbang Subang sub-zone and 28% in Shah Alam sub-zone (**Table 4-18a**). Population in the impact zone for 2013 is estimated at 110,000 persons. Although not all would use the LRT3, it would be appropriate to forecast that many within the impact zone would benefit from it.

Table 4-18a Total Population for 2010 by Sub-zone

Sub-zone	Population 2010	%
a) Sub-zone 1: Bandar Utama – Jalan Lapangan Terbang Subang	28,831	31
b) Sub-zone 2: Jalan Lapangan Terbang Subang – Shah Alam – Bukit Raja Industrial Estate/Klang Straits Bypass	25,762	28
c) Sub-zone 3: Klang Straits Bypass through Klang town to Jalan Langat and Johan Setia	37,743	41
Total (Impact Zone)	92,336	100

Source: Population and Housing Census of Malaysia 2010, Special Request (Department of Statistics Malaysia)

The population is grouped into 25,356 households, giving an average household size of 3.6 persons per household. In Sub-zone 1, the average household is smaller as compared to Shah Alam and Klang (**Table 4-18b**). A total of 27,418 living quarters are found in the impact zone. Living quarters refer to housing units and collective living quarters for large groups of people with common shared facilities.

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Table 4-18b Total Household and Living Quarters for 2010 by Sub-zone

Subzone	Household (HH)	Living Quarter (LQ)	Household Size	LQ/HH
a) Sub-zone 1: Bandar Utama – Jalan Lapangan Terbang Subang	8,617	9,352	3.3	1.1
b) Sub-zone 2: Jalan Lapangan Terbang Subang – Shah Alam – Bukit Raja Industrial Estate/Klang Straits Bypass	7,278	6,416	3.5	0.9
c) Sub-zone 3: Klang Straits Bypass through Klang town to Jalan Langat and Johan Setia	9,461	11,650	4.0	1.2
Total (Impact Zone)	25,356	27,418	3.6	1.1

Source: Population and Housing Census of Malaysia 2010, Special Request (Department of Statistics Malaysia)

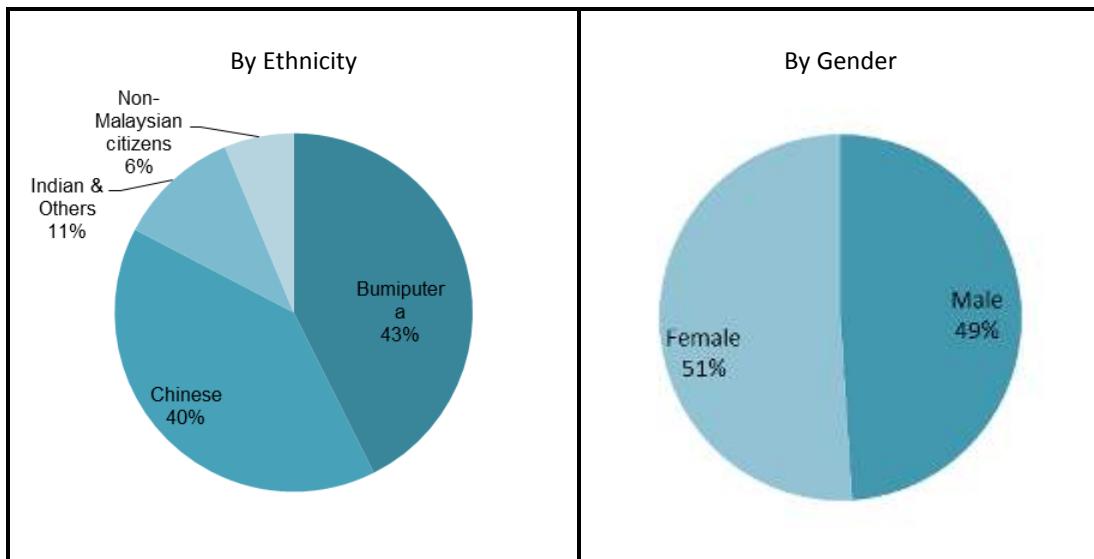
4.11.2.2 Ethnic and Gender Distribution

The two dominant ethnic groups are Bumiputera (43%) and Chinese (40%), giving a combined share of 83% of total population in the impact zone (**Chart 4-3**). Non-citizens made up 6% of the population and mostly found in Klang. Spatial distribution of ethnic groups shows a dominant concentration of Bumiputera in the Sub-zone 2 (Shah Alam area) (**Table 4-19a**), while the Chinese mainly at Sub-zone 2 and 3 (Bandar Utama and Klang areas).

In terms of gender distribution, females have a slight majority with a share of 51% of the overall population in the impact zone (**Chart 4-3**). This is reflected in the gender ratio in the impact zone which shows there are 96 males to every 100 females (**Table 4-19b**). The imbalance is caused by the lower ratio of males to females in the Shah Alam subzone.

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Chart 4-3 Distribution of Population by Ethnicity and Gender in the Impact Zone for 2010



Source: Population and Housing Census of Malaysia 2010, Special Request (Department of Statistics Malaysia)

Table 4-19a Impact Zone – Total Population by Ethnicity and Subzone for 2010

Ethnicity	Sub-zone 1	%	Sub-zone 2	%	Sub-zone 3	%	Impact Zone
Bumiputera	6,047	21.0	21,178	82.2	12,106	32.1	39,331
Chinese	1,9305	67.0	1,578	6.1	16,100	42.7	36,983
Indians	1,673	5.8	1,428	5.5	6,791	18.0	9,892
Others	113	0.4	48	0.2	171	0.5	332
Non Malaysian Citizens	1,693	5.9	1,530	5.9	2,575	6.8	5,798

Source: Population and Housing Census of Malaysia 2010, Special Request (Department of Statistics Malaysia)

Table 4-19b Impact Zone – Population by Gender and Subzone for 2010

Gender	Sub-zone 1	%	Sub-zone 2	%	Sub-zone 3	%	Impact Zone
Male	14,523	50.4	11,235	43.6	19,469	51.6	45,227
Female	14,308	49.6	14,527	56.4	18,274	48.4	47,109
Male-Female Ratio	101.5		77.3		106.5		96.0

Source: Population and Housing Census of Malaysia 2010, Special Request (Department of Statistics Malaysia)

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4.11.2.3 Age Structure

A large proportion of the population living in the impact zone falls within the working age group. More than three-quarters of the people are in the working age group, 15 – 64 years (**Table 4-20**). This is good for the proposed LRT3 because it would generate demand for its services. Another large age group is those aged 15 – 24 years. These are typically the young and likely to be students. This group would also contribute to demand for the LRT3 services. Among the three sub-zones, Shah Alam area has the largest working population (82%) and big proportion of population in the age group 15 – 24 years (47%).

Table 4-20 Impact Zone – Population by Age Structure by Subzone for 2010

Age (years)	Sub-zone 1	%	Sub-zone 2	%	Sub-zone 3	%	Impact Zone	%
0 – 14	5,211	18.1	3,924	15.2	8,104	21.5	17,239	18.7
15 – 24	4,869	16.9	12,201	47.4	7,006	18.6	24,076	26.1
25 – 64	17,399	60.3	9,081	35.2	20,809	55.1	47,289	51.2
65+	1,352	4.7	556	2.2	1,824	4.8	3,732	4.0
15 – 64	22,268	77.2	21,282	82.6	27,815	73.7	71,365	77.3
Dependency Ratio (%)	29		21		36		29	
Median Age	29		23		29		26	

Source: Population and Housing Census of Malaysia 2010, Special Request (Department of Statistics Malaysia)

4.11.2.4 Employment and Occupational Skills

The employment analysis is based on number of households. The overall employment-population (E-P) ratio in the impact zone is relatively high at 50%, indicating that half the population are working and considered productive (**Table 4-21**). The E-P ratios are relatively high in Sub-zone 1 and Sub-zone 3. The E-P ratio is lower in Sub-zone 2 (Shah Alam), probably because of the presence of UiTM students in this zone. In terms of distribution across the impact zone, 37% of employed workers are in Sub-zone 1, 42% are in Sub-zone 3 and the remaining 20% are in Sub-zone 2 (**Table 4-21**). The large concentration of employed workers in the impact zone has direct beneficial implications for the proposed LRT3 due to the impact on demand for its services.

SECTION 4 : EXISTING ENVIRONMENT

Table 4-21 Impact Zone -Employment by Subzone for 2010

	Sub-zone 1	%	Sub-zone 2	%	Sub-zone 3	%	Impact Zone
Employment	17,266	37.4	9,415	20.4	19,466	42.2	46,147
Total Population	28,831		25,762		37,743		92,336
Employment-Population Ratio (%)	59.9		36.5		51.6		50.0

Source: Population and Housing Census of Malaysia 2010, Special Request (Department of Statistics Malaysia)

Table 4-22 tabulates the distribution of occupational skills among the employed workers in the impact zone. It is used to reflect indirectly the distribution of wealth among the population within the impact zone. The employed population is categorised into four skill groups, namely, highly skilled, skilled, semi-skilled and unskilled.

Table 4-22 Impact Zone – Employment by Occupational Skill and Subzone by 2010

	Sub-zone 1 (%)	Sub-zone 2 (%)	Sub-zone 3 (%)	Impact Zone	%
Highly Skilled	27.4	37.0	19.4	11,990	26.0
Skilled	25.5	13.9	27.0	10,965	23.8
Semi-Skilled	42.1	41.7	47.6	20466	44.3
Unskilled	5.0	7.4	5.9	2,726	5.9

Notes:

- Highly skilled refer to managers and professionals
- Skilled refer to technicians and associate professionals
- Semi-skilled refer to clerical support, sales and administrative, machine operators, etc
- Unskilled refer to elementary occupations

Source: Population and Housing Census of Malaysia 2010, Special Request (Department of Statistics Malaysia)

The majority of workers living in the impact zone falls under the highly skilled and skilled (49.8% of total workers), implying that the population within the impact zone are relatively well-off. Given the spatial characteristics of the impact zone, the distribution of skills and the implication on social status is not surprising. The next large skill category is the semi-skilled with a share of 44%. This is the group who would likely use the LRT3. The proportions of unskilled workers across the three sub-zones are relatively low, at less than 10%.

SECTION 4 : EXISTING ENVIRONMENT

The distribution of employment by main economic sectors shows that services industry is the key source of employment for people living in the impact zone. It is especially important for those in sub-zone 1 and sub-zone 2. However, in the sub-zone 3, manufacturing sector is relatively important, contributing 45% of jobs as compare to 55% for services sector (**Table 4-23**).

Table 4-23 Impact Zone – Employment by Main Economic Sector and Subzone, 2010

	Sub-zone 1 (%)	Sub-zone 2 (%)	Sub-zone 3 (%)	Impact Zone	%
Primary	0.5	1.1	0.5	13,238	0.6
Secondary	13.9	22.9	44.7	32,550	28.7
Tertiary	85.7	76.0	54.8	46,064	70.7

Notes:

- Primary sector refers to agricultural, mining and quarrying activities
- Secondary sector refers to manufacturing and construction
- Tertiary sector refers to all services

Source: Population and Housing Census of Malaysia 2010, Special Request (Department of Statistics Malaysia)

4.12 EXISTING ROAD TRAFFIC CONDITION

In this section, existing road traffic along the proposed LRT3 is described. The traffic volumes of the roads along the LRT3 Line are reviewed, recognising that these roads may be affected during construction. The current traffic volumes are sourced from a secondary database and reviewed against the existing road inventory, specifically the road capacity, resulting in the drawing up of a broad based volume capacity ratio. This is necessary to gauge the performance of these roads during the construction phase of the project.

Table 4-24 tabulates the location of the stations, the type of stations and the roads where the stations are to be located.

SECTION 4 : EXISTING ENVIRONMENT

Table 4-24 Proposed Station and Roads Adjacent to the Station

No	Station Name	Type of Station	Road Adjacent to Station
1	One Utama	Elevated	Persiaran Bandar Utama
2	Damansara Utama	Elevated	Jalan 5
3	Tropicana	Elevated	Jalan Tropicana Selatan 1
4	Lien Hoe	Elevated	Persiaran Tropicana
5	Dataran Prima	Elevated	NKVE
6	Persada PLUS	Elevated	NKVE
7	Station 3	Elevated	Persiaran Kerjaya
8	Temasya	Elevated	Persiaran Kerjaya
9	Glenmarie	Elevated	Persiaran Kerjaya
10	Stadium (Grand Central)	Elevated	Persiaran Sukan
11	Persiaran Hishamuddin	Underground	Persiaran Hishamuddin
12	Section 14	Elevated	Persiaran Dato' Menteri
13	SIRIM	Elevated	Federal Highway
14	UiTM	Elevated	Federal Highway
15	I-City	Elevated	Persiaran Permai
16	Bukit Raja	Elevated	Lebuh Keluli
17	Kawasan 17	Elevated	Persiaran Bukit Raja
18	Jalan Meru	Elevated	Jalan Meru
19	Klang	Elevated	Jalan Jambatan Kota
20	Taman Selatan	Elevated	Persiaran Tengku Ampuan Rahimah
21	Sri Andalas	Elevated	Jalan Langat
22	Tesco Bukit Tinggi	Elevated	Jalan Langat
23	AEON Bukit Tinggi	Elevated	Jalan Langat
24	Bandar Botanik	Elevated	Jalan Langat
25	Johan Setia	Elevated	Jalan Langat

a) Segment 1: One Utama Station to Persada PLUS Station

There are a total of six elevated stations in this segment. The alignment travels on major roads and highways in Damansara area, namely LDP, SPRINT Highway, Persiaran Tropicana and NKVE. These are busy roads with high travel demand, during peak and off-peak periods, taking into cognisance that these roads function as primary and secondary distributors. The broad-based v/c ratio shows that the LDP is congested with a level of service F.

SECTION 4 : EXISTING ENVIRONMENT

One Utama Station

The first station of LRT3 is situated on Jalan SS 21/13, with the access from Persiaran Bandar Utama, close to LDP. Persiaran Bandar Utama is a 3-lane single carriageway distributor road with a capacity of 1,800 veh/hr/lane. It distributes traffic from Bandar Utama residential enclaves and commercial area and discharges to the LDP which is the major highway in the area. The LDP is an urban 6-lane highway that provides direct connection between Damansara and Puchong, with a capacity of 2,000 vehicle/hr/lane. The traffic flow survey indicates that the highway is currently performing at level of service (LOS) F. However, significant queues and delays are observed on the highway especially during peak hours.

The station is within the vicinity of the commercial area in Bandar Utama, where Sri Pentas, One World Hotel, 1 Utama Shopping Mall, and 1 First Avenue are within 500 m radius from the proposed station location. It is also close to the residential area where Taman Tun Dr Ismail and Damansara Utama. A shared link (covered walkway) is proposed to be built to connect LRT3 to MRT SBK (Line 1) station which is 300 m away. In addition, a pedestrian bridge is proposed to be built to connect to Taman Tun Dr Ismail.

Damansara Utama Station

Damansara Utama station is located at Damansara Utama on the DID reserve on Jalan 5 section. Jalan 5 is a 2-lane single carriageway, a local road that provides access to the residential units. The station is situated within the residential areas behind the houses. Jalan 5 has the capacity of 1,700 veh/hr/lane and is currently performing at a satisfactory level of A during peak hours.

Tropicana Station

Tropicana station is situated along Jalan Tropicana Selatan 1, a dual 2 carriageway which is currently under-utilised with low traffic volume. The capacity of the road is 1800 veh/hr/lane, and the volume/capacity analysis shows that it has a level of service A during both AM and PM peak hours. The road that connects to Jalan Tropicana Selatan 1 is also performing at an acceptable level of service A to B, namely Jalan Tropicana Selatan, during peak hours.

This station is also situated in the vicinity of SPRINT Highway, which is one of the major highways in Damansara region that connects to Kuala Lumpur and Petaling Jaya. SPRINT Highway is an 8-lane highway (with 4 lanes in each direction) with capacity of 2,000 veh/hr/lane and is connected to NKVE. Traffic surveys show that the level of service of SPRINT Highway is A, which has the capacity to accommodate for future increase of traffic flow.

SECTION 4 : EXISTING ENVIRONMENT

The development in the vicinity of station are such as: Riana Green Condominium and Bayu Puteri Apartment are within walking distance to the proposed station. In addition, the Merchant Square Business Centre is about 82 m from the station. Two schools are in the vicinity of the station.

Lien Hoe Station

Lien Hoe station is situated along Persiaran Tropicana which is a dual 2 carriageway with a capacity of 1,800 veh/hr/lane. Traffic survey shows that the road is currently performing at an acceptable level of service of C. The roadway connecting to Persiaran Tropicana is Jalan PJU 1a/1. A major highway that connects to the station is NKVE which is a 6-lane urban highway with a capacity of 2,000 veh/hr/lane. Traffic survey shows that the highway is performing at a level of service of C to D during peak hours.

Lien Hoe station is located in the vicinity of Luxor Tower and Lien Hoe Tower and is expected to serve several residential area nearby, such as Damansara Idaman, Damansara Lagenda, and Taman Bukit Mayang Emas.

Dataran Prima Station

Dataran Prima Station is situated along NKVE, a 6-lane highway with a capacity of 2,000 veh/hr/lane. Traffic survey on existing condition shows that the highway is performing at an acceptable level, i.e. LOS C to D. Higher traffic volume is observed during PM peak hours than AM peak hours. The roadways in the vicinity of the station includes Jalan PJU 1a/1 and Jalan PJU 1a/3, and Jalan Bukit Mayang Emas (in the opposite direction of the station), functioning as local streets that serve the residential conurbation in the locality. Mid-block analyses on these roads show that they are currently operating at acceptable levels of service A to B.

Persada PLUS Station

Persada PLUS Station is situated along NKVE, near the Subang Toll Plaza. Existing traffic survey shows that the highway is performing at different levels of service for different sections/directions. Westbound direction of NKVE to Jalan Lapangan Terbang Subang is performing at level of service A to C during AM and PM peak hours respectively, while the Eastbound direction of Jalan Lapangan Terbang Subang to NKVE is performing at LOS D and LOS F during AM and PM peak hours respectively. This shows that the highway sections have insufficient capacity to accommodate future traffic growth.

Persada Plus Station is in the vicinity of condominiums and commercial areas, whereby Kelana D'Putera and Kelana Mahkota condominiums are to be served by this station. In addition, Zenith Corporate Park and Kelana Square are major commercial buildings in the area. Covered walkways and pedestrian bridges would be built for the convenient access of users from this area.

SECTION 4 : EXISTING ENVIRONMENT

b) Segment 2: Station 3 Station to Bukit Raja Station

A total of eight stations have been proposed for this stretch of study area in Shah Alam. The main roads involved are Persiaran Kerjaya, Persiaran Sukan, Persiaran Hishamuddin, Persiaran Dato' Menteri, Federal Highway, Persiaran Permai, and Jalan Pekan Baru. A stretch of 2 km segment at Persiaran Hishamuddin involves underground construction, in order to avoid the Istana Kayangan neighbourhood.

Station 3 Station

Station 3 is located at Persiaran Kerjaya which is a dual 2 carriageway road with a capacity of 1,800 veh/hr/lane. Persiaran Kerjaya is a major arterial that connects to Jalan Lapangan Terbang Subang. Traffic survey on existing condition shows that it is performing at level of service A to C, with the worst level of service (LOS C) during AM peak hours.

Nearby amenities include residential zones such as Accentra Glenmarie and Shang Villa. In addition, the Kelana Business Centre is also within walking distance of the station.

Temasya Station

Temasya station is located on the downstream of Persiaran Kerjaya. Persiaran Kerjaya is dual 3 carriageway with a capacity of 1,800 veh/hr/lane. The survey on the existing traffic condition shows that this road is performing at LOS of A to C during AM and PM peak hours for both directions, which is deemed satisfactory.

The station is situated in the locality of Temasya Industrial Park, Temasya Anggun, Hyundai Manufacturing Plant, Glenmarie Golf and Country Club and BP Diagnosis Centre.

Glenmarie Station

Glenmarie station is also located along Persiaran Kerjaya. Traffic survey analysis shows that the traffic condition at this section of the road is performing at an acceptable level of service, i.e. LOS A to C.

The station is situated in the industrial area in which the HICOM Glenmarie Industrial Park and the Glenmarie Industrial Park are within walking distances from the station.

SECTION 4 : EXISTING ENVIRONMENT

Stadium (Grand Central) Station

The Stadium-Grand Central station is located on Persiaran Sukan, which is a dual 2 carriageway road with a capacity of 1,800 veh/hr/lane. The road is currently performing at an acceptable level of service B during AM peak hour and LOS C during PM peak hour.

This station is situated in front of the Melawati Indoor Stadium and within walking distance of Shah Alam Stadium and Tesco Extra.

Persiaran Hishamuddin Station

Persiaran Hishamuddin station is situated on Persiaran Hishamuddin which is a dual 2 carriageway, with a capacity of 1,800 veh/hr/lane. The level of service for existing condition ranges from LOS A to LOS C during AM and PM peak hours. The station is proposed to be an underground station, thus creating some inconvenience to the road users during construction.

The proposed station is in the vicinity of major residential areas of Section 9 and Section 11 of Shah Alam.

Section 14 Station

Section 14 station is located adjacent to Persiaran Dato' Menteri of Section 14 Shah Alam, which is a major distributor with dual 2 carriageway. The capacity of this road is 1,500 veh/hr/lane. Persiaran Dato' Menteri is one of the major roads connecting Shah Alam and Kuala Lumpur/Petaling Jaya. The volume/capacity analysis shows that it has a level of service B during both AM and PM peak hours. Persiaran Bandar Raya which connects to Persiaran Dato' Menteri is also performing at acceptable level of service A during both peak hours.

Existing developments adjacent to the Section 14 Station are namely the Pejabat Pos Besar Shah Alam, SACC Mall, Kompleks PKNS and DEMC Specialist Hospital.

SIRIM and UiTM Station

SIRIM station is located on Federal Highway, functioning as the primary spine that connects Shah Alam to Kuala Lumpur/Petaling Jaya. Also known as the Federal Highway, it is a dual 3 carriageway with a capacity of 2,000 veh/hr/lane. Traffic survey shows that the highway is currently servicing at a level of service F. It is expected that the construction of LRT3 will exacerbate traffic congestion on this particular highway section.

The UiTM station is another station that is located along Federal Highway. The station, by the name in itself, aims to serve the students and staff of UiTM.

SECTION 4 : EXISTING ENVIRONMENT

I-City Station

I-City station is located at Persiaran Permai which is a dual 2 carriageway, functioning as a collector road with a capacity 1,800 veh/hr/lane. Traffic survey shows that the road is performing at acceptable levels of service A to C.

The amenities within the captive area of the station are I-City and Section 7 of Shah Alam.

Bukit Raja Station

Bukit Raja station is situated along Persiaran Bestari, which is a dual 2 carriageway major road with a capacity is 1,800 veh/hr/lane, collecting and dispersing traffic from/to Lebuhraya Selat Klang and Bukit Raja area. The volume/capacity analysis shows that it has level of service B during both AM and PM peak hours.

This station is proposed to be located in the Bukit Raja business centre and industrial park.

c) Segment from Kawasan 17 to Johan Setia Station

There are a total of nine stations located in the Klang Area. The main roads involved are Jalan Meru, Jalan Besar, Persiaran Tengku Ampuan Rahimah, Jalan Langat and Jalan Klang Banting. These roads are also major roads conveying commuting trips during peak hours.

Kawasan 17 Station

Kawasan 17 station is located on Persiaran Bukit Raja, which is a dual 2 carriageway with a capacity of 1,800 veh/hr/lane. Persiaran Bukit Raja is currently performing at LOS A during peak hours. This station is proposed to be situated in the residential area and the developments within captive area are such as Taman Berkeley, Taman Eng Ann, Bukit Raja Shopping Centre, and Bandar baru Klang. The KPJ Klang Specialist Hospital is within the captive area too.

Jalan Meru Station

Jalan Meru station is located on Jalan Meru, a 6-lane single carriageway road with a capacity of 1,200 veh/hr/lane. Jalan Meru is one of the major roads that connects to Jalan Kapar. The volume/capacity analysis shows that it has a level of service C during AM peak period and a level of service B during PM peak hours.

The proposed station serves the commercial area and educational centres in the area. There are two schools within walking distance from the station, i.e. SMK Tinggi Klang and SMK Meru.

SECTION 4 : EXISTING ENVIRONMENT

Klang Station

Klang station is located along Jalan Jambatan Kota, which is a 6-lane dual carriageway with a capacity of 1,800 veh/hr/lane. Existing traffic survey shows that the road is performing at an acceptable traffic level, i.e. LOS D during PM peak hours.

The building of Majlis Perbandaran Klang, Pejabat Daerah Dan Tanah Klang, and Jabatan Bekalan Air is in the vicinity of the station. Besides, there is a school nearby, i.e. Sekolah Menengah Methodist.

Taman Selatan and Sri Andalas

Taman Selatan station is located on Persiaran Tengku Ampuan Rahimah, which is a dual 3 carriageway with a capacity of 1,800 veh/hr/lane. Persiaran Tengku Ampuan Rahimah is one of the major roads that connect Jalan Jambatan Kota and Jalan Tengku Kelana, performing at an acceptable level of LOS A to C during AM and PM peak hours.

The Sri Andalas station is proposed to be located along Jalan Langat at Bukit Tinggi Klang, in the vicinity of Masjid Al-Rahimiah Langat, Hospital Tuanku Ampuan Rahimah Klang and Taman Sri Andalas shop lots.

In the analysis, Persiaran Tengku Ampuan Rahimah and Jalan Langat have levels of service C during both AM and PM peak hours.

Tesco Bukit Tinggi, AEON Bukit Tinggi and Bandar Botanik Stations

All the three are located on Jalan Langat, which is a dual 3 carriageway with a capacity of 1,800 veh/hr/lane. Traffic survey shows that these roads are performing at acceptable levels of service A to C during AM and PM peak hours.

The Tesco Bukit Tinggi station would be located right in front of the Tesco shopping complex and AEON Bukit Tinggi station in front of AEON Bukit Tinggi shopping complex. The Bandar Botanik station is located in front of the Botanic Capital commercial area.

Johan Setia Station

Johan Setia station is located along Jalan Klang Banting, which is a dual 3 carriageway with a capacity of 1,200 veh/hr/lane. This station will house the LRT depot and will be built with a park and ride parking facility. The volume/capacity analysis shows that it has a level of service C during both AM and PM peak hours.

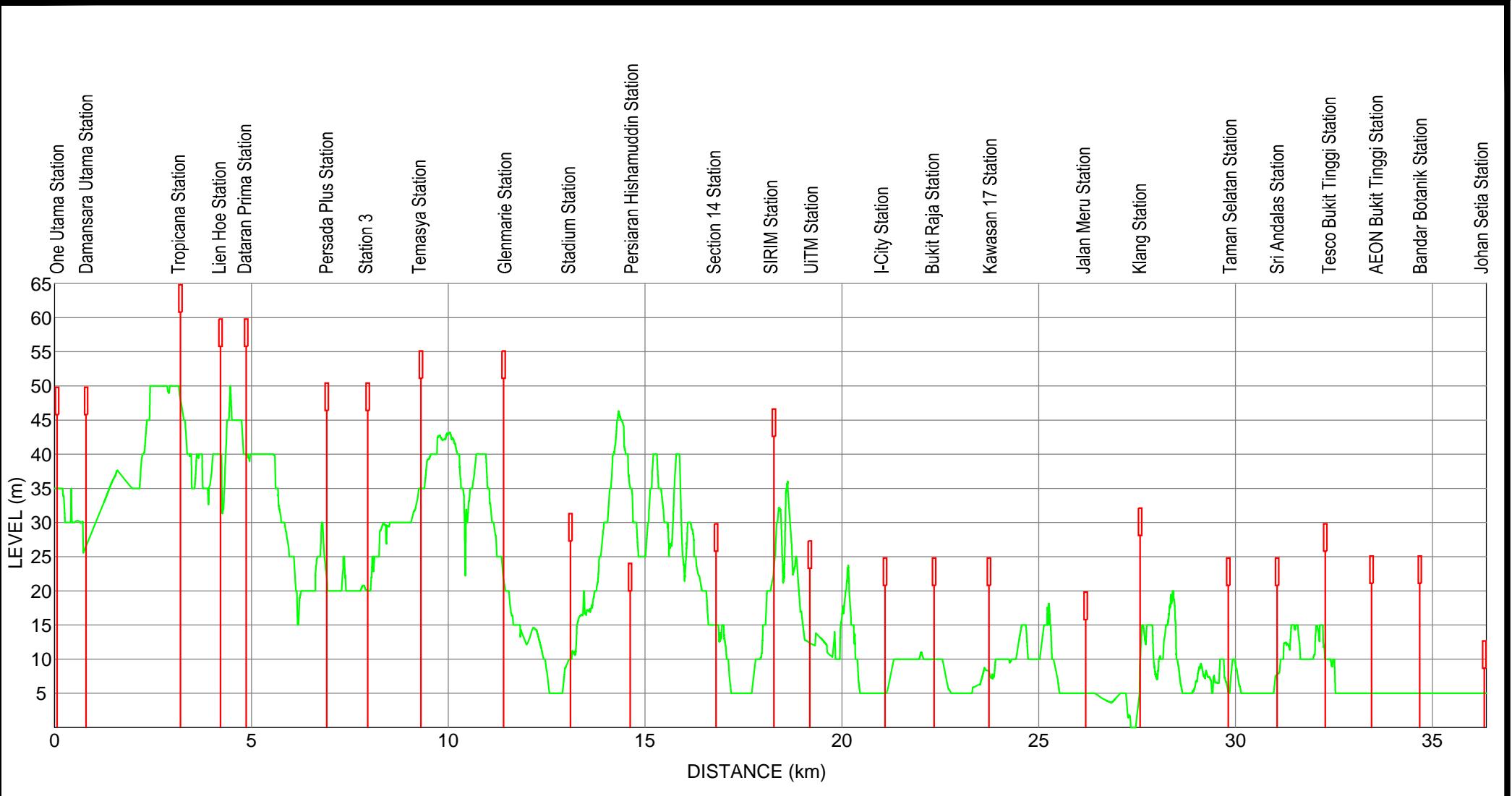
Table 4-25 illustrates the volume/capacity ratio and level of service on the roads of the proposed stations for AM and PM peaks for both directions.

SECTION 4 : EXISTING ENVIRONMENT

Table 4-25 Existing Traffic Conditions

No.	Road Section	No. of lanes Eastbound (Westbound)	Capacity Eastbound (Westbound)	Volume (v/c ratio)				Highest v/c ratio	
				AM Peak		PM Peak			
				Eastbound/ Northbound	Westbound/ Southbound	Eastbound/ Northbound	Westbound/ Southbound		
1	Persiaran Bandar Utama	3 (3)	5,400 (5,400)	692 (0.19 A)	1,014 (0.19 A)	1,280 (0.24 A)	1,338 (0.25 A)	0.25 A	
2	Jalan 5	1 (1)	1,700 (1,700)	453 (0.27 A)	217 (0.13 A)	317 (0.19 A)	309 (0.18 A)	0.27 A	
3	Jalan Tropicana Selatan 1	2 (2)	3,600 (3,600)	286 (0.08 A)	87 (0.02 A)	105 (0.03 A)	108 (0.03 A)	0.08 A	
4	Persiaran Tropicana	2 (2)	3,600 (3,600)	1,783 (0.5 C)	2,379 (0.66 C)	1,930 (0.54 C)	1,855 (0.52 C)	0.66 C	
5	NKVE	3 (3)	6,000 (6,000)	4,100 (0.68 C)	4,603 (0.77 C)	5,383 (0.89 D)	5,181 (0.86 D)	0.89 D	
6	Persiaran Kerjaya	2 (2)	3,600 (3,600)	1,967 (0.55 C)	1,658 (0.46 B)	1,244 (0.23 A)	1,553 (0.29 B)	0.55 C	
7	Persiaran Sukan	2 (2)	3,600 (3,600)	1,146 (0.32 B)	1,685 (0.47 B)	1,364 (0.38 B)	2,235 (0.62 C)	0.62 C	
8	Persiaran Hishamuddin	2 (2)	3,600 (3,600)	2,797 (0.78 C)	1,503 (0.42 A)	2,369 (0.65 C)	2,219 (0.62 C)	0.78 C	
9	Persiaran Dato' Menteri	2 (2)	3,000 (3,000)	1,233 (0.41 B)	676 (0.22 A)	1,233 (0.45 B)	598 (0.20 A)	0.45 B	
10	Federal Highway	3 (3)	6,000 (6,000)	4,184 (0.70 C)	6,273 (1.04 F)	5,353 (0.89 D)	6,273 (1.04 F)	1.04 F	
11	Persiaran Permai	2 (2)	3,600 (3,600)	1,595 (0.44 B)	722 (0.2 A)	1,557 (0.43 B)	1,750 (0.49 C)	0.49 C	
12	Lebuh Keluli	2 (2)	3,600 (3,600)	2,422 (0.67 C)	1,305 (0.36 B)	1,479 (0.41 B)	1,357 (0.38 B)	0.67 C	
13	Persiaran Bukit Raja	2 (2)	3,600 (3,600)	990 (0.28 A)	378 (0.10 A)	636 (0.18 A)	811 (0.23 A)	0.23 A	
14	Jalan Meru	3 (3)	3,600 (3,600)	1,988 (0.55 C)	2,160 (0.60 C)	1043 (0.29 B)	1,147 (0.32 B)	0.60 C	
15	Jalan Jambatan Kota	3 (3)	5,400 (5,400)	3,393 (0.63 C)	3,262 (0.60 C)	3,394 (0.63 C)	4,623 (0.86 D)	0.86 D	
16	Persiaran Tengku Ampuan Rahimah	3 (3)	5,400 (5,400)	2,588 (0.48 C)	2,631 (0.49 C)	2,608 (0.48 C)	2,772 (0.51 C)	0.51 C	
17	Jalan Langat	3 (3)	5,400 (5,400)	665 (0.12 A)	2,513 (0.46 C)	797 (0.14 A)	1,482 (0.27 A)	0.46 C	
18	Jalan Klang Banting	3 (3)	3,600 (3,600)	2,086 (0.58 C)	1,882 (0.52 C)	1,435 (0.40 B)	1,793 (0.50 C)	0.58 C	

Source: Traffic Impact Assesment Reports

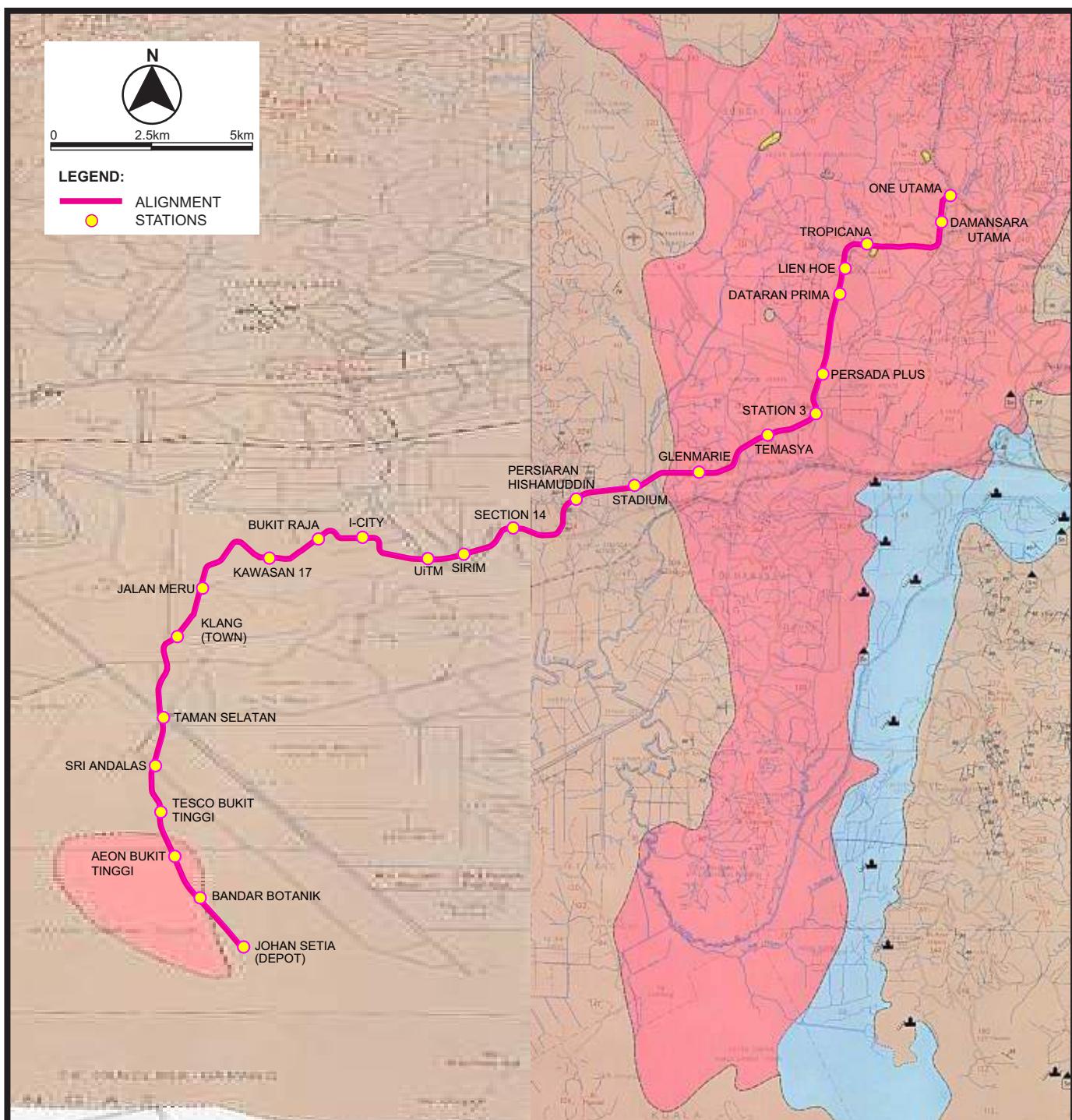


*Vertical scale exaggerated



Figure 4-1

Terrain along the LRT3 Alignment



AGE	FORMATION	LITHOLOGY
QUATERNARY	ALLUVIUM	Alluvium
MESOZOIC OR YOUNGER	GRANITE AND ITB DIFFERENTIATES	Erosive Rock
PERMIAN - CARBONIFEROUS P PERHAPS TRIASSIC PP	KENYI HILL FORMATION	Quartzite and Phyllite
MIDDLE - UPPER SILURIAN	HAWTHORNDEN FORMATION	Phyllite and Schist

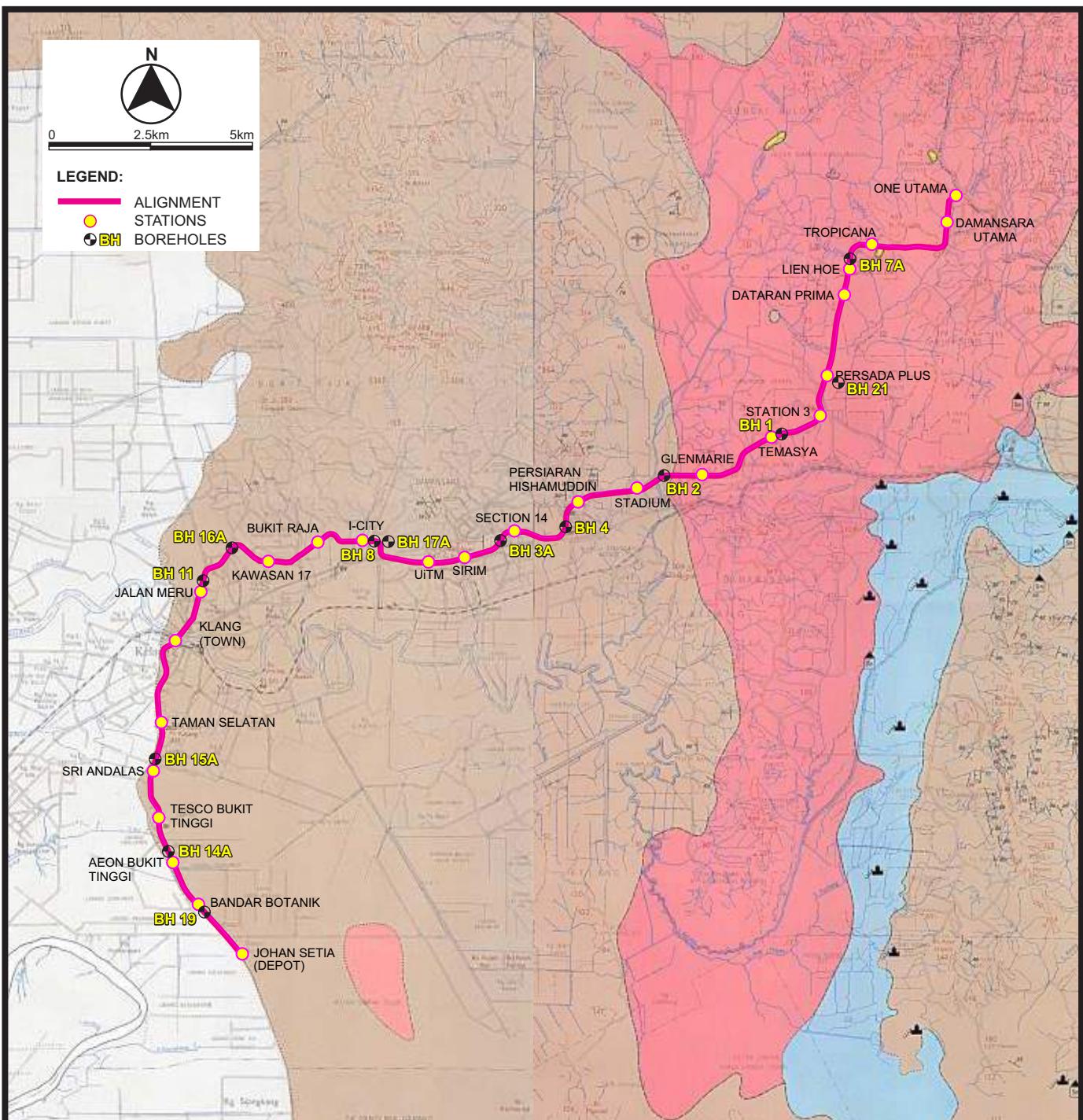
STRUCTURAL INFORMATION	ROCK CONTACT		Within 100 yards, quarter mile, inferred.
	BEDDING		Inferred, dip in degrees
	FOLIATION		Vertical
	JOINTING		Inferred, dip in degrees
	FOLDING		Strata undulating

Source : New Series Peninsular Malaysia, Geological (Sheet 93 & 94)



Figure 4-2

Geology along the LRT3 Alignment



Chainage	Borehole	Coordinate	
		Northing	Easting
3,860	BH 7A	346146.201	400108.515
6,500	BH 21	343502.054	399895.069
8,800	BH 1	342084.047	398221.052
12,100	BH 2	340991.587	395352.801
14,910	BH 4	339857.69	393101.947
16,760	BH 3A	339582.262	391495.524
20,200	BH 17A	339586.512	388651.536

Chainage	Borehole	Coordinate	
		Northing	Easting
20,660	BH 8	339505.176	388033.733
24,300	BH 16A	339304.814	384772.302
25,700	BH 11	338210.192	384009.769
30,000	BH 15A	334268.605	383017.373
33,260	BH 14A	331124.759	383537.203
34,800	BH 19	329798.668	384352.134

Source : New Series Peninsular Malaysia, Geological (Sheet 93 & 94)



Figure 4-3

Location of Boreholes

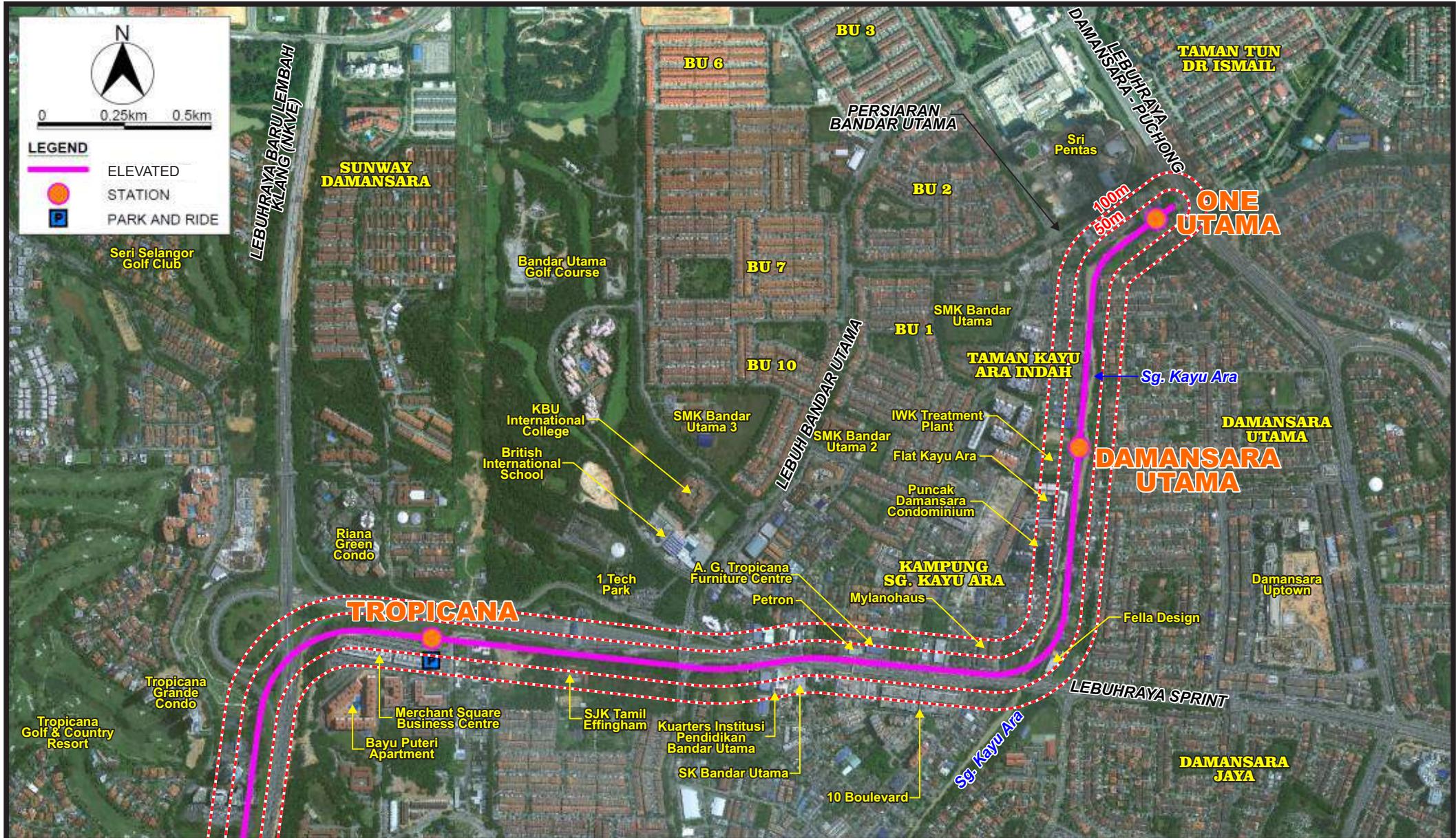


Figure 4-4a

Land Use along Segment 1A



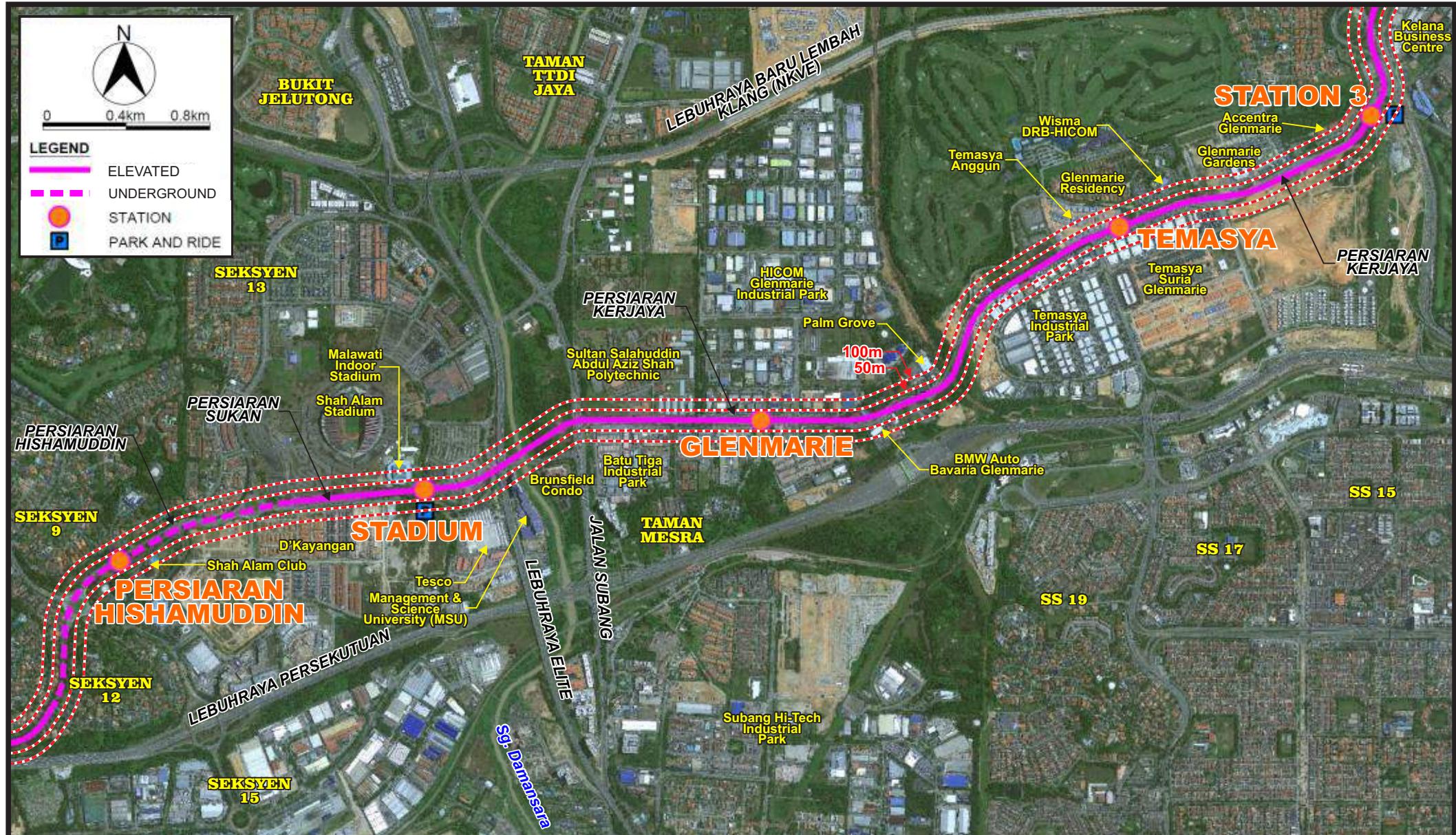


Figure 4-4c

Land Use along Segment 2A



Figure 4-4d

Land Use along Segment 2B

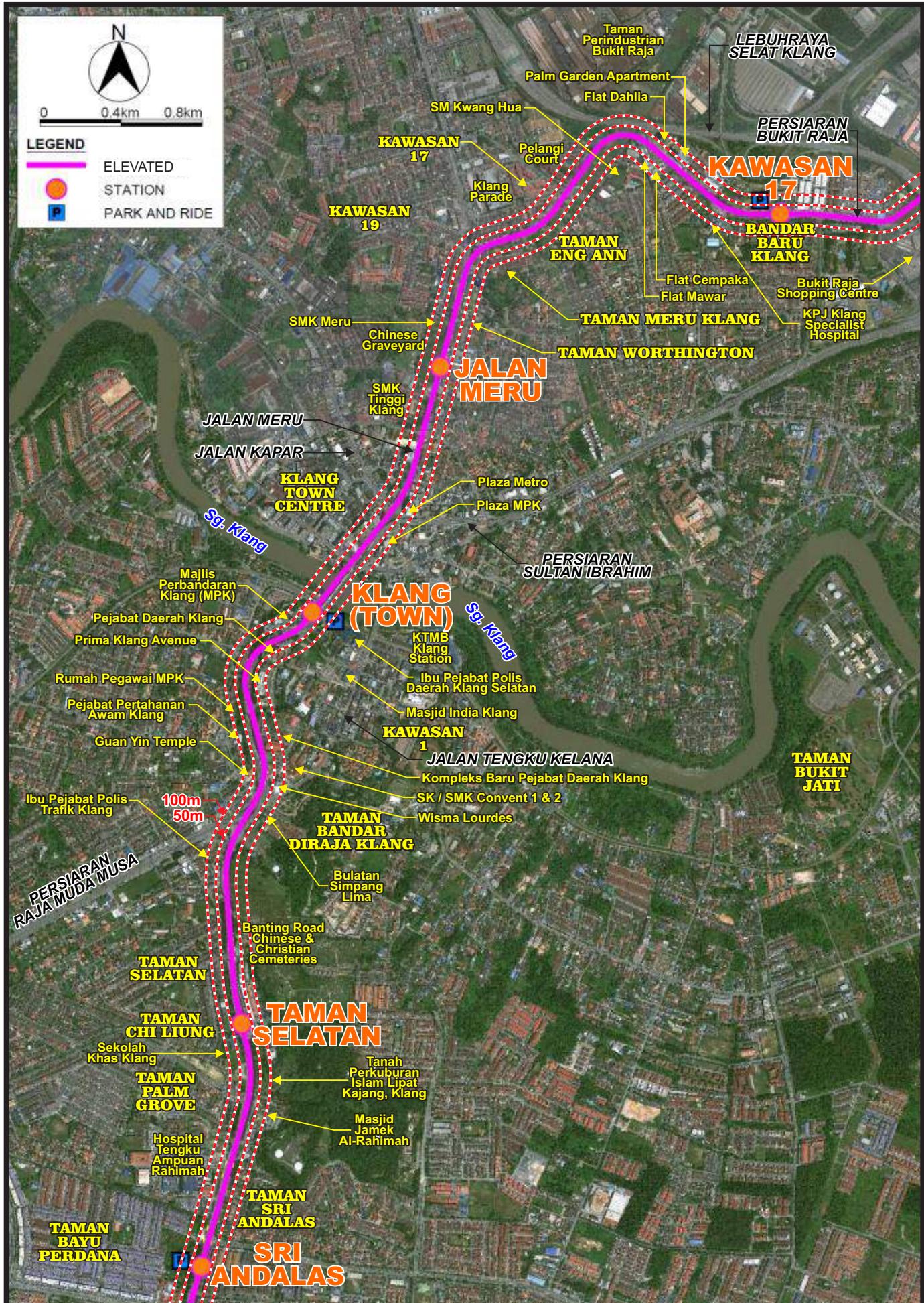




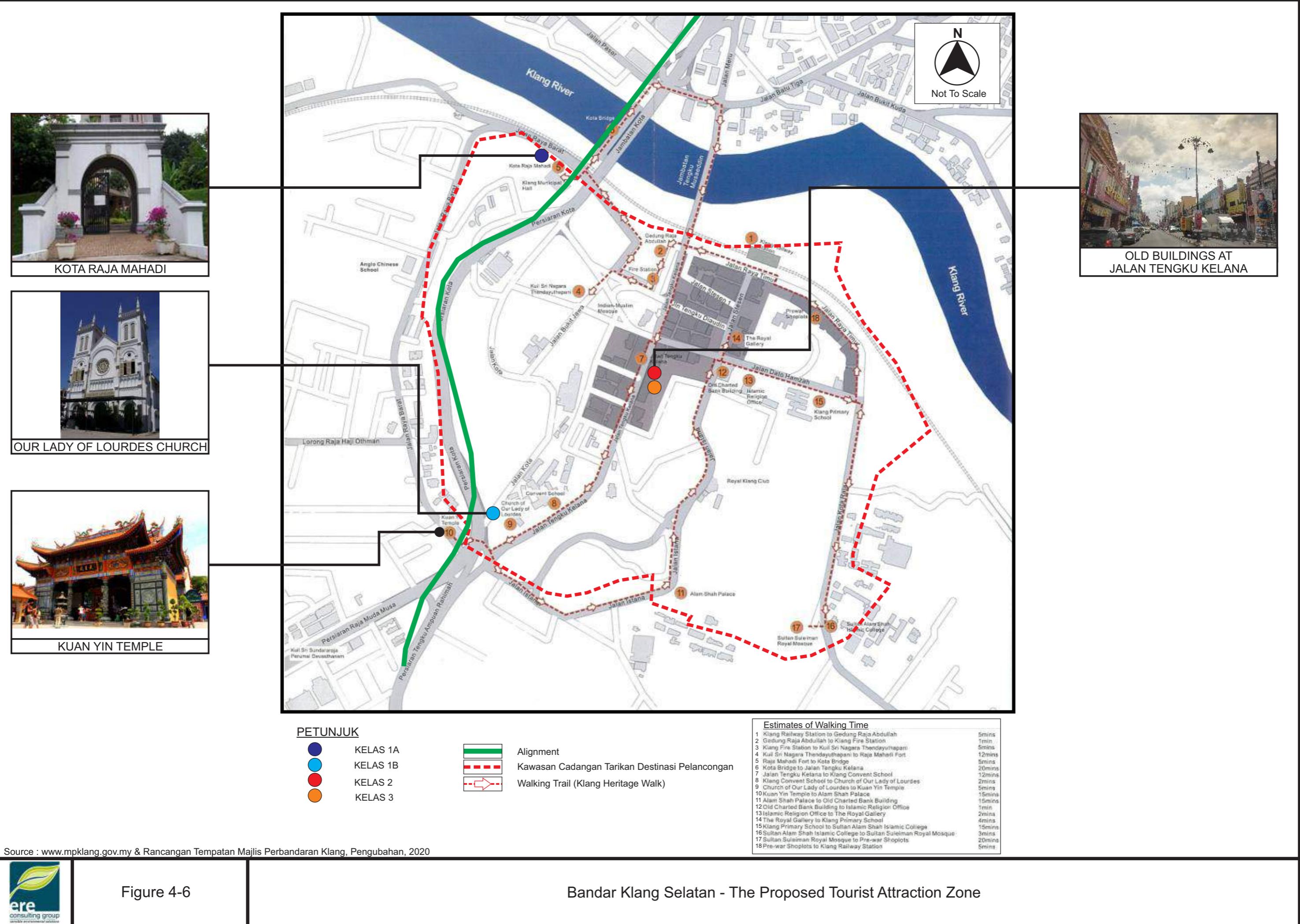
Figure 4-4f

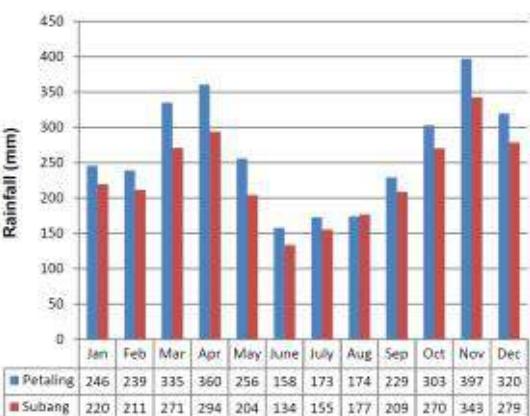
Land Use along Segment 3B



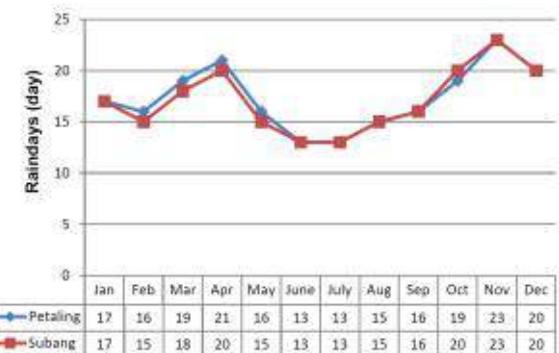
Figure 4-5

Land Use at Depot Area (3KM)





Average Rainfall



Average 24-hour Mean Temperature



Average 24-hour Mean Relative Humidity



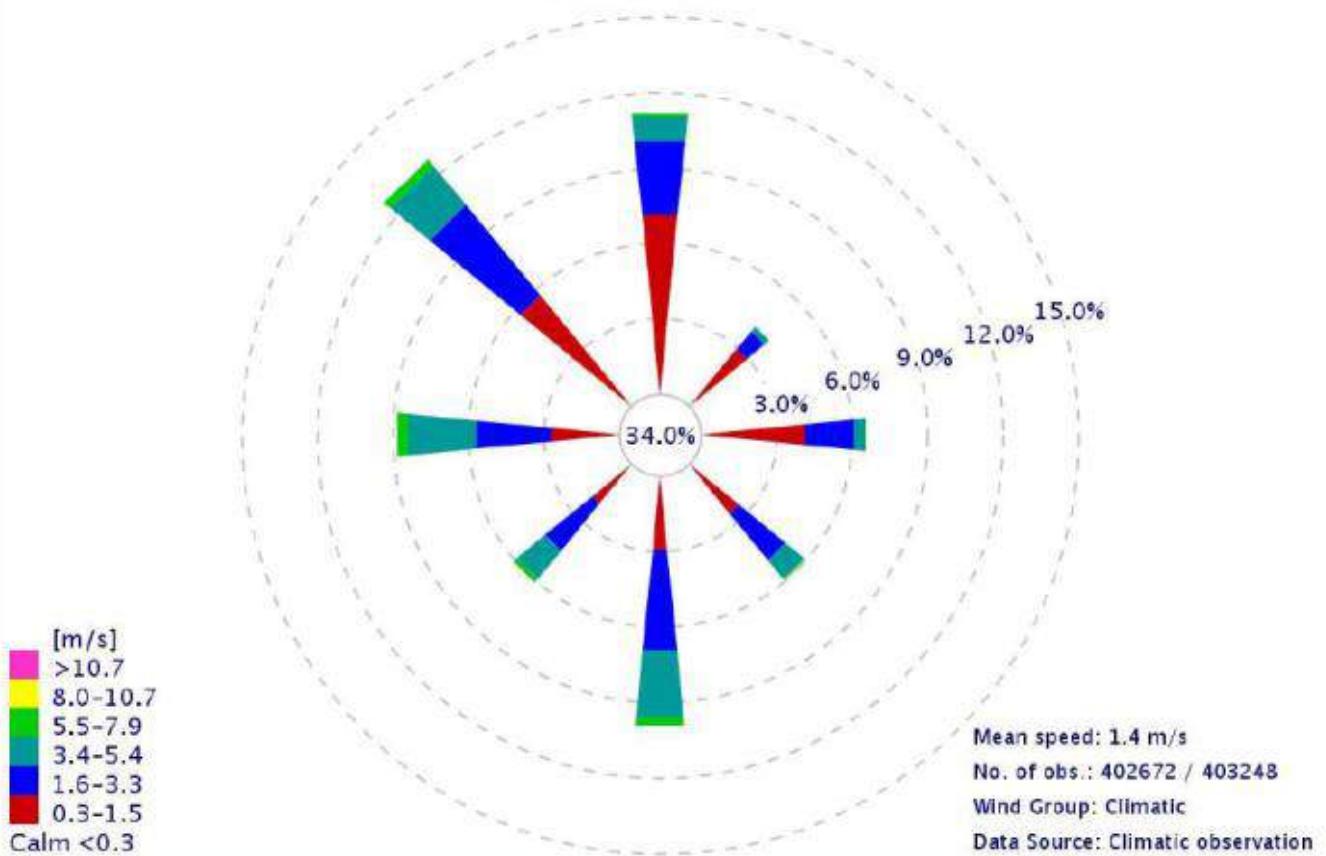
Source : Malaysian Meteorological Department, 2014



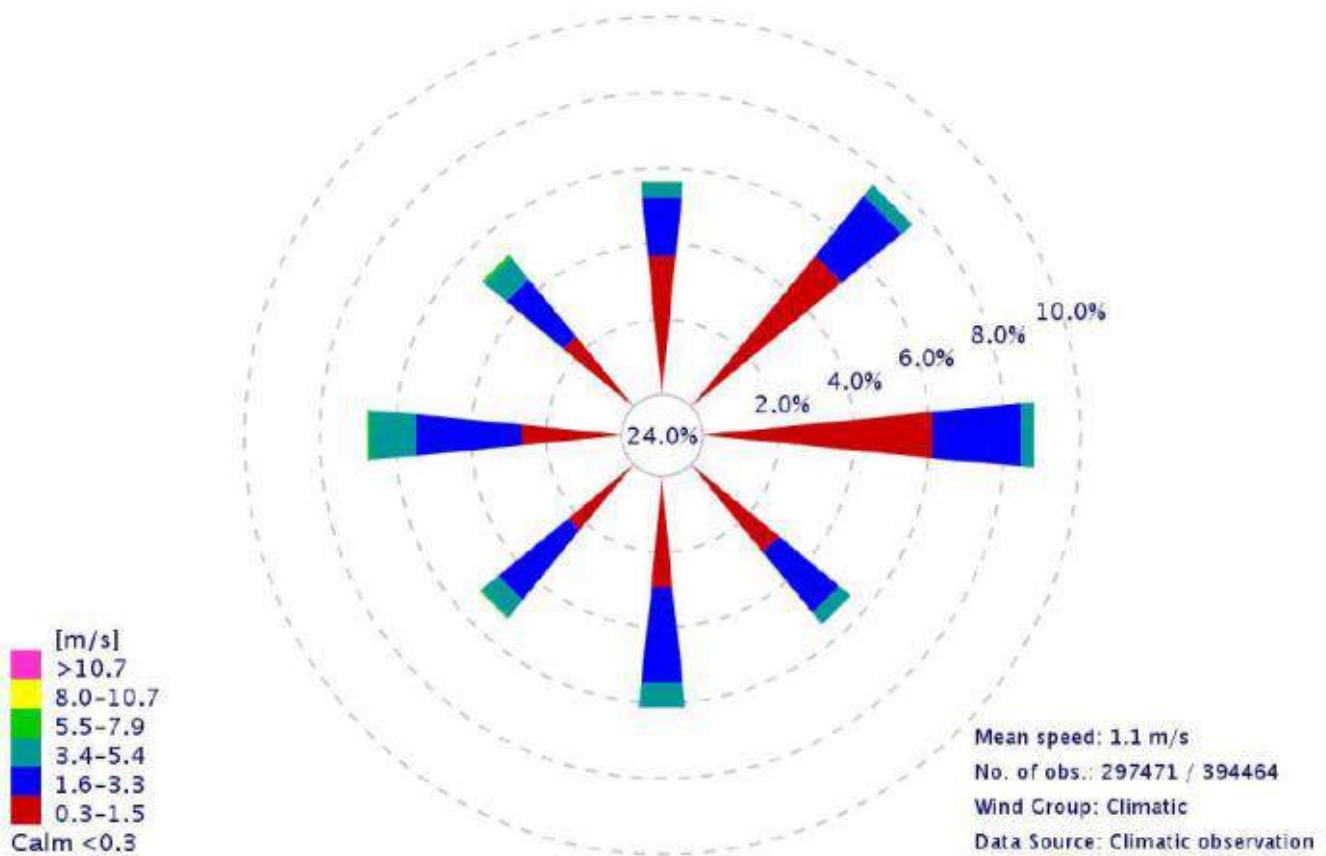
Figure 4-7a

Average Monthly Rainfall, Raindays, Temperature and Humidity for 1990-2013

SUBANG 1968 – 2013



PETALING JAYA 1969 – 2013



Source : Malaysian Meteorological Department, 2014



Figure 4-7b

Annual Wind Rose



0 7km 14km

LEGEND

ALIGNMENT
SG. KLANG CATCHMENT ($1,300 \text{ km}^2$)

RIVER CROSSING	CHAINAGE
SG KAYU ARA	460
SG KAYU ARA	6190
SG DAMANSARA	12590
SG RENGGAM	17290
SG RASAU	20970
SG KLANG	27400
SG AUR	32840



SUNGAI KAYU ARA



SUNGAI KAYU ARA



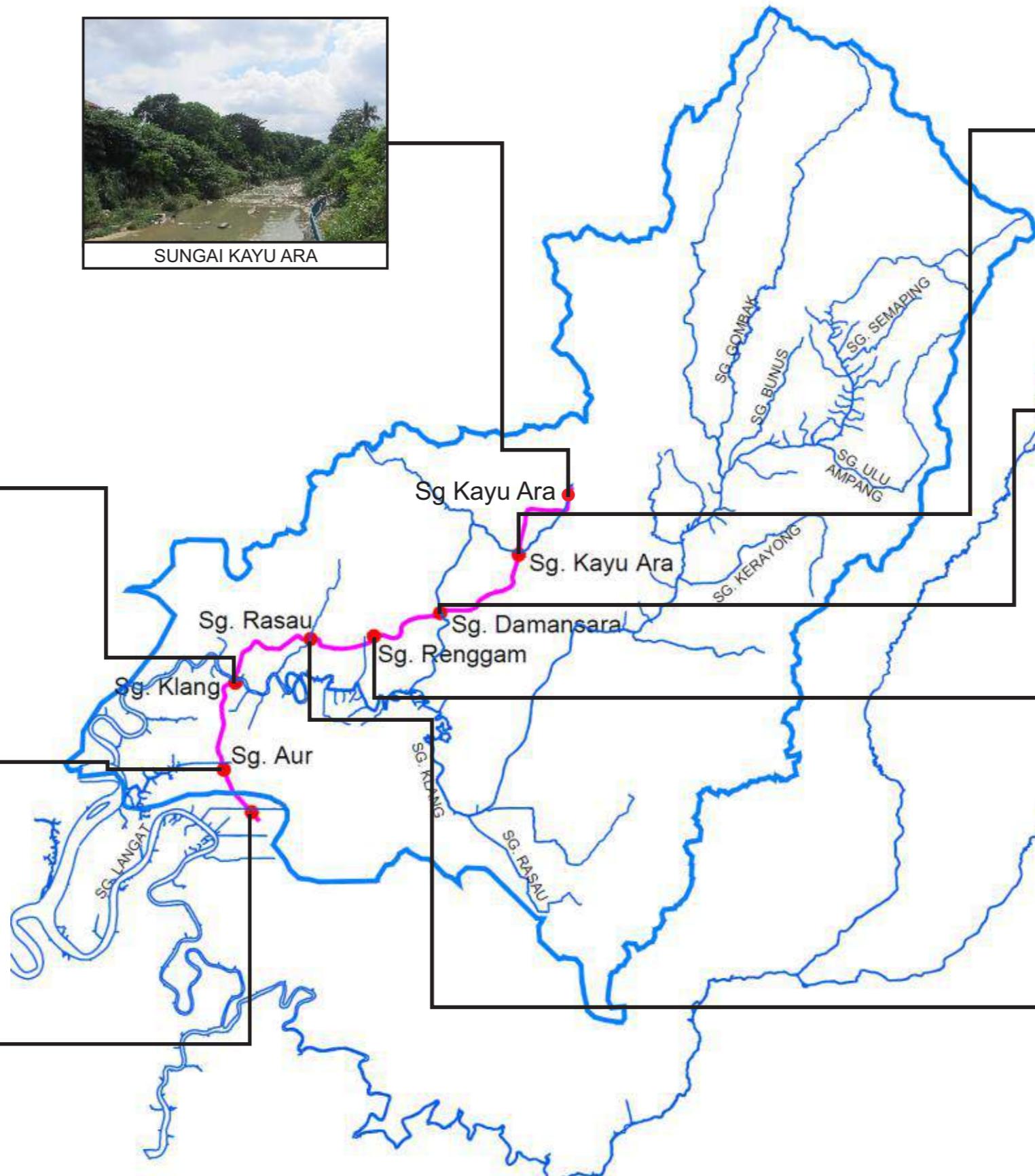
SUNGAI KLANG



SUNGAI AUR



PARIT JOHAN SETIA



SUNGAI DAMANSARA



SUNGAI RENGHAM



SUNGAI RASAU



Figure 4-8

River Crossing Along Alignment

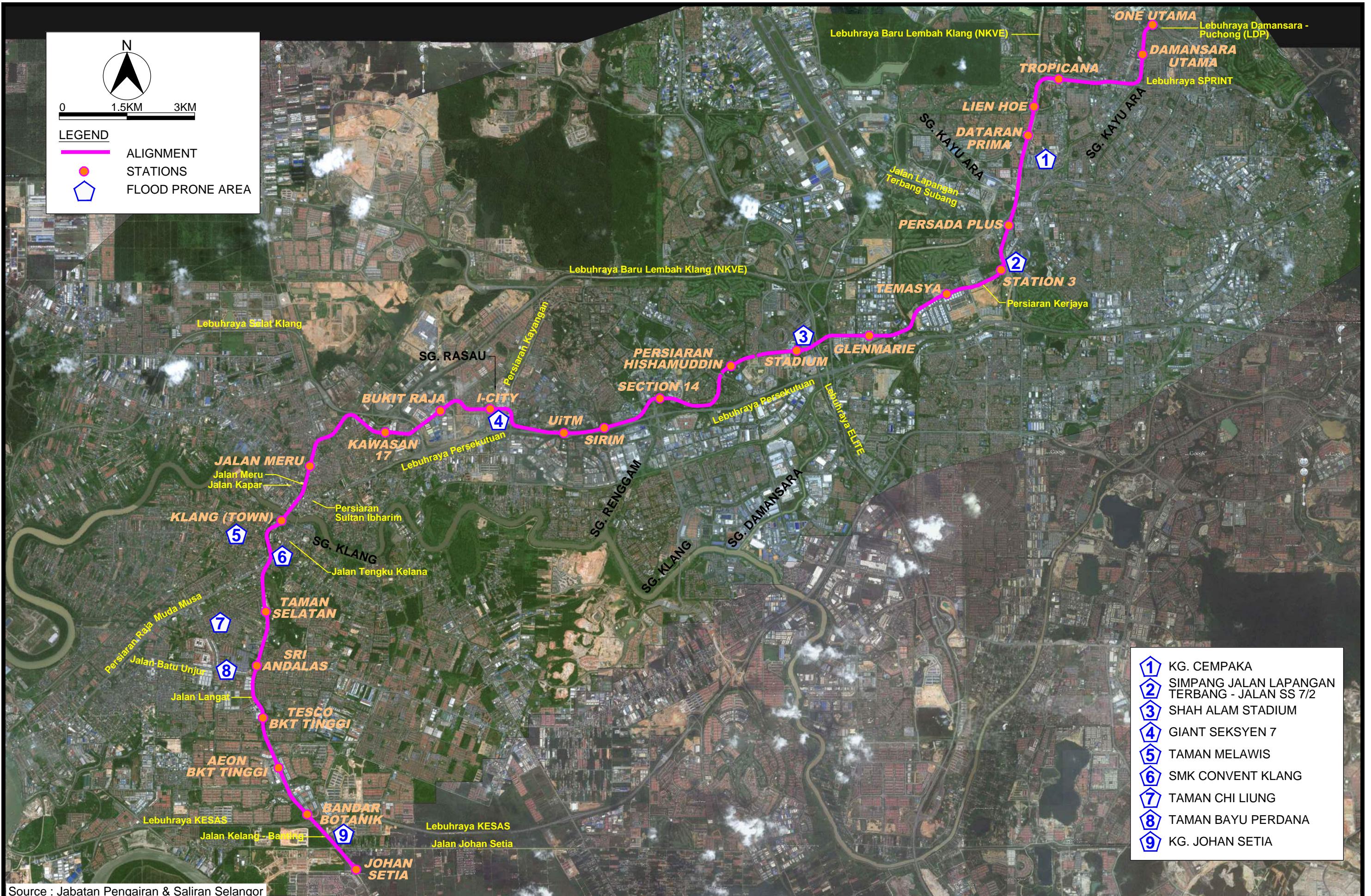


Figure 4-9

Flood Prone Area along Alignment

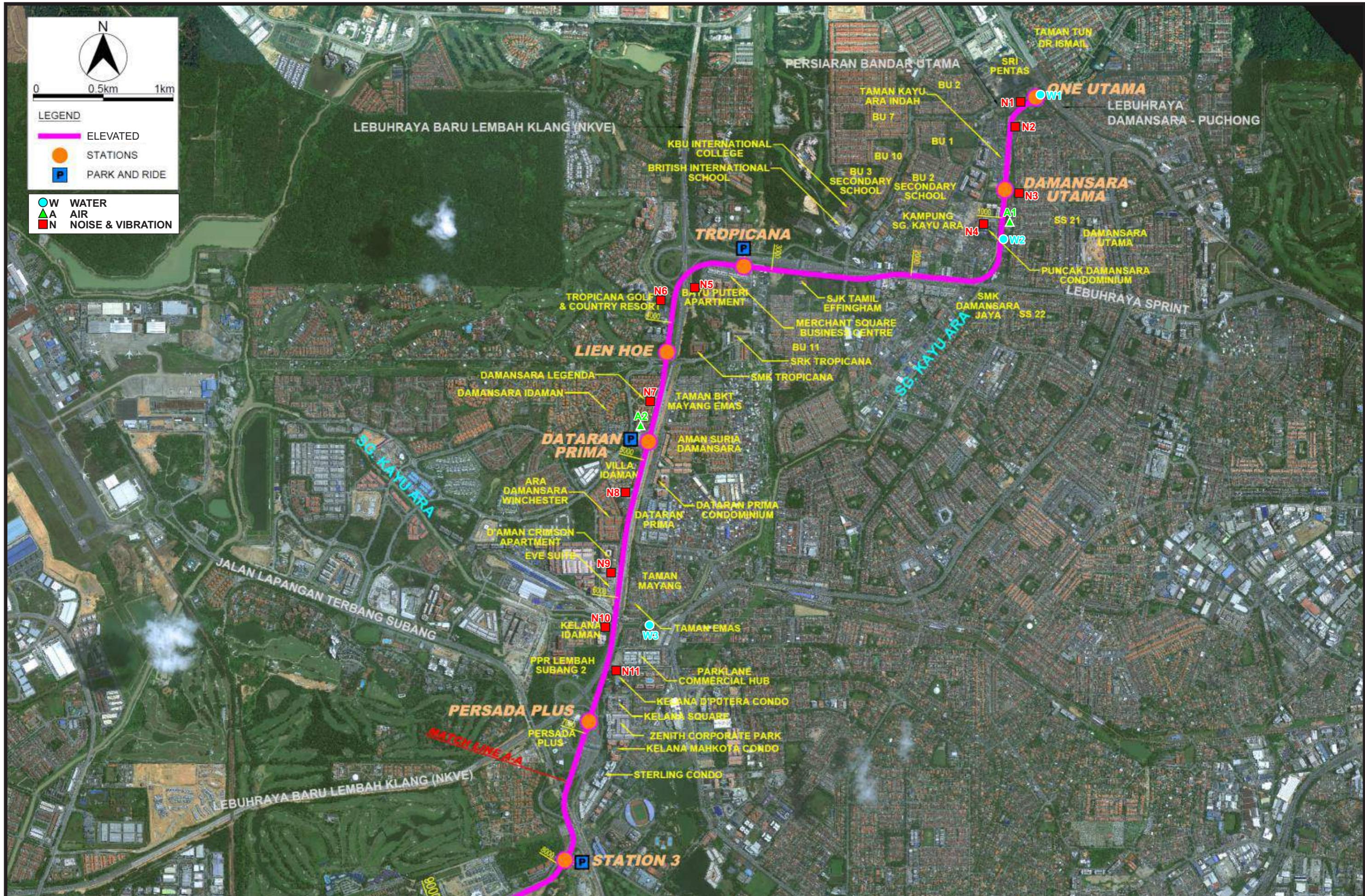
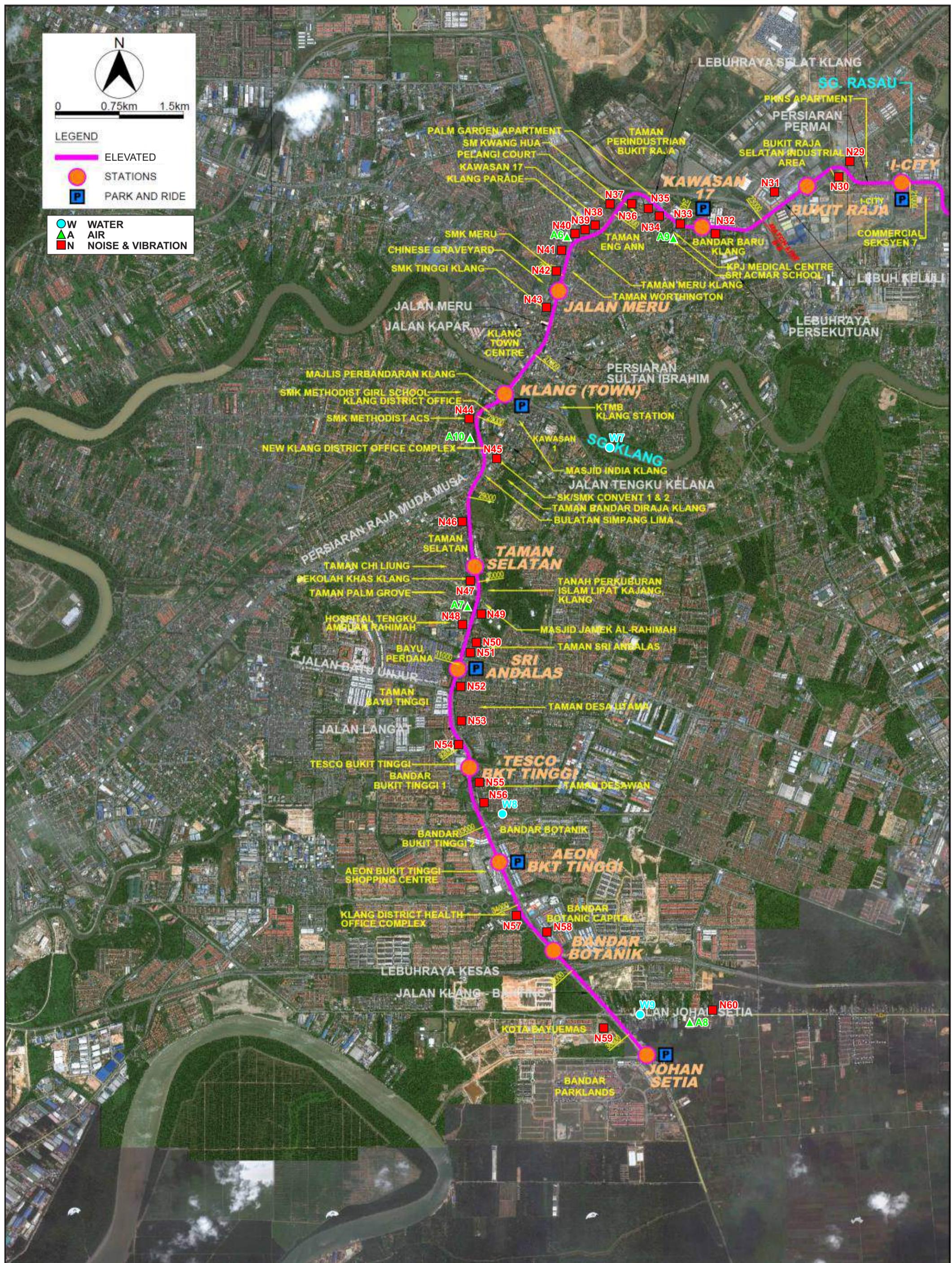




Figure 4-10b

Baseline Sampling Locations along Segment 2 : Station 3 Station - Bukit Raja Station



SECTION 4 : EXISTING ENVIRONMENT

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