Executive Summary

INTRODUCTION

1. This Detailed Environmental Impact Assessment (DEIA) report has been prepared for the "**Light Rail Transit (LRT) Line 3 from Bandar Utama to Johan Setia**" or referred to as "the Project" or the "LRT3".

2. The Project involves the construction of a 36-km LRT line from Bandar Utama to Johan Setia in Klang (**Figure ES-1**). The alignment traverses three local authority areas namely Majlis Bandaraya Petaling Jaya (MBPJ), Majlis Bandaraya Shah Alam (MBSA) and Majlis Perbandaran Klang (MPK).

3. The LRT3 line will be elevated except for a 2 km underground section in Shah Alam. The LRT3 will integrate with the KTM Komuter, Bus Rapid Transit (BRT), Kelana Jaya Line (KLJ) and the Mass Rapid Transit Line 1 (MRT1). There will be 25 stations. A depot will be built at Johan Setia in Klang.

4. The Project Proponent is **Prasarana Malaysia Berhad (PRASARANA)**, which is wholly owned by the Ministry of Finance Malaysia. Enquiries about the Project may be directed to:

   Prasarana Malaysia Berhad
   B-20-1, Level 20, Menara UOA Bangsar
   No. 5, Jalan Bangsar Utama 1, 5900, Kuala Lumpur
   Tel : 603-2299 1999/2287 5959
   Fax : 603-2299 1960
   Contact Person : Pn Norlia Noah

5. The Consultant undertaking the Detailed Environmental Impact Assessment (DEIA) is **ERE Consulting Group Sdn Bhd**:

   ERE Consulting Group Sdn Bhd
   9, Jalan USJ 21/6; 47630 Subang Jaya
   Selangor Darul Ehsan
   Tel : 603-8024 2287
   Fax : 603-8024 2320
   Contact Person : Raja Nur Ashikin / Goh Shan Min

6. The project is a prescribed activity under Activity 16 of the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987, which stipulates that an Environmental Impact Assessment (EIA) is mandatory for the construction of mass rapid transport projects. The Terms of Reference (TOR) for the DEIA was approved by the Department of Environment (DOE) on 12 January 2015 via their letter ref. no.: AS(PN)91/110/622/1483(27).

STATEMENT OF NEED

7. With the growth in population and private vehicles in the Greater Kuala Lumpur/Klang Valley (GKL/KV) region, it is crucial that an efficient and integrated urban public transport system be put in place to address the traffic congestion problem. In view of this, the GKL/KV Public Transport Master Plan (PTMP) and its subsidiary plans have been prepared to provide coordinated approach to public transport planning in the GKL/KV region. This is crucial not only to address current deterioration of public transport but more importantly is to provide sustainable urban public transportation. Providing greater accessibility and mobility within Klang Valley region is pertinent since it is the most important economic centre for the country.

8. The GKL/KV PTMP has identified that there is a gap in the main travel corridor for public transport from the western part of Klang Valley namely the Klang – Shah Alam – Petaling Jaya corridor. Although this corridor is served by the KTM, there is still a need to improve the rail coverage due to the growing population and employment along this corridor which will result in an increase in travel demands. With population within this corridor expected to reach 2 million people by 2020, the travel flow is expected to increase significantly.

9. The proposed LRT3 is expected to :

- Facilitate future travel demand and growth of public transportation in the western corridor of Klang Valley where population is expected to reach 2 million people by 2020.
- Complement the connectivity between the western corridor of Klang Valley and Kuala Lumpur.
- Enhance existing public transport system in terms of connectivity and integration to other transit systems.
- Alleviate traffic congestion along the main roads or highways from the western corridor to Kuala Lumpur city centre.
- Improve travel time along the corridor.

PROJECT DESCRIPTION

Planning and Design Basis

10. The over-arching principle in the development of LRT3 is even network coverage, location of stations in densely populated areas and ability to sustain future expansion. In addition, these transit system needs to be integrated seamlessly with other public transport mode such as buses and taxis.

11. The criteria for selection of the best alignment include the following:

a) Ridership
- Integration with existing transit.
- Connectivity to future developments and demand areas that have potentially high ridership.

b) Environmental and Social Impacts
- Noise and vibration impacts.
- Social impacts.
- Changes to the landscape along the alignment.

c) Economic and Financial
- Construction and operational costs.
- Economic returns.

d) Constructability and Engineering
- Construction feasibility taking into account the site conditions and constraints.
- Compliance to geometric requirements for the rail design and operation.
- Local authority compliances e.g. local plan and Suruhanjaya Pengangkutan Awam Darat (SPAD) Public Transport Master Plan.

Proposed Alignment

12. The whole alignment has been divided into three segments:

- Segment 1: from One Utama Station to Persada PLUS Stations (within MBPJ area)
- Segment 2: from Persada Plus Station to Bukit Raja Station (within MBSA area)
- Segment 3: from Bukit Raja Station to Johan Setia depot (within MPK area)

Segment 1 : One Utama Station to Persada PLUS Station

13. The alignment starts at ***One Utama Station*** near the MRT Line 1 station and traverses southwesterly along the Sg Kayu Ara where the ***Damansara Utama Station*** is located (**Figure ES-2**). The alignment then continues along Sg Kayu Ara before swinging onto the SPRINT Highway and continues towards the Damansara Toll Plaza. ***Tropicana Station*** is proposed after the toll plaza near the Merchant Square Business Centre.

14. After ***Tropicana Station***, the alignment continues along the North Klang Valley Expressway (NKVE) towards Subang. The first station along the NKVE will be the ***Lien Hoe Station*** near Persoft Tower and Ambank Building. The alignment continues along the NKVE until the proposed ***Dataran Prima Station*** near the Shell petrol station. After ***Dataran Prima Station***, the alignment crosses the NKVE and continues towards the Subang Toll Plaza. The ***Persada PLUS Station*** is proposed within the Persada PLUS open space area near the Subang Toll Plaza. After this station the alignment crosses Jalan Lapangan Terbang Subang towards the Glenmarie area in Shah Alam.

Segment 2 : Persada PLUS Station to Bukit Raja Station

15. After the Persada PLUS Station, the alignment crosses Jalan Lapangan Terbang Subang onto Persiaran Kerjaya. There will be three stations located along Persiaran Kerjaya, namely ***Station 3 Station*** (near Accentra Glenmarie commercial area), ***Temasya Station*** (fronting Temasya Industrial Park and Temasya Anggun residential area) and ***Glenmarie Station*** (in front of HICOM Glenmarie Industrial Area) (**Figure ES-3**).

16. The alignment then continues along Persiaran Kerjaya and crosses over Jalan Subang, Sg Damansara and North South Expressway Central Link (ELITE) towards the proposed ***Stadium (Grand Central) Station*** near the Shah Alam Stadium. The alignment then continues to travel along Persiaran Sukan towards the Stadium roundabout and along Persiaran Hishamuddin.

17. The ***Persiaran Hishamuddin Station*** is proposed near the Shah Alam Club. The underground segment starts about 800 m before the ***Persiaran Hishamuddin Station.*** The underground segment will mainly run below Persiaran Hishamuddin and Persiaran Dato' Menteri before it resurfaces near Section 11 residential area. The elevated segment of the alignment then continues along Persiaran Dato' Menteri until ***Section 14 Station*** near Pejabat Pos Besar Shah Alam.

18. From ***Section 14 Station***, the alignment continues along Persiaran Dato' Menteri and swings towards the SIRIM area and Federal Highway. The alignment then travels along the green area bordering SIRIM area and Federal Highway until the proposed ***SIRIM Station*** near Persiaran Raja Muda flyover.

19. After the ***SIRIM Station***, the alignment continues along the Federal Highway and UiTM area until the ***UiTM Station*** near the existing Shell petrol station. After ***UiTM Station***, the alignment turns into Persiaran Kayangan and passes the UiTM entrance. It then swings into Persiaran Permai towards the ***I-City Station*** near the pond and commercial areas of Section 7.

20. The alignment continues along Persiaran Permai and passes along the PKNS apartments before turning onto Lebuh Keluli. The ***Bukit Raja Station*** will be located near the Bukit Raja Selatan Industrial Area.

Segment 3 : Bukit Raja Station to Johan Setia Station

21. After the ***Bukit Raja Station***, the alignment crosses North Klang Straits Bypass towards Bandar Baru Klang (BBK) and onto Persiaran Bukit Raja. The alignment travels along Persiaran Bukit Raja until the proposed ***Kawasan 17 Station*** near the abandoned BBK Business Park (**Figure ES-4**). The alignment continues along Persiaran Bukit Raja before it swings into Kawasan 17 area after the Cempaka Flats.

22. Within Kawasan 17 area, the alignment runs parallel to the TNB power line reserve and passes along Pelangi Court apartment and into Jalan Pekan Baru and Jalan Pekan Baru 38. It continues towards Jalan Meru and along the way, it traverses the commercial and residential areas along Jalan Kelicap 41, Jalan Kelicap 44 and Jalan Kelicap 45.

23. The alignment travels along Jalan Meru, mainly on the road median, and passes the commercial buildings, shop houses and schools (SK Meru 1 & 2, SMK Meru). The proposed ***Jalan Meru Station*** will be sited on the open space after the SMK Meru.

24. The alignment then continues along Jalan Meru until the roundabout after which it follows Persiaran Sultan Ibrahim towards the Jambatan Kota. The alignment then crosses Sg Klang and enters into Jalan Jambatan Kota. The ***Klang Station*** is proposed on the right hand side of Jalan Jambatan Kota, after the bridge adjacent to the KTMB railway track. The alignment passes several institutional buildings (e.g. MPK building, Pejabat Agama Islam Klang and Kompleks Pejabat Daerah dan Tanah Klang) as it travels towards Bulatan Simpang Lima.

25. After Bulatan Simpang Lima, the alignment travels along the right hand side of Persiaran Tengku Ampuan Rahimah and passes commercial and residential areas of Taman Selatan as it approaches ***Taman Selatan Station*** which is situated before the Klang Special School.

26. After the ***Taman Selatan Station***, the alignment continues along the road median and passes Masjid Al-Rahimiah and Hospital Besar Tengku Ampuan Rahimah before the ***Sri Andalas Station*** at Taman Sri Andalas commercial area.

27. The alignment then continues along Persiaran Tengku Ampuan Rahimah and Jalan Langat until it reaches the ***Tesco Bukit Tinggi Station***, across Tesco Bukit Tinggi. Next, the alignment continues along the road median of Jalan Langat, traversing the residential and commercial areas of Bandar Bukit Tinggi and Bandar Botanic until it reaches the proposed ***AEON Bukit Tinggi Station.***

28. After the ***Aeon Bukit Tinggi Station***, the alignment continues south along the median of Jalan Langat towards Bandar Botanic area where the ***Bandar Botanik Station*** is proposed near the Botanic Capital commercial area. The alignment continues to travel south along the LHS of Jalan Langat and passes Kota Bayuemas, Johan Setia area and Bandar Parkland before it ends at the proposed ***Johan Setia Station/depot***.

29. The proposed depot will be located at Johan Setia, opposite Bandar Parklands. The depot will occupy an area of about 28 ha (70 acres).

Stations

30. The LRT3 will have 25 stations, one of which will be underground (**Table ES-1**). There will be four interchange stations:

- **Bandar Utama** Station integration with MRT1 Line
- **Station 3** Station integration with Kelana Jaya (KJL) Line
- **Klang** Station integration with KTM Komuter Line
- **SIRIM** Station integration with BRT Line

Table ES-1 Proposed Station – Features and Catchment Areas

No.	Station	Type	Park & Ride Facilities	Catchment Area
1	One Utama	Elevated		Bandar Utama, Taman Tun Dr Ismail, Mutiara Damansara
2	Damansara Utama	Elevated		Bandar Utama, Damansara Utama, Kg Sg Kayu Ara
3	Tropicana	Elevated	Yes	Damansara Indah, SS 23, BU 11, BU 12
4	Lien Hoe	Elevated		Taman Bukit Mayang Emas, PJU 1, Taman Mayang Jaya, BU 12, Kg Cempaka
5	Dataran Prima	Elevated	Yes	Ara Damansara, Kg Cempaka, SS 2, Taman Megah
6	Persada PLUS	Elevated		SS 7, SS 3, Taman Putra Damai
7	Station 3	Elevated	Yes	Glenmarie Courts, SS 7
8	Temasya	Elevated		Temasya Glenmarie, Temasya Industrial Park, Subang Jaya SS 15, SS 18

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Table ES-1 Proposed Station – Features and Catchment Areas (Cont'd)

No.	Station	Type	Park & Ride Facilities	Catchment Area
9	Glenmarie	Elevated		HICOM-Glenmarie Industrial Park, Sultan Salahuddin Abdul Aziz Shah Polytechnic, Subang Hi-Tech Industrial Park, SS 19, Subang Heights, Taman Mutiara Subang
10	Stadium (Grand Central)	Elevated	Yes	Section 13, 15, 22
11	Persiaran Hishamuddin	Underground		Section 13, 9, 12, 20
12	Section 14	Elevated		Section 14, 9, 19, 18
13	SIRIM	Elevated		Section 2, 3, 4, 15, 18, 24
14	UiTM	Elevated		Section 16, 17, 7, UiTM
15	I-City	Elevated	Yes	Kg Padang Jawa, Section 7
16	Bukit Raja	Elevated		Bukit Raja Selatan Industrial Area, Taman Perindustrian Bukit Raja
17	Kawasan 17	Elevated	Yes	Taman Eng Ann, Taman Berkeley, Bandar Baru Klang
18	Jalan Meru	Elevated		Kawasan 19, Taman Sri Pinang, Taman Sentosa, Batu Belah, Kg Sg Pinang Dalam, Taman Haji Ismail
19	Klang	Elevated	Yes	Taman Wangi, Taman Kota Jaya, Kg Pandan, Bukit Jaya
20	Taman Selatan	Elevated		Taman Selatan, Taman Palm Grove, Taman Sri Pesona, Taman Sri Andalas
21	Sri Andalas	Elevated	Yes	Taman Bayu Perdana, Taman Chi Liung, Kg Teluk Gadong Besar, Taman Bayu Emas, Taman Chi Leong
22	Tesco Bukit Tinggi	Elevated		Bandar Bukit Tinggi, Taman Klang Jaya, Taman Klang Ria
23	AEON Bukit Tinggi	Elevated	Yes	Bandar Bukit Tinggi 2, Ambang Botanic
24	Bandar Botanik	Elevated		Bandar Puteri Klang, Botanic Capital
25	Johan Setia (Depot)	Elevated	Yes	Bandar Parklands, Kota Bayuemas, Taman Johan Setia Permai

System Operations

31. The Light Rail Vehicle train, similar to those used in the Kelana Jaya LRT Line, will be used. The train can be configured to a 2, 4 or 6 car-vehicle train. The dimension of each car is 20 m long x 2.65 m wide x 3.44 m high. Each car will have a minimum of 36 seats and 6 passenger doors (3 doors on each side). It will be full Automatic Train Operation driverless system.

32. The maximum design train speed will be about 90 km/hr while the operation speed is expected to be 80 km/hr. The Operations Control Center located at the Johan Setia depot will be the main control hub for the line.

33. The LRT3 will operate daily from 6.00 am to 12.00 am (midnight). The proposed peak hour frequency for the train is every 2 minutes.

Project Schedule

34. Construction works for the Project is scheduled to commence in 2016 and LRT3 is expected to be operational by 2020.

PROJECT OPTIONS

No Project Option

35. The no project option will not enable the GKL/KV region to achieve a 40:60 modal split for public transport and its aspiration for an efficient public transportation network. The Project has been planned and designed to integrate with the other transit systems such as the KLJE, KTM, MRT1 and the proposed BRT Federal Highway. Such integration is critical in ensuring efficient and well-connected public transport system for the Klang Valley area.

Alignment Options

36. During the Feasibility Study that was completed in March 2014, numerous alignment options were evaluated within a defined corridor (Klang – Shah Alam – Kelana Jaya – Petaling Jaya) prior to the selection of the preferred alignment. Two main stretches which are; Klang to Kelana Jaya and Kelana Jaya to Bandar Utama were evaluated.

37. For Klang to Kelana Jaya stretch, five options were considerered and evaluated for Shah Alam area and two options within within Klang area (mainly the stretch crossing Sg Klang). For Kelana Jaya to Bandar Utama stretch, four options were considered. These options were further evaluated and one combined alignment was recommended during the Feasibility Study Stage.

38. During preliminary design and EIA stage, the combined alignment was further reviewed and evaluated based on the feedback received during stakeholder engagement sessions. As a result, changes were made to certain stretches of the alignment which are at Bandar Utama, Bukit Raja and Jalan Tengku Kelana in Klang. Therefore, findings from the EIA study, in terms of feedback received during the stakeholder engagement sessions, were important inputs in determining the proposed alignment for LRT3.

39. Summary of the evaluation process in the selection of the proposed alignment is shown below.

<table>
<tr><th>Stretch of Alignment</th><th>Stage 1</th><th>Stage 2</th><th>Stage 3</th><th>Stage 4</th><th>Stage 5</th></tr>
<tr><td></td><td colspan="3">Feasibility study stage</td><td colspan="2">Preliminary design/EIA stage</td></tr>
<tr><td>Klang to Kelana Jaya</td><td>10 alternative alignments</td><td>5 alternative alignments</td><td rowspan="2">1 combined alignment</td><td rowspan="2">Alignment review based on feedback from stakeholders</td><td rowspan="2">Proposed alignment</td></tr>
<tr><td>Extension to MRT1 from Kelana Jaya</td><td>4 alternative alignments</td><td>2 alternative alignments</td></tr>
</table>

EXISTING ENVIRONMENT

40. The LRT3 traverses highly developed areas in Selangor, passing through multiple residential, commercial, industrial and institutional areas. The 36 km line will follow major highways and state roads within Petaling Jaya, Shah Alam and Klang areas.

41. In terms of topography the alignment traverses along the terrain with elevation ranges from RL 0 m to RL 50 m. The lower elevation is mainly in Klang area and the higher elevation in Petaling Jaya area, from Tropicana Station to Dataran Prima Station.

42. The LRT3 runs over two geological formations, namely the Kuala Lumpur Granite (from One Utama Station to Glenmarie Station) and Kenny Hill Formation (from Stadium (Grand Central) Station and Johan Setia Station).

43. Within Segment 1 (MBPJ area), the alignment passes through Damansara Utama, Tropicana, Taman Megah Mas and Taman Mayang. The land uses along this area is made up of residential areas (60%), commercial areas (25%) and institutional and public facilities (15%) (**Figure ES-5a** and **Figure ES-5b**).

44. Within Segment 2 (MBSA area), the alignment passes through Glenmarie, Temasya, Shah Alam Stadium, Seksyen 7, Seksyen 9, Seksyen 11 – Seksyen 14, SIRIM and UiTM areas. The land use along this area is dominated by industrial area (55%) followed by residential (20%), public institution (15%) and commercial (10%) (**Figure ES-5c** and **Figure ES-5d**).

45. Within Segment 3 (MPK area), the line traverses the northern and southern parts of Klang. The northern part of Klang include Bandar Baru Klang, Kawasan 17, Jalan Meru while southern part include Taman Sri Andalas, Taman Selatan, Bandar Bukit Tinggi, Bandar Botanik, Kota Bayuemas and Johan Setia. The dominant land use along this area are residential (50%), commercial (35%) and institutional and public facilities (15%). For the depot area, the current land use is agriculture (**Figure ES-5e** and **Figure ES-5f**).

46. There are nine river crossings along the alignment (i.e. Sg Kayu Ara, Sg Damansara, Sg Renggam, Sg Rasau, Sg Klang and Sg Aur) including one crossing over drainage system in Johan Setia (i.e. Parit Johan Setia). The initial stretch of the alignment runs along the Sg Kayu Ara. One Utama Station and Damansara Utama Station are also situated along Sg. Kayu Ara.

47. Some of the areas located near to the alignment are flood prone. These include Kg Cempaka and Simpang Jalan Lapangan Terbang – Jalan SS 7/2 in Petaling Jaya, Shah Alam Stadium and Giant Seksyen 7 in Shah Alam as well as Kg Johan Setia, SMK Convent Klang, Taman Chi Liung, Taman Bayu Perdana and Taman Melawis in Klang.

48. 24-hour noise level monitoring was carried out at 60 locations showed that the noise levels at most of the areas exceed 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 reflect the prevailing road traffic conditions as well as local activities at the monitoring stations.

49. Vibration monitoring was undertaken at the same locations as noise monitoring. The vibration levels ranged from 0.0476 to 3.94 mm/s. The vibration levels were well within the human comfort levels except for one location at I-City. The high vibrations measured at I-City were due to construction activities and heavy vehicles movement.

50. Air quality monitoring was carried out at 10 locations. The concentrations of total suspended particulates (TSP) (from 75 to 88 $\mu g/m^3$), particulate matters less than 10 micron (PM_{10}) (from 64 to 77 $\mu g/m^3$), nitrogen dioxide (NO_2) (below detection limit of 2 $\mu g/m^3$) and carbon monoxide (not detectable) in the ambient air were within the recommended limits of the Malaysian Ambient Air Quality Guidelines.

51. River water samples were collected at nine locations. Sg Kayu Ara, Sg Damansara, Sg Renggam, Sg Rasau, Sg Klang, Sg Aur and Parit Johan Setia are relatively urbanised catchments with numerous sources of pollution. The results showed that the water quality of the rivers along the LRT3 range from Class II to Class III.

52. The social impact zone for the LRT3 is identified as the area that extends 400 m from of each side of the LRT3 alignment. Total population in the impact zone in 2010 was 92,336, with Bumiputera and Chinese being the dominant ethnic group. The population is grouped into 25,356 households, giving an average household size of 3.6 persons per household. More than three-quarters of the people are in the working age group (i.e. 15 – 64 years). This is good for the proposed LRT3 because it would generate demand for its services.

53. The employment-population ratio in the impact zone is relatively high (50%).The majority of workers living in the impact zone are highly skilled and skilled (49.8% of total workers). The next large skill category is the semi-skilled with a share of 44%. The proportions of unskilled workers across the three sub-zones are relatively low, at less than 10%.

54. The LRT3 alignment traverses major road and highways (**Table ES-2**). Along Segment 1 from One Utama Station to Persada PLUS Station, the alignment travels along the LDP, SPRINT Highway, Persiaran Tropicana and NKVE. These are busy roads with high travel demand, during peak and off-peak periods. The broad-based v/c ratio shows that the LDP is congested with a level of service (LOS) F.

55. Along Segment 2, the alignment traverses along Persiaran Kerjaya, Persiaran Sukan, Persiaran Hishamuddin, Persiaran Dato' Menteri, Lebuhraya Persekutuan, Persiaran Permai and Jalan Pekan Baru. Lebuhraya Persekutuan is currently servicing at a LOS F. Along Segment 3, 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. Most of these roads are performing at acceptable LOS of A to C during peak hours.

Table ES-2 Proposed Station and Roads Adjacent to the Station

No	Station Name	Road Adjacent to Station
1	One Utama	Persiaran Bandar Utama
2	Damansara Utama	Jalan 5
3	Tropicana	Jalan Tropicana Selatan 1
4	Lien Hoe	Persiaran Tropicana
5	Dataran Prima	Lebuhraya Baru Lembah Klang (NKVE)
6	Persada PLUS	Lebuhraya Baru Lembah Klang (NKVE)
7	Station 3	Persiaran Kerjaya
8	Temasya	Persiaran Kerjaya
9	Glenmarie	Persiaran Kerjaya
10	Stadium (Grand Central)	Persiaran Sukan
11	Persiaran Hishamuddin	Persiaran Hishamuddin

Table ES-2 Proposed Station and Roads Adjacent to the Station (Cont'd)

No	Station Name	Road Adjacent to Station
12	Section 14	Persiaran Dato' Menteri
13	SIRIM	Lebuhraya Persekutuan
14	UiTM	Lebuhraya Persekutuan
15	I-City	Persiaran Permai
16	Bukit Raja	Persiaran Bestari
17	Kawasan 17	Persiaran Bukit Raja
18	Jalan Meru	Jalan Meru
19	Klang	Jalan Jambatan Kota
20	Taman Selatan	Persiaran Tengku Ampuan Rahimah
21	Sri Andalas	Jalan Langat
22	Tesco Bukit Tinggi	Jalan Langat
23	AEON Bukit Tinggi	Jalan Langat
24	Bandar Botanik	Jalan Langat
25	Johan Setia	Jalan Langat

PUBLIC PERCEPTION AND STAKEHOLDER FEEDBACK

54. A public perception survey involving 1,200 respondents was undertaken to gauge the perception of the public about the LRT3. A total of 31 focus group discussions, case interviews and dialogues with various stakeholders were also held.

Public Perception

55. Only 28% of the 1,200 respondents were aware of the Project. Most of the respondents knew about the Project from family and friends while less than a third of them had obtained this information from the newspapers. Despite their lack of awareness, the overall support for the Project was very strong (87%). The respondents recognise there are positive contributions from the LRT, especially at the community and societal level.

56. The survey showed that 1.2% of the respondents are against and strongly against the proposed Project. Although this proportion is small; in absolute terms, the number may be relatively large enough to cause objections and protests should they be impacted upon negatively. The neutral group, at 10%, is relatively high.

Table ES-3 Support for LRT3 by Survey Zones

Survey Zone	Strong favour/ favour (%)	Neutral (%)	Strongly against/ Against (%)	Undecided/ Need to know more (%)	Total (%)
Bandar Utama – Persada Plus	89.9	9.6	0.2	0.2	100
Temasya-Glenmarie	95.7	2.9	-	1.4	100
Shah Alam	91.2	6.8	0.7	1.4	100
Klang North	70.0	22.0	3.3	4.7	100
Klang South	85.7	11.1	2.1	1.1	100
Total	**87.1**	**10.4**	**1.2**	**1.3**	**100**

Source: Perception Survey 2014

57. The perceptions of those staying within the 20 m zone and those outside showed that both groups favour and support the proposed Project. Those who live nearer to the alignment or stations have a lower support level of 84% compared to 88% for those who live away from the alignment and station (**Table ES-4**).

Table ES-4 Support for LRT3 by Location

Proximity to Alignment & Station	Strong favour/ favour (%)	Neutral (%)	Strongly against/ Against (%)	Undecided/ Need to know more (%)	Total (%)
Within 20 m	83.9	12.5	1.4	2.2	100
21 m – 400 m	88.4	9.5	1.1	1.0	100

Source: Perception Survey 2014

58. Respondents' perceptions on the proximity of the proposed LRT3 in terms of the alignment and stations were also assessed taking into considerations negative impacts such as noise, vibration, dust, safety, traffic and loss of privacy. Broadly, the survey results indicated high level of objections against the Project by both residents and commercial operators if the alignment or stations are located near to their premises (**Chart ES-1**).

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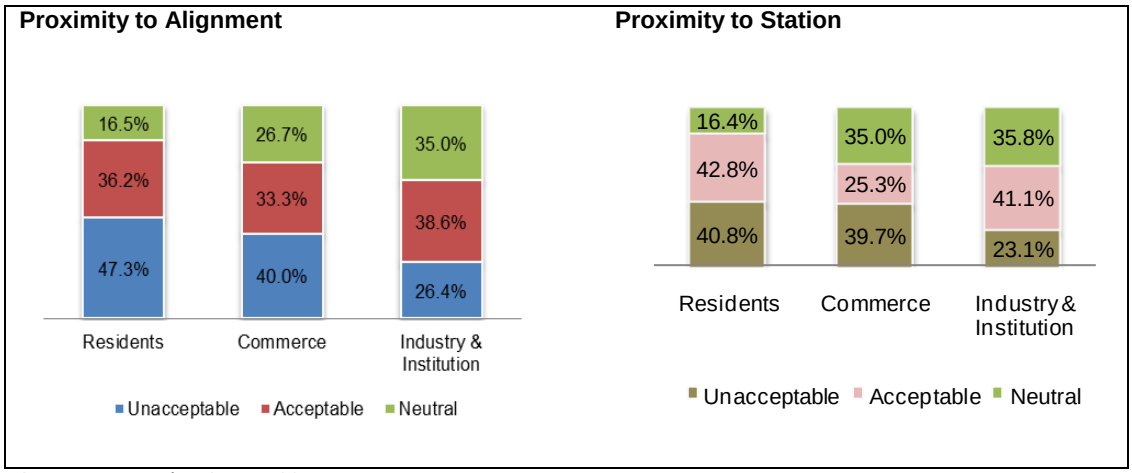
Chart ES-1 Overall Acceptance of Proximity to Alignment and Station



Source: Perception Survey 2014

59. The survey also showed that about 10% to 15% of the respondents would object to the proposed LRT3 regardless of the distance to their premises, i.e. at even more than 100 m away, they still find any LRT alignment or stations unacceptable. This result is observed especially in Klang South and Bandar Utama – Persada PLUS areas, highlighting that these areas are likely to be very sensitive to any negative environmental impacts arising from construction activities or even during operations.

60. **Table ES-5** summaries the positive and negative impacts of the Project as perceived by the respondents.

Table ES-5 Respondents Perception of Positive and Negative Impacts

Positive	%	Negative	%
Efficient Mode of Public Transport	39.0	Traffic Congestion during Construction	40.8
Convenient Mode of Public Transport	31.0	Negative Impacts on the Neighbourhood	39.5
Economic Benefits	20.0	Negative Impacts on the Environment	23.7
Cost and Time Savings	10.0		
Total	**100.0**	**Total**	**100.0**

Focus group discussions and dialogues

61. Interviews were conducted with agencies or organisations located near to the alignment or to stations. Participants in the interviews are mostly from the commercial and institutional sectors. The general consensus is the LRT is a much needed public transport for the Shah Alam – Klang corridor. They also raised their concerns on issues such as traffic congestion, land acquisition, noise, vibration and security issues as well as inappropriate location of some proposed stations.

62. 31 Focus Group Discussions (FGDs), case interviews and public dialogues were carried with stakeholder groups who are expected to be impacted by the proposed LRT3. The general feedback is they support the LRT in principle because of its beneficial effects on society and the economy. There are three major groups who objected strongly to the LRT3 entering their neighbourhoods – at Bandar Utama, at Jalan Tengku Kelana and at Idaman Villa. Their major concerns were mainly on the inappropriate location of stations, the choice of alignment, traffic congestion, properties acquisition, noise and vibration issues, loss of privacy as well as safety and security issues. They also raised their concern on flooding issue during construction and the facilities provided such as feeder bus services, car parks and amenities for disabled and elderly at the stations.

POTENTIALLY SIGNIFICANT IMPACTS & MITIGATING MEASURES DURING PRE-CONSTRUCTION STAGE

Land and Property Acquisition

63. Land and property acquisition has been identified as the main issue during pre-construction stage. About 339 lots (20 lots in MBPJ area, 45 lots in MBSA area and 274 lots in MPK area) are likely to be acquired based on the provision alignment of LRT3 line including 165 lots of agricultural land for the depot.

64. Some of the impacts from land/property acquisition include:
- Loss of social cohesion, sense of community and current lifestyle for long standing communities (e.g. Shah Alam and Kawasan 17 in Klang).
- Businesses could be severely interrupted and disrupted.
- Acquisitions of cultural and religious assets (such as Hindu shrines in Kawasan 17) could adversely impact the social and cultural welfare of the affected communities.

65. Among the mitigating measures proposed to minimise impacts from land/property acquisition are:

- Provide due notice, information and assistance to the affected parties, giving them ample time to make alternative plans and minimise inconveniences.
- Undertake continuous engagement with the affected parties. Critical areas include Kawasan 17 and Jalan Meru.
- Establish a specific committee or team to manage acquisition and relocation matters.

Utilities Relocation

66. A total of 32 potential relocation works (24 TNB transmission lines and eight water pipelines) have been identified during preliminary utilities survey. Some of the risks related to utilities relocation works are:

- Exposed utilities wires/ cables from relocation exercise from human error/negligence.
- Vehicular accident from temporary closure of road, road diversion, speed and loss of parking space.
- Flooding of the construction area from heavy rain or clogged drainage system.
- Occupational and safety hazard from heavy machinery and working within enclosed areas.

67. The measures to minimise risks from utilities relocation include:

- Relocation to be carried out at night time and implement traffic diversion if required.
- Usage of appropriate signboards during relocation works.
- Eliminate all possible ignition sources near to the work area.
- Safety requirement for fire-fighting and explosion to be provided at the work site.
- First aid kits must be well prepared and available.
- Workers involved must be trained in first aid and emergency procedures.
- Implement emergency response plan.

POTENTIALLY SIGNIFICANT IMPACTS & MITIGATING MEASURES DURING CONSTRUCTION STAGE

Traffic Congestion

68. The major impact caused by the construction works involves reduction of lane width and working area being located on the road shoulder which could reduce the capacity of carriageways. Safety risk will also arise as the result of reduction in lane width and road shoulder closure.

69. For the segment from One Utama Station to Persada PLUS Station, Damansara Utama, Bandar Utama, Tropicana, Taman Bukit Mayang Emas and Sunway Mas Commercial Centre are most likely to experience traffic congestion. Construction traffic access via the local streets around One Utama Station, Damansara Utama Station and Tropicana Station may also create safety issues to the residents staying in Damansara Utama and Bandar Utama.

70. For Segment 2 (Station 3 Station to Bukit Raja Station), the construction of SIRIM and UiTM stations on Federal Highway could worsen its level of service which is already performing poorly. Queues could develop and spillback to supporting roads and interchanges connecting to it (e.g. Persiaran Dato' Menteri, Persiaran Selangor, Persiaran Raja Muda, Jalan Padang Jawa, Jalan Sg Rasau and Jalan Batu Tiga Lama). The underground works will also result in reduction of capacity of Persiaran Hishamuddin which is a major arterial in Shah Alam.

71. The stations of Segment 3 (Kawasan 17 Station to Johan Setia Station) are situated on major arterial and/or collector/distributor roads in Klang area. Jalan Meru, Jalan Jambatan Kota and Jalan Langat could have deteriorated road condition during the construction stage. Construction traffic (with heavy vehicles) will pose safety risk to the vulnerable road users such as pedestrians, bicyclists and motorcyclists.

Noise Impacts

72. Noise impact from the construction of the LRT3 is anticipated at the stations and depot, viaduct piers along the entire alignment as well as underground works along Persiaran Hishamuddin.

73. Noise generated during construction will come primarily from earth moving equipment, heavy vehicles, diesel generator sets and pilling works. Additional impacts relating to traffic congestion with increased noise impact may are also likely. The increase in absolute noise levels may not necessarily be very significant, although the subjective perception may suggest otherwise due to increased frustration of associated with the traffic congestion in the neighborhood.

74. Construction of piers supporting the elevated section of the Project would require piling. Piling vibrations and noise represent potential areas of concern.

75. The measures to minimise the noise impacts include:

- Use of bored piles, injection piles and other low noise low impact piling methods.
- Installation of temporary acoustic noise barriers at construction work sites near noise sensitive areas.
- Use of low noise type of diesel generator sets and earth moving equipment.
- Restriction of operating hours of earth moving vehicles.
- Continuous monitoring of noise levels to confirm compliance to DOE acceptance limits for construction activities in residential areas.

Vibration

76. Excessive vibrations in close proximity to vibration sensitive structures may result in concerns of potential structural damage. However, with bored piles and other similar low impact piling methods, vibrations from piling are anticipated to comply with limits recommended for human response in buildings.

77. Even with the use of bored piling, excessive transient vibrations can be generated during chiseling (used during bore piling when encountering rocks), casing extraction and mishandling during setting up of the piles and casings.

78. Trenches could be considered to minimise surface wave propagation from piling and other ground-borne vibration impacts (heavy vehicles road traffic) where feasible. In addition, the use of diaphragm sheet piles should also be considered in construction sites with longer construction period (typically at the stations and underground work sites).

79. Vibration shall be continuously monitored during piling activities in residential areas to ensure that piling (and other construction activity) does not result in a disturbance.

EXECUTIVE SUMMARY

Public Safety

80. Occupational and safety hazards during construction pose risks as they involve lifting of construction material, workers working at height and the use of heavy machinery and crane. In areas involving construction of stations, bigger working space is required as there is a need to provide laydown areas, cabins, material storage, etc. Here, the probability for accident to occur is also high. Public safety is of a major concern if public are near to the working site and may be injured from accidental dropped objects.

81. Measures to reduce the risks include:

- Prepare a detailed Project Safety and Health Plan according to Department of Occupational Safety and Health (DOSH) guidelines. A central safety and health committee shall be set up to coordinate the implementation of the plan.
- Regular safety inspection to the construction site by the Project Proponent.
- Workers shall attend the safety and health training provided by DOSH or by the appointed Contractor prior entering the site or working at the site.
- Avoid construction work during peak period, i.e. 5.00 am – 9.00 am and 4.30 pm – 7.30 pm.
- Strictly adhere and fully implement the approved traffic management plan.

Air Quality

82. During earthworks, particularly at the depot and underground works, dust levels could potentially increase. The major sources of dust include site clearing activity and movement of construction vehicles.

83. The results of the Air Dispersion Modelling exercise showed that, if the whole depot area is cleared at the same time, the TSP dispersion will have significant impact to the population along Jalan Johan Setia north of the Project site. However, the TSP levels will reduce significantly when the development area is developed in phases.

84. There will be three areas of concern (around roundabout of Persiaran Sukan – Persiaran Hisamuddin – Persiaran Bulatan, around roundabout of Persiaran Kayangan – Persiaran Hisamuddin – Persiaran Dato' Menteri and certain stretch of Persiaran Dato' Menteri along Sekyen 11) along the proposed underground alignment where the cut and cover construction method will be carried out. Hence, adequate attention shall be given to ensure that possible nuisance created by the fugitive dust is minimised.

85. Among the management measures to minimise fugitive dusts include:

- Site clearing and the earthworks shall be conducted in phases within depot area.
- Hoarding shall be provided around the construction area.
- Areas cleared for open spaces shall be turfed as soon as possible.
- Regular water spraying of construction sites.
- Stockpiles shall be covered. Spraying of water proposed for uncovered stockpiles to control dust emissions.
- Ensure construction access or haulage route are kept damp by water browser on regular basis.
- Wheel washing facility shall be provided at all entry or exit points into the public road.
- Lorries or vehicles which carry earth, sand, aggregate or other similar types of material, shall be covered with tarpaulin, plastics or other equivalent material before they are allowed to enter the public road.
- Smoke belching vehicles and equipment shall not be allowed. Idling of engines shall be discouraged.
- Undertake immediate repairs of any malfunctioning construction vehicles and equipment.
- Portable fencing to be installed at the hotspots area (where possible and deemed practical) to minimise dust dispersion.
- Provide prior notification to the affected community on schedule of construction activities and if possible to provide complaint hotline.

Soil Erosion and Sedimentation

86. Soil erosion and sedimentation will be contributed from the construction of the Project. Impact from the depot construction is expected to be significant due to the large area (28 ha). The results of the assessment show that during worst case scenario (without mitigation), the average value of soil loss at depot area is about 1.13 ton/ha/yr while the total soil loss is 23,719 ton/ha/yr. However, this could be reduced by about 50% (11,859 ton/ha/yr) with the adoption of effective soil erosion and sediment control measures.

87. Generally, the Project site falls under low risk according to erosion risk map of Malaysia. The sediment may be expected to be settled out at the southern part of the depot where the agricultural land will acts as a natural trap for sediment. Thus, soil erosion and sedimentation is not expected to significantly impact the Parit Johan Setia and Sg Langat.

88. For the underground works, soil erosion and sedimentation is expected during the excavation work. Excavation will be carried out in stages and for an average maximum depth of 15 m over a duration of 24 months. A temporary retaining wall shall be erected at the sides of the trench, and hence protecting the side from soil erosion. Sedimentation will be mainly from the dewatering of the trench and from the stockpile of excavated earth.

89. For the elevated works, soil erosion and sedimentation is expected to be minimal since the working areas for each station and each pier are relatively small. Sedimentation will be mainly from the dewatering of the substructure working area. Soil erosion and sedimentation during the construction of the elevated structures along Sg Kayu Ara as the elevated structure will be constructed along the river reserve. Excavation for the column foundations may result in sedimentation of the river due its close proximity.

90. A conceptual Erosion and Sedimentation Control Plan (ESCP) has been prepared for the depot, elevated works and underground work. The conceptual ESCP incorporates the measures includes silt traps, temporary earth drains, check dams and silt fence.

Hydrology and Flooding

91. Construction of elevated sections and stations are not expected to cause major flooding as the work area has a small footprint. The construction works will be carried out along the road shoulder or road median.

92. The stretch from Bandar Utama to Damansara Utama (≈ 1.5 km) traverses along Sg Kayu Ara. Construction the elevated structure and the stations may result in soil erosion and sedimentation which will effect to cause waterways to become narrow and shallow and result in clogging of the waterway. This will eventually increase the risk of flooding to the area as Sg Kayu Ara has been identified as flood prone area.

93. Construction of underground viaducts and stations will involve excavation of a 2 km stretch between Persiaran Hishamuddin and Persiaran Dato' Menteri. There is no flooding recorded along this stretch. However, flooding may occur if the existing surrounding drainage system is closed or obstructed due to the construction activity. There is also a possibility that the surrounding drainage not able to accommodate the increase in surface run-off from the underground works.

94. The depot construction and operation could increase the runoff and lead to more runoff into the existing drainage (e.g. Parit Johan Setia) and eventually into the nearby rivers (e.g. Sg Langat). The existing drainage may not be designed to cater for the additional runoff, resulting in flash floods during heavy downpour. Kg Johan Setia where the depot is located is presently affected by floods.

95. The depot is located within a peat area and the surrounding area is susceptible to peat fires. The existing peat soil at the depot area will be excavated and backfilled with suitable material as part of the ground improvement works. Temporary dewatering for the preparation of the filling work will induce a groundwater drawdown. This could extend beyond the depot area and affect the groundwater levels in the surrounding areas and cause the peat to dry and subside. Dry peat soil is highly combustible because it contains a high proportion of organic material. During dry seasons, dry peat is a serious fire hazard.

96. In order to minimise peat fire, constant pumping of groundwater will not be allowed. Earth filling shall be carried out once excavation of the required peat has reached the required depth. Earth bund shall be constructed along the northern boundary of the site to minimise the groundwater drawdown particularly on the Kg Johan Setia. Water truck shall be provided to constantly keep the peat soil damp during dry weather periods. Besides, an emergency action plan shall be established to contain the fire while waiting for the fire department to arrive.

97. Project Proponent will liaise with the relevant local authorities for the provision of widening the drainage to cater the increase of the runoff to the surrounding drainage or to maintain the surrounding drainage to minimise obstruction of the flow. All ESCP implementation shall be regularly inspected and maintained properly to ensure its function effectively.

Water Pollution

98. Water pollution may occur due to waste oils, fuels and lubricants from machineries that are used during construction in the event of breakdowns, repairs and maintenance flowing into the drainage system. Any spillages may also potentially reach the nearby rivers and result in water pollution.

99. Runoff from the batching plant containing chemicals may lead to contamination of the nearby waterways. Formation of hardened concrete in the existing waterways may occur due to runoff from washing of concrete trucks or concrete coated equipment as well as mortar mixing activities.

100. Measures to minimise water pollution include:

- Maintenance of vehicles and plants shall be carried out at the designated area. Sand contaminated with oil spillage will be removed and disposed of as scheduled waste.
- Fuel spillage seeping into the ground shall be prevented by the construction of a containment wall.

- All runoff from the batching plant shall be directed into a grout settling pond before being discharged into drainage system. Slurry residue and sedimentation from the settling pond shall be cleared periodically and allowed to dry before being disposed.

Waste Generation

101. The total volume of biomass generated from the site clearing for depot area is estimated to be around 172 tonnes. Biomass can be used as temporary slope protection to reduce soil erosion. Remaining biomass will be stockpiled temporarily at the designated area.

102. It is anticipated that about 2 million m^3 of excavated material will be generated from depot and 30,000 m^3 from underground excavation. Excavated material will be stockpiled temporarily at the designated area at the depot and working area for elevated and underground. The stockpiled area shall be located away from the watercourses. Temporary drainage will be constructed surrounding the stockpiled area to divert any runoff away from the watercourses.

103. Solid waste and construction waste (e.g. material packaging, disused formwork, concrete debris and used containers) are also expected to be generated. The wastes will be disposed at a municipal approved landfill or dumping site.

104. Scheduled waste (e.g. used oil, used batteries and used oil filter) will be generated from the maintenance of the construction vehicles. Contaminated sand resulted from cleaning the oil spillage will be disposed off as scheduled waste. Scheduled waste shall be managed according to the Environmental Quality (Scheduled Wastes) Regulations 2005.

Social Impacts during Construction Stage

105. The main social impacts during the construction stage relate to traffic condition of the existing highways and roads will could worsen. The problem will be further compounded at locations where stations are proposed. The affected highways and roads include SPRINT Highway, NKVE, Jalan Meru, Jalan Pekan Baru and Kayangan roundabout.

106. Noise and vibration impacts are the major concerns for those located close to the proposed alignment such as Hospital Tengku Ampuan Rahimah, residents of Idaman Villa and Damansara Lagenda.

107. Safety and security issues were raised by Hospital Tengku Ampuan Rahimah and some of the schools located close to the major roads. In view of the nature of construction works that will be carried out, safety of the school students and public are of paramount importance. Measures must be in place to take into account conditions during the normal school hours but also during special events that may be held at the schools.

108. In the case of business owners located within the vicinity of the alignment, their businesses could be severely interrupted and disrupted. Shah Alam Stadium has expressed concern that their activities could be affected during construction as they do hold events or activities on daily and weekly basis. For other businesses, they fear that such interruptions to their business could be long term. This is particularly of concern for the businesses along Jalan Meru and SPRINT Highway since accessibility to their businesses are crucial for their businesses.

109. Increase in economic activities and employment are the major positive impacts during the construction stage. The construction sector is expected to benefit from the Project due to its size and magnitude. Significant number of employment will be generated to fulfill the demand for the construction needs of the Project. Other spin-offs and business opportunities can also be expected at local level in terms of job creation and demand for property or housing, food and other services.

110. Based on the discussion conducted with the various stakeholders, the most important mitigation measure is communication between the Project Proponent and the stakeholders. They want to be consulted, informed and updated about the Project on a regular basis. It is important to note that the mitigating measures need to be localised to address the specific needs of the community at a particular location.

POTENTIALLY SIGNIFICANT IMPACTS & MITIGATING MEASURES DURING THE OPERATIONAL STAGE

111. Noise from the trains is a key concern during the LRT3 operational phase. While the change in L_{Aeq} are generally not significant due to the short term nature of train pass-bys, noise disturbance is anticipated in most residential areas close to the tracks (typically up to 50 m corridor). This short term noise disturbance was evident at locations where the instantaneous peak maximum noise of the train pass-bys (L_{max}) were found exceeding 75 dBA noise limits. Areas where train pass-by noise predicted to exceed the L_{max} 75 dBA limit are Puncak Damansara Apartments, Damansara Idaman, D'Aman Crimson Apartments, Kelana D'Putera Condominium, Jalan Kerjaya/Persiaran Kerjaya 3, Politeknik Sultan Sallehuddin, Section 13 Education Institute, Jalan Akuatik 13/77, Jalan Plumbum areas, Flat Mawar, Apartment Pelangi, Jalan Pekan Baru areas, Jalan Meru 1 and Perumahan

MPK (**Table ES-6**). These locations will require noise mitigation measures including noise barriers.

Table ES-6 Tentative Locations to be installed with Noise Barriers

#	Locations
1	Damansara Utama Jln SS 21/42, Jln SS 21/28, Jln SS 21/13
2	Puncak Damansara Condominium
3	Jalan PJU 1a/43, D'Aman Crimson Apartments, etc.
4	Suria Damansara Condo, Kelana D'Putera Condo
5	Persiaran Permai Bestari(Residential Area)
6	Bandar Baru Klang Condomimium
7	The Palm Garden(Under Construction)
8	Flat Cempaka Mawar
9	Apartment Pelangi
10	Jalan Kelicap 44, Kelicap 46, etc.
11	Saujana Damai Apartment
12	Perumahan MPK, Jalan Jelutong
13	Jalan Gambus
14	Hospital Besar Tengku Rahimah
15	Jalan Cassia, Bandra Botanik

112. In addition to the trains, noise from ventilation air fans (fresh air supply and exhaust of the underground tunnel and station) at the underground alignment is also of concern. Mitigation of ventilation air fans are conventionally with the use of sound attenuators/silencers placed along the air ducts or at the air intakes and exhaust discharge. Additional measures include acoustics lining of the air ducts and use of acoustically line air plenum at the air intakes and discharge. The use of low noise fan type with high air flow capacities is also recommended to minimise noise generation at source.

113. At the LRT stations, increased road traffic is anticipated along local roads leading to the stations. Noise from local traffic to and from the stations and from the feeder buses is anticipated to be an issue of concern. Mitigation of the local traffic noise will be addressed with noise barriers. The station ingress and departure roads shall be designed to avoid inconveniences. This includes the use of noise screening barriers, soft and hard landscape.

Vibration

114. The ground-borne vibration propagation analysis showed that receptors in houses (1 to 2 storey buildings) up to 15 m away could potentially experience vibrations below Curve 1 with good condition wheels/tracks, but exceed Curve 2 with worn wheels/tracks without railways vibration mitigation. For a receptor (at 1st floor) in a high rise building on piles (at 1st floor) at 15 m away vibration levels were estimated to below Curve 1 good condition wheels/tracks but exceed Curve 2 with worn wheels/tracks without vibration mitigation. At 30 m distances, vibration in houses were estimated to be well below perceptible levels with good condition wheels/tracks and marginally above curve 1 but below curve 2 with worn wheels/tracks without mitigation.

115. With vibration mitigation on the railway tracks (typically using resilient baseplate fasteners) vibration levels are expected to be within recommended limits (Curve 1) even with worn wheels/rails conditions at 15 m distance from the railway tracks for typical residential buildings.

116. Mitigation at source typically involves the use of continuous welded tracks which is often a standard design in modern railway lines. Issues related to brake squeals and impacts between wheels and track from out of roundness wheels are maintenance related issues and shall be addressed with proper maintenance and upkeep by the trains (wheels in particular) and tracks (undulations/corrugations in the rails which shall require rail grinding).

Traffic Impacts

117. The main beneficial impact of the LRT3 is to alleviate traffic congestion in the Klang Valley, particularly in the western corridor from Petaling Jaya to Klang. An efficient rail system serves as the pull factor to encourage mode shift that reduces private vehicles usage. Thus, it could reduce private vehicle trips especially on the western corridor of Klang Valley. The roads that would benefit from the LRT3 include NKVE, Federal Highway and Persiaran Kerjaya.

118. Localised traffic congestion may occur during operational stage at certain stations due to their locations. Proper access plans are beneficial to ensure smooth flow of traffic and minimise traffic congestion around the stations. It could also ensure proper integration of the proposed LRT3 services in the multi-modal transportation context. In addition other facilities for pedestrians and vulnerable road users to access the stations are also important.

EXECUTIVE SUMMARY

Visual Impacts

119. Visual impacts along the LRT3 alignment are considered low and moderate except at certain stretches where the line is running very near to houses e.g. at Taman Kayu Ara Indah (before Damansara Utama Station), houses along Jalan Akuatik 13/77 (before Persiaran Hishamuddin Station), houses from Kejiranan Plumbum 7/101 and PKNS Apartments (along Persiaran Permai) as well as houses along Jalan Kelicap 44, Jalan Kelicap 45 and Jalan Kelicap 46 (before Jalan Meru Station).

120. Management measures to minimise visual impacts from the LRT3 include (1) development and enhancement of buffers and landscapes, (2) restoration of aesthetic through physical readjustments and creative designs, and (3) accommodating the needs of mobile receptors.

Air Quality

121. It is anticipated that there will be a positive impact to the overall air quality within the Klang Valley with the LRT3. With the shift from private transport to rail and the reduction in traffic congestion, air pollution related to vehicular emission such as nitrogen oxides, carbon monoxide, sulphur dioxide and volatile organic compounds will also be reduced accordingly. The amount of CO_2e emission avoided due to the shift from private transport to rail was calculated to be about 94,535 MT/annum. In addition to the shift from private to public transport, there will also be emissions avoided to the reduced congestion on the roads. As the traffic flow improves, the fuel consumption will be more efficient and vehicles will emit less emission.

122. There may be localised deterioration in air quality at the vicinity of stations if the traffic circulation is not planned and designed properly. The problem may be aggravated by buses and cars with engine idling waiting to pick up passengers. Proper traffic circulation system, well-designed car parks and stringent supervision are necessary to minimise this problem.

Public Safety

123. In comparison with the other transportation modes, rail rapid transit enjoys a higher degree of safety as it is designed with the exclusive right of way and the automatic train control and monitoring systems. Nevertheless, rail rapid transit systems are not free from serious accidents, which often led to human injuries and facility damages.

124. The worst case from any rail incident is potential to cause fatality and major injuries to passenger and public. The LRT3 shall be operated in conformance with the relevant Safety & Health regulations and other legal requirements such as Occupational Safety & Health Act 1994, Land Public Transport Act 2010, Factories & Machinery Act 1967 and relevant local councils By Laws.

Social and Economic Impacts

125. For the communities located within the vicinity of the alignment (e.g. within 30 m), the main impacts are expected to be noise and vibration impact from the train operation. Another potential impact is traffic congestion. Traffic congestions could potentially occur at stations such as at One Utama, Kawasan 17, Jalan Meru and Klang. On the other hand, being located close to the LRT3 alignment will also benefit them due to easier and better access to the Project. This is particularly beneficial to those living close to station (within walking distances) and those without their own transport.

126. For communities located further than 30 m from the track but within walking distance (400 m), they are expected to benefit significantly. Residents, workers, students and shoppers are expected to benefit from being within walking distance to the Project, thereby increasing accessibility and mobility of the community.

127. Measures to minimise impacts to communities close to the alignment include:

- Provide sufficient car parking facilities.
- Develop a proper feeder bus system that takes into account the specific needs of the communities around the stations.
- Ensure that the design of each stations incorporate universal design and to make sure that it is accessible, safe, clean and properly lighted up.
- Maintain the cleanliness and physical conditions of stations.
- Provide on-line feedback mechanism and establish a communications channel in order to facilitate dialogue.

128. The LRT3 is expected to bring considerable benefits to the communities within Klang and Shah Alam areas since these areas are not well served by public transportation network. The proposed LRT3 is expected to bring positive impacts to these areas by:

- Improving connectivity and mobility of the people.
- Providing a more reliable and safe mode of transport.
- Increasing productivity due to travel time saving.
- Enhancing land and property values within the vicinity of the Project.

129. It is expected that the LRT3 will lead to the increase in land demands along the proposed alignment. Changes in land use and/or development densities can be expected although these are mainly beyond the control of the Project Proponent. Land and property values, especially in areas that are near and accessible to proposed stations, are expected to be enhanced.

RESIDUAL IMPACTS

130. Residents whose houses that will be acquired, will need to relocate elsewhere. While the compensation is expected to fair and reflect current market value of their properties, certain “quality of life” elements may be irreplaceable. Businesses that have to relocate may also lose some portion of the customers and business.

131. During construction stage, the noise generated from pilling would be considered as intrusive by the community and potential source of disturbance.

132. Although noise levels from the trains can be adequately mitigated during operation, the noise levels may increase over time due to wear and tear of the track and wheels. Similarly, ground-borne vibration may increase over time with the deterioration of the tracks, wheels and vibration reduction elements.

133. Traffic congestion cannot be avoided given the fact that alignment is located along busy roads and highways within urban and semi-urban areas of Petaling Jaya, Shah Alam and Klang (e.g. SPRINT Highway, NKVE, Persiaran Hishamuddin, Jalan Meru and Jalan Jambatan Kota). Construction of the elevated viaducts and stations will take place along busy roads and highways and are likely to affect the performance and level of service these roads despite all the traffic management measures. At some locations, presence of schools along or near the roads is a major concern particularly during peak hours.

134. During operational stage, some amount of congestion can be expected to persist at some stations due to either inadequate road capacity, vehicles stopping to drop and pick up passengers and haphazard/illegal parking.

135. The viaducts and the pillars supporting them will be prominent features along the LRT3 line – all the way from Bandar Utama to Johan Setia except at the underground stretch. Although hard and soft landscaping will be carried out, the impacts of the structure on the landscape will remain. The problem may be compounded by other attendant issues such as illegal billboards and graffiti.

ENVIRONMENTAL MANAGEMENT FRAMEWORK

136. The environmental management framework for the construction and operational phases will addresses the following key components:

- Organisation set-up – which will form the back-bone of the environmental management structure in identifying roles and responsibilities of each parties involved in the Project.
- Environmental communication line – which will indicate the different levels of communication required during different stages, particularly where it involves the public and other stakeholders.
- Environmental reporting – which will state the types of reporting required.
- Environmental monitoring and auditing – which will stipulate the monitoring and auditing requirements in terms of environmental quality (water quality, noise level, vibration level and air quality) as well as implementation of the mitigating measures proposed in the DEIA and EMP.
- Emergency response plan – which will identify the various responses to emergencies that could potentially occur at the Project site.

137. There is a basic need in the environmental management of the Project to establish a suitable Environmental Monitoring Programme. The programme will require environmental sampling and monitoring to be carried out by competent personnel and accredited laboratory. Summary of the proposed environmental monitoring programme for the Project during construction stage is shown in **Table ES-7**.

Table ES-7 Summary of the Proposed Environmental Monitoring Programme during Construction Stage

Environmental Component	*Number of Station	Parameter	Frequency
Noise	60	L_{eq}, L_{10}, L_{90} and L_{max}	Monthly
Water Quality	9	pH, heavy metals, BOD, ammoniacal nitrogen, COD, DO, TSS and Oil and Grease	Monthly
Silt Trap Discharge	Johan Setia Depot Final discharge from Sediment Treatment Plant	TSS and Turbidity	Monthly
Air Quality	10	TSP, NO_x, and CO	Quarterly

Note:
* Provisional location. Exact locations will be determined in the Master EMP or Site Specific EMP.

138. The engagement with local communities along the proposed alignment is vital both during the pre-construction and construction period. The engagement provides insights into the problems that may have arisen as a result of acquisition, relocation and construction works that will take place to enable the Project Proponent to quickly pinpoint the cause and remedy the situation. Based on earlier engagements with the communities, it is evident that community engagement must be continuous as different issues arise at different stages. It is proposed that a specific communication plan with various platforms for communication should be utilised for engagement with the communities and these include discussions, meetings and SMS.

139. A system whereby complaints are received, properly examined and attended to quickly is vital to minimise the level of nuisances to the affected parties. There will be a Customer Service Centre in place to handle these complaints. It is important that a telephone hotline and an email address to forward complaints to are made known to the public. These numbers and email addresses shall also be clearly printed on hoardings and signages at all construction sites.

CONCLUSIONS

140. The LRT3 will complement the connectivity between the western part of Klang Valley (i.e. Klang – Shah Alam – Petaling Jaya) to Kuala Lumpur by improving the current rail coverage and increasing accessibility of public transport network to areas not currently served by public transport. It will contribute towards to achieve public transport mode share in the Klang Valley from 12% to 40% by 2030.

141. Various technology and alignment options have been examined in the planning and designing of the LRT3. The alignment has been chosen and optimised based on criteria such as ridership, environmental and social impacts, economic and financial and constructability and engineering.

142. Land acquisition and relocation of people and businesses will be the main impact during the pre-construction stage of the Project. 339 lots are expected to be acquired to accommodate the LRT3 Line. The major concerns due to the land acquisition and relocation are disruption to lives and loss of social cohesion. In the case of businesses, there will be potential loss of customers. Continued engagement with the affected residents is important.

EXECUTIVE SUMMARY

143. Traffic congestion will be the most significant issue during the construction stage. The duration of the congestion at any one location could be anything from a few months to two years. The most affected roads include SPRINT Highway, NKVE, Persiaran Hishamuddin, Federal Highway, Jalan Meru and Jalan Langat. It is important that the existing number of lanes on the major roads be maintained as far as possible and sufficient warning signs are provided at all locations. Detailed traffic management plans will be prepared for every construction site.

144. Most of the impacts anticipated during construction stage are common to many construction projects and adequate technology and knowledge exists to control these impacts to acceptable level. Only traffic congestion may not be fully mitigated due to the fact that the LRT3 Line will be built along busy roads.

145. The main concerns during the operations of the LRT3 are noise and vibrations. Prediction of noise propagation has shown that, without noise barriers, almost the entire alignment will experience noise levels (L_{max}) exceeding 75 dB. Noise levels at bends and at the approach to stations may even be higher. It has been shown that various types of noise barriers can be used to reduce to the noise levels at the receptor to within acceptable limits. In addition to noise barriers, the adoption of continuous welded tracks and acoustic absorption on track sides will further reduce noise levels.

146. The viaducts will be prominent features of the landscape in many stretches along the alignment. In some parts of Sg Kayu Ara (Taman Kayu Ara Indah), Persiaran Hishamuddin (D'Kayangan), Persiaran Permai (PKNS Apartments), Jalan Pekan Baru 38 (Pelangi Court) and Jalan Meru (Kelicap area), the visual impacts are expected to be high. Visual impacts can be mitigated to a certain extent by the use of soft and hard landscaping but cannot be completed avoided.

147. The LRT3 Line will greatly benefit people in the Klang Valley in many ways such as improving connectivity and mobility of the people, providing more reliable and safe mode of transport, increasing productivity due to travel time saving etc. Besides enabling people to commute efficiently and in comfort, the LRT3 will contribute towards avoiding further congestions to roads in the Klang Valley.

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
PRE CONSTRUCTION STAGE				
• Land and property acquisition • Utilities relocation	• Loss of land and property	• Establish a special team to manage acquisition and relocation matters. • Develop general procedures and terms in relation to compensation and relocation. • Comprehensive information shall be provided to the affected parties. • Provide sufficient notice and time to the affected parties. • Maintain continuous engagement with the potentially affected parties. • Relocation to be carried out at night time and implement traffic diversion if required. • Usage of appropriate signboards during relocation works. • Eliminate all possible ignition sources near to the work area. • Safety requirement for fire-fighting and explosion to be provided at the work site. • First aid kits must be well prepared and available. • Workers involved must be trained in first aid and emergency procedures. • Implement emergency response plan, evacuation to assemble point.	While the compensation to the affected communities is expected to fair and reflect current market value of the properties, certain “quality of life” elements (e.g. sense of community) may be irreplaceable.	

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
CONSTRUCTION STAGE				
• Road diversion, closure and lane reduction • Transportation of excavated material for disposal, construction materials and equipment/ machineries	• Traffic congestion	• Traffic management for specific roads. • Designated route for disposal of excavated material.	Congestion at selected locations.	
• Vehicular accidents from temporary closure or diversion of roads, movement of construction vehicles • Occupational and safety hazard from use of heavy machineries, working at height and confined space	• Risks to public safety (residents, workers, road users and adjacent building)	• Prepare a detailed Project Safety and Health Plan based on guidelines issued by DOSH. • Safety inspection by Project Proponent shall be conducted regularly. • All workers shall attend the safety and health training provided by DOSH or by the appointed Contractor. • Working hours for construction site shall be avoided during peak period, i.e. 5.00a m – 9.00 am and 4.30 pm – 7.30pm. • Contractors or sub-contractors to strictly adhere and fully implement the approved traffic management plan.		

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
• Piling works • Construction of viaduct and elevated stations • Use of high noise generating machineries	• Increased noise level	• Use of bored piles, injection piles or other low noise impact piling methods. • Install noise barrier or full hoarding (where relevant). • Use of low noise equipment. • Restriction of operating hours of earth moving vehicles. • Continuous monitoring of noise levels.	Residual impacts at specific locations could persist from one year or more depending on the extent of construction works.	
• Tunneling • Piling works	• Increased vibration level	• Use of low impact energy methods (typically bore piling). • Mishandling of piles and casings are simple on site management to avoid unnecessary free fall of casings and inherent banging noise as a result of mishandling. • Chiseling should be avoided at location in close proximity to residential receptors. • Where feasible, trenches could be considered to minimise surface wave propagation from piling and other ground-borne vibration impacts (heavy vehicles road traffic). • Use of diaphragm sheet piles in construction sites with longer construction period.	Residual impacts at specific locations could persist from one year or more depending on the extent of construction works.	

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
• Site clearing and earthworks from depot construction • Sedimentation from excavation at elevated section	• Soil erosion and sedimentation	• Silt traps shall be inspected and desilted on a regular basis. • Dewatering work for structure foundations or earthwork operations adjacent to, or encroaching on, stream or watercourses shall be conducted in a manner to prevent muddy water and eroded materials from entering the drainage system by first discharging into the silt trap. • All completed platforms that are not turfed shall be well compacted. • Turfing shall be carried out at areas where earthworks have been completed. • The turf will be watered regularly, especially during the dry weather periods. • Excavated material shall be stockpiled above ground before being removed by lorries for disposal. Silt fences shall be erected around the stockpile area. • For underground segment, due to the space constraint, sump pits will be excavated to collect underground water which will be turbid due to the excavation, and the turbid water will be pumped out into mobile tank above ground. The water in the tank will be transferred to the sediment treatment plant where the sediment will be separated from the runoff via a chemical process. The sediment will then be disposed as unsuitable material.		

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
• Site clearing and earthworks from depot construction • Movement of construction vehicles	• Air pollution	• Site clearing and the earthworks shall be conducted in stages or phases within the depot area. • Provide hoarding around construction area. • Areas cleared for open spaces shall be turfed as soon as possible. • Regular water spraying of construction sites. • Stockpiles shall be covered. Spraying of water proposed for uncovered stockpiles to control dust emissions. • Ensure construction access or haulage route are kept damp by water browser on regular basis. • Wheel washing facility shall be provided at all entry or exit points into the public road. • Lorries or vehicles which carry earth, sand, aggregate or other similar types of material, shall be covered with tarpaulin, plastics or other equivalent material before they are allowed to enter the public road. • Fuel-efficient and well-maintained haulage trucks will be used to minimise exhaust emissions. Smoke belching vehicles and equipment shall not be allowed and shall be removed from the Project area. • Undertake immediate repairs of any malfunctioning construction vehicles and equipment. • Idling of engines shall be discouraged. • *Where possible and deemed practicable* by the Project Proponent, particularly at the identified hotspots area, the residential properties along the proposed underground stretch to be installed with portable fencing with shade netting.	Residual impacts at specific locations could persist from one year or more depending on the extent of construction works.	

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
• Operation of maintenance yard • Operation of batching plant	• Water pollution	• Maintenance of vehicles shall be carried out at the designated area. • Sand contaminated with oil spillage shall be removed and disposed of as scheduled waste. • Fuel spillage seeping into the ground will be prevented by the construction of a containment wall either made out of concrete or bricks around the skid tank. • All runoff from the batching plant shall be directed into a grout settling pond before being discharged into drainage system. Slurry residue and sedimentation from the settling pond shall be cleared periodically and allowed to dry before being disposed.		
• Site clearing • Setup of site office and workers camp	• Waste generation	• Minimise biomass generation by implementing the Project in phases. • Biomass can be used as temporary slope protection to reduce soil erosion. • Open burning is prohibited. • Stockpiled area shall be located away from the watercourses. Temporary drainage to be constructed surrounding the stockpiled area to divert any runoff away from the watercourses. • Construction and solid waste shall be disposed at a municipal approved landfill or dumping site. • Scheduled wastes shall be managed according to the Environmental Quality (Schedule Wastes) Regulations 2005.		

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
OPERATIONAL STAGE				
• Train operation	• Increased noise level	• Installation of noise barriers and enclosures. • Use of sound attenuators/silencers along the air ducts or at the air intakes and exhaust discharge. • Acoustics lining of the air ducts and use of acoustically line air plenum at the air intakes and discharge. • Use of low noise fan type with high air flow capacities. • Use of correct sizing of fresh air opening and louvers to minimise air flow noise. • Design and selections of sound attenuators/fans silencing and air intake/ discharge plenum shall be undertaken as part of the ventilation fan design.	Noise levels may increase over time due to wear and tear of the track and wheels.	
	• Increased vibration level (underground tunnel and stations)	• Use of continuous welded tracks. • Issues related to brake squeals and impacts between wheels and track from out of roundness wheels are maintenance related issues and shall be addressed with proper maintenance and upkeep by the trains (wheels in particular) and tracks (undulations/corrugations in the rails which shall require rail grinding). • Introduction of vibration isolation medium between the tracks and supporting structure.	Ground-borne vibration may increase over time with the deterioration of the tracks, wheels and vibration reduction elements.	

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
• Train operation	• Risk from operation	• Provision of Passenger Information Display System. Train passengers shall be educated with safety procedures during embarking; disembarking and ride in the train. Safety posters and videos shall be located at strategic places to instill safe practices among passengers. • Sufficient safety signage, warnings and instructions shall be provided at strategic locations. • Provision of barriers at the end of the platform to prevent access to the tracks • Emergency Stop Plunger shall be provided to stop any approaching train upon activation under emergency situation. • Provision of adequate rubbish bins in the rail transit environment with regular disposal to reduce or eliminate fire risk. • Regular cleaning of the station floor to reduce the risk of slip, trip and fall due to slippery floor. • Anti-slip flooring shall be provided. • Schedule of maintenance and inspection of the rolling stocks shall be developed and comply with the schedule. • Sufficient safety features such as door warning, door obstruction detection, hold bars and stanchions shall be installed. • Fire-fighting system shall be installed in the LRV to control the spread of fire.		

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
• Vehicles movement – Stations	• Increased of noise level	• Installation of noise barriers (which can be masonry acoustics type to be rendered aesthetically acceptable to minimise visual impact). • Station planning and design and all ingress and departure roads to the station shall be include due consideration to potential noise disturbance and avoidance of inconvenience including addressing likely road traffic congestions. This includes the use of noise screening barriers, soft and hard landscape.	Some amount of congestion can be expected to persist at some stations due to either inadequate road capacity, vehicles stopping to drop and pick up passengers and haphazard/illegal parking.	
• Elevated structure – permanent	• Visual Impact (change in present landscapes)	• Maintenance, development and enhancement of buffer and landscapes. • Restoration of aesthetics through physical readjustments (height, width and location of the structures) and creative designs. • Accommodating the needs of mobile receptors (e.g. reviewing the height of the track at areas that are being heavily affected, providing sufficient signage, inclusion of lighting elements at the road junctions or corners beneath the track structures).	Impact on landscape will remain until resident are accustomed to it.	

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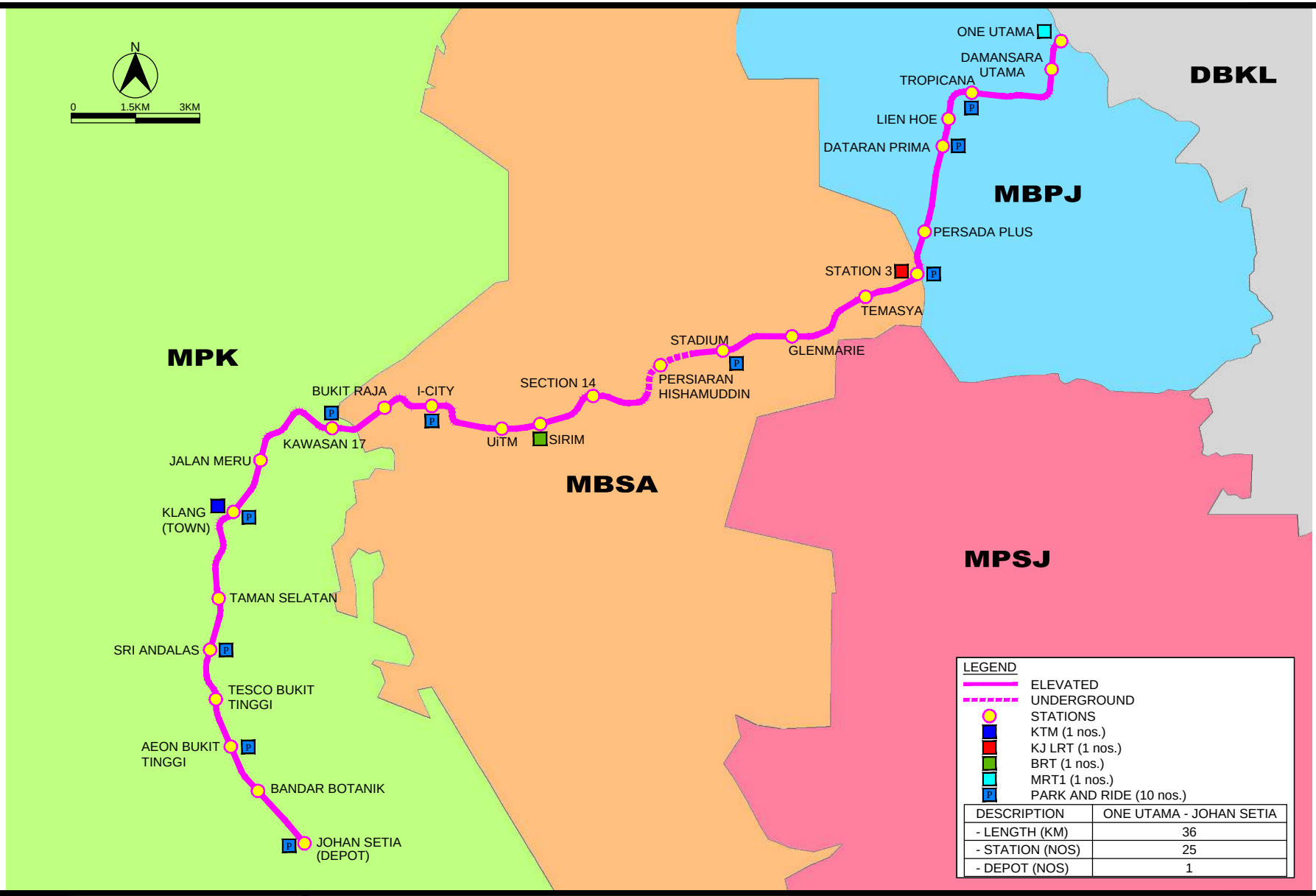

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Figure ES-1

Overview of LRT3 Alignment

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N

0 0.5km 1km

LEGEND

ELEVATED

STATIONS

P PARK AND RIDE

LEBUHRAYA BARU LEMBAH KLANG (NKVE)

KBU INTERNATIONAL COLLEGE

BRITISH INTERNATIONAL SCHOOL

TROPICANA

TROPICANA

TROPICANA GOLF & COUNTRY RESORT

BAYU PUTERI APARTMENT

SJK TAMIL EFFINGHAM

MERCHANT SQUARE BUSINESS CENTRE

LIEN HOE

BU 11

SRK TROPICANA

SMK TROPICANA

DAMANSARA LEGENDA

DAMANSARA IDAMAN

ARA DAMANSARA

TAMAN BKT MAYANG EMAS

SG. KAYU ARA

DATARAN PRIMA

AMAN SURIA DAMANSARA

CHEMPAKA UTAMA

VILLA IDAMAN

ARA DAMANSARA WINCHESTER

DATARAN PRIMA CONDOMINIUM

DATARAN PRIMA

D'AMAN CRIMSON APARTMENT

EVE SUITE

TAMAN MAYANG

TAMAN MEGAH

TAMAN SEA

JALAN LAPANGAN TERBANG SUBANG

KELANA IDAMAN

TAMAN EMAS

SAUJANA GOLF & COUNTRY CLUB

PPR LEMBAH SUBANG 2

PARKLANE COMMERCIAL HUB

KELANA D'PUTERA CONDO

PERSADA PLUS

KELANA SQUARE

ZENITH CORPORATE PARK

PERSADA PLUS

KELANA MAHKOTA CONDO

KAMPUNG TENGKU

MATCH LINE A-A

STERLING CONDO

TAMAN UNIVERSITI

LEBUHRAYA BARU LEMBAH KLANG (NKVE)

GLENMARIE GOLF & COUNTRY CLUB

STATION 3

PERSIARAN BANDAR UTAMA

TAMAN TUN DR ISMAIL

SRI PENTAS

ONE UTAMA

LEBUHRAYA DAMANSARA - PUCHONG

TAMAN KAYU ARA INDAH

BU 2

BU 7

BU 1

BU 10

BU 3 SECONDARY SCHOOL

BU 2 SECONDARY SCHOOL

DAMANSARA UTAMA

KAMPUNG SG. KAYU ARA

SS 21

DAMANSARA UTAMA

PUNCAK DAMANSARA CONDOMINIUM

LEBUHRAYA SPRINT

SMK DAMANSARA JAYA

SS 22

DAMANSARA INTAN

3000

3000

1000

4000

5000

6000

7000

8000

8000

ere consulting group	Figure ES-2	Segment 1 : One Utama Station - Persada PLUS Station

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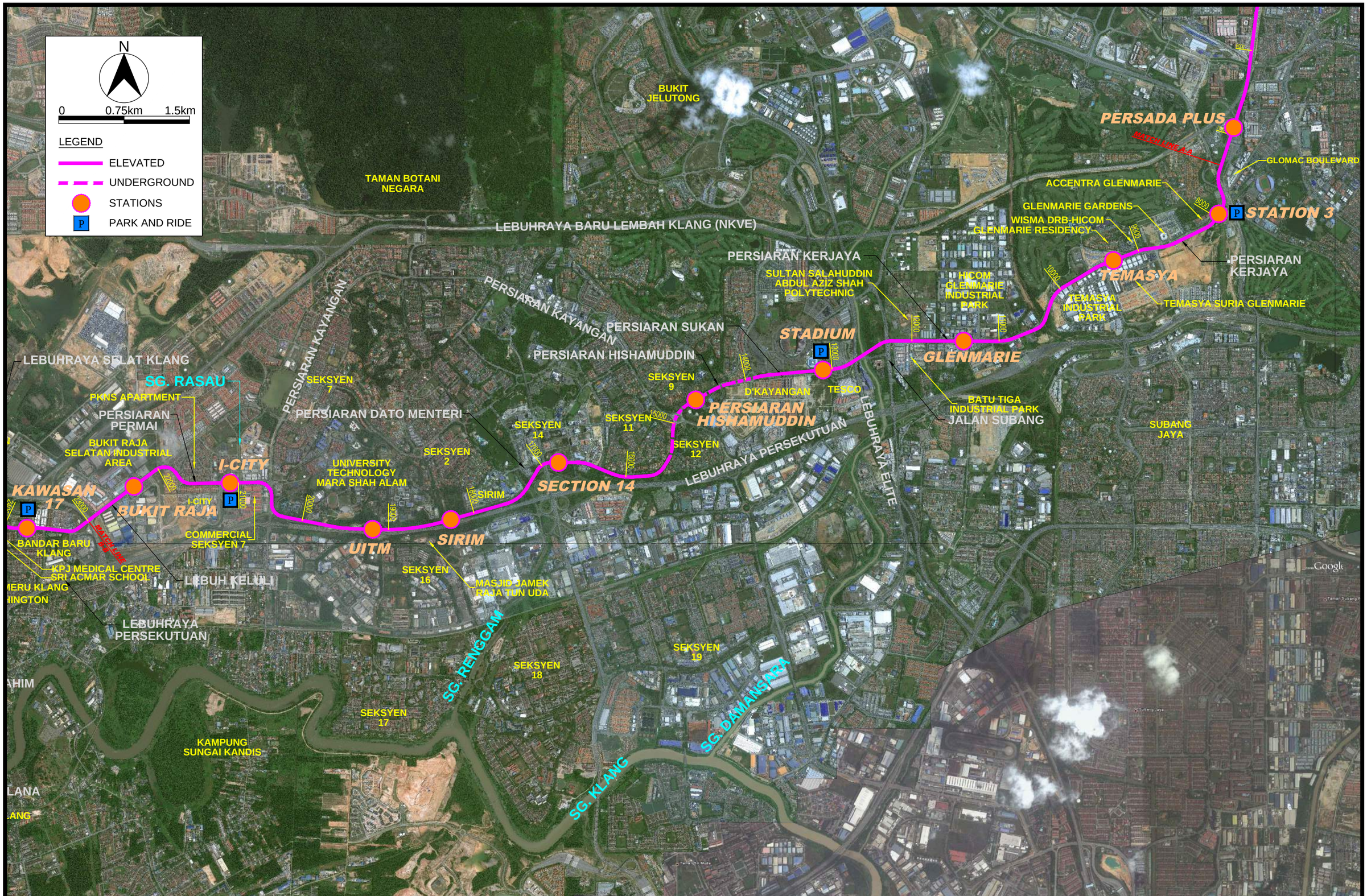

ere consulting group	Figure ES-3	Segment 2 : Station 3 Station - Bukit Raja Station

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N

0 0.75km 1.5km

LEGEND

ELEVATED

STATIONS

PARK AND RIDE

BANDAR BUKIT RAJA

LEBUHRAYA SELAT KLANG

SG. RASAU

PKNS APARTMENT

PERSIARAN PERMAI

PALM GARDEN APARTMENT

SM KWANG HUA

PELANGI COURT

KAWASAN 17

KLANG PARADE

TAMAN PERINDUSTRIAN BUKIT RAJA

BUKIT RAJA SELATAN INDUSTRIAL AREA

I-CITY

KAWASAN 17

BUKIT RAJA

I-CITY

COMMERCIAL SEKSYEN 7

SMK MERU

CHINESE GRAVEYARD

SMK TINGGI KLANG

TAMAN ENG ANN

BANDAR BARU KLANG

KPJ MEDICAL CENTRE

SRI ACMAR SCHOOL

LEBUH KELULI

TAMAN MERU KLANG

TAMAN WORTHINGTON

JALAN MERU

JALAN MERU

JALAN KAPAR

KLANG TOWN CENTRE

LEBUHRAYA PERSEKUTUAN

MAJLIS PERBANDARAN KLANG

SMK METHODIST GIRL SCHOOL

KLANG DISTRICT OFFICE

SMK METHODIST ACS

KLANG (TOWN)

PERSIARAN SULTAN IBRAHIM

KTMB KLANG STATION

KAMPUNG SUNGAI UDANG

NEW KLANG DISTRICT OFFICE COMPLEX

KAWASAN 1

SG. KLANG

KAMPUNG SUNGAI KANDIS

MASJID INDIA KLANG

JALAN TENGKU KELANA

SK/SMK CONVENT 1 & 2

TAMAN BANDAR DIRAJA KLANG

BULATAN SIMPANG LIMA

PERSIARAN RAJA MUDA MUSA

TAMAN SELATAN

TAMAN SELATAN

TAMAN CHI LIUNG

SEKOLAH KHAS KLANG

TAMAN PALM GROVE

TANAH PERKUBURAN ISLAM LIPAT KAJANG, KLANG

KAMPUNG DELEK

KAMPUNG RAJA UDA

HOSPITAL TENGKU AMPUAN RAHIMAH

MASJID JAMEK AL-RAHIMAH

TAMAN SRI ANDALAS

BAYU PERDANA

SRI ANDALAS

JALAN BATU UNJUR

TAMAN BAYU TINGGI

TAMAN DESA UTAMA

TAMAN SRI SENTOSA JAYA

JALAN LANGAT

TESCO BUKIT TINGGI

TESCO BKT TINGGI

BANDAR BUKIT TINGGI 1

TAMAN DESAWAN

BANDAR BUKIT TINGGI 2

BANDAR BOTANIK

AEON BUKIT TINGGI SHOPPING CENTRE

AEON BKT TINGGI

TAMAN SENTOSA

KLINIK KESIHATAN BANDAR BOTANIK

BANDAR BOTANIC CAPITAL

BANDAR BOTANIK

LEBUHRAYA KESAS

JALAN KLANG - BANTING

JALAN JOHAN SETIA

KOTA BAYUEMAS

JOHAN SETIA

BANDAR PARKLANDS

ere consulting group	Figure ES-4	Segment 3 : Kawasan 17 Station - Johan Setia Station

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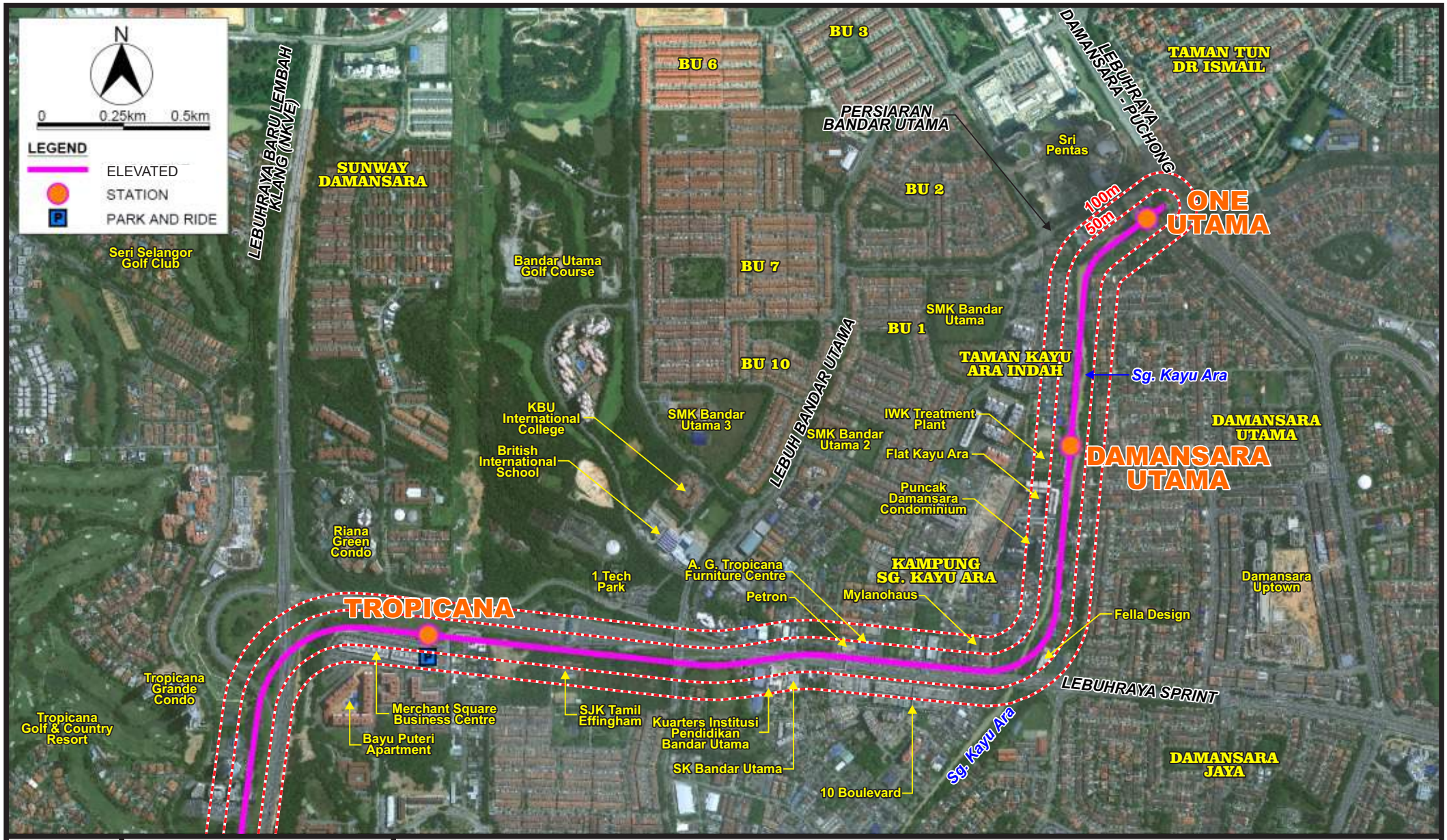

Figure ES-5a

Land Use along Segment 1A

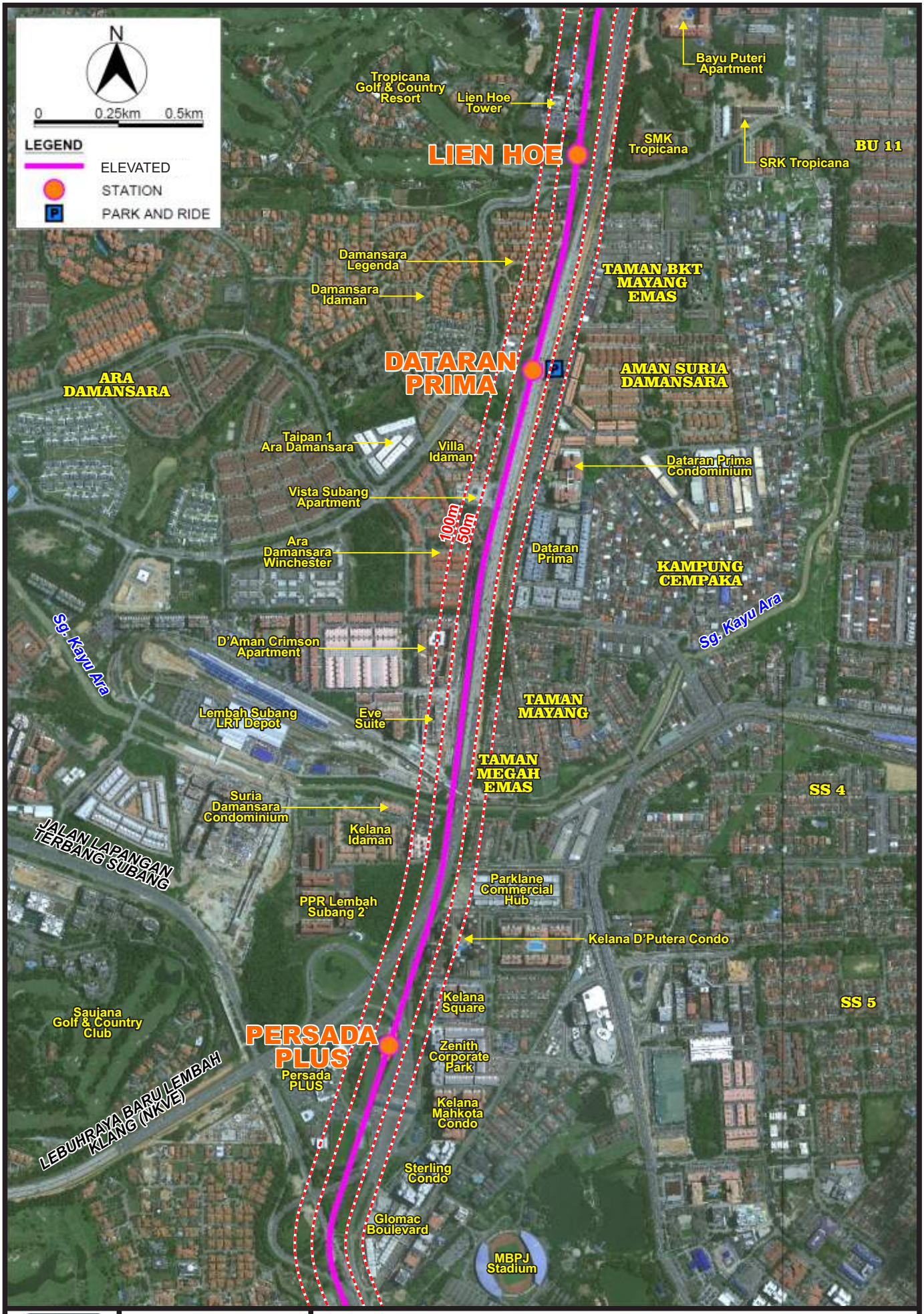

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Figure ES-5b

Land Use along Segment 1B

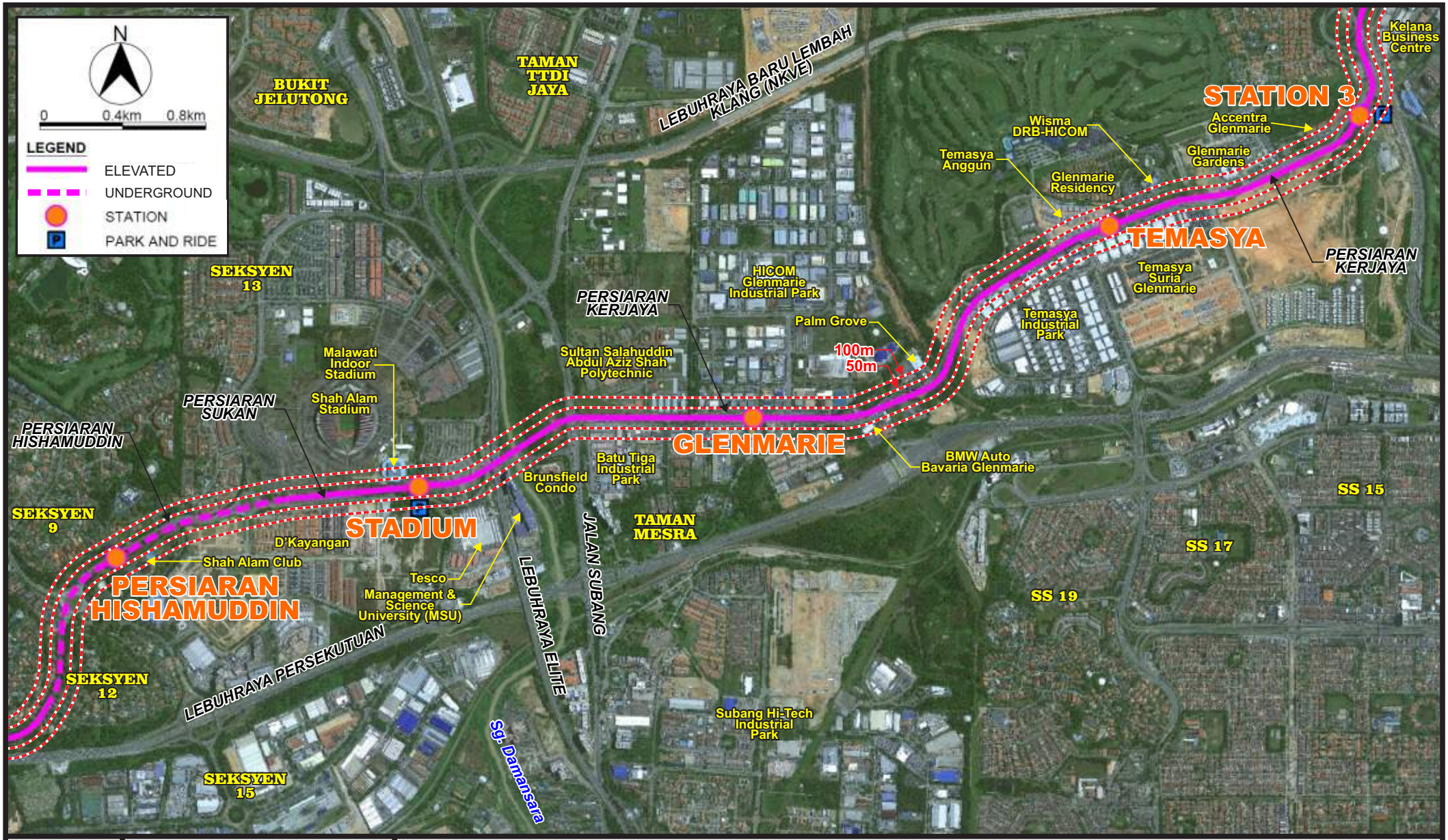

Figure ES-5c

Land Use along Segment 2A

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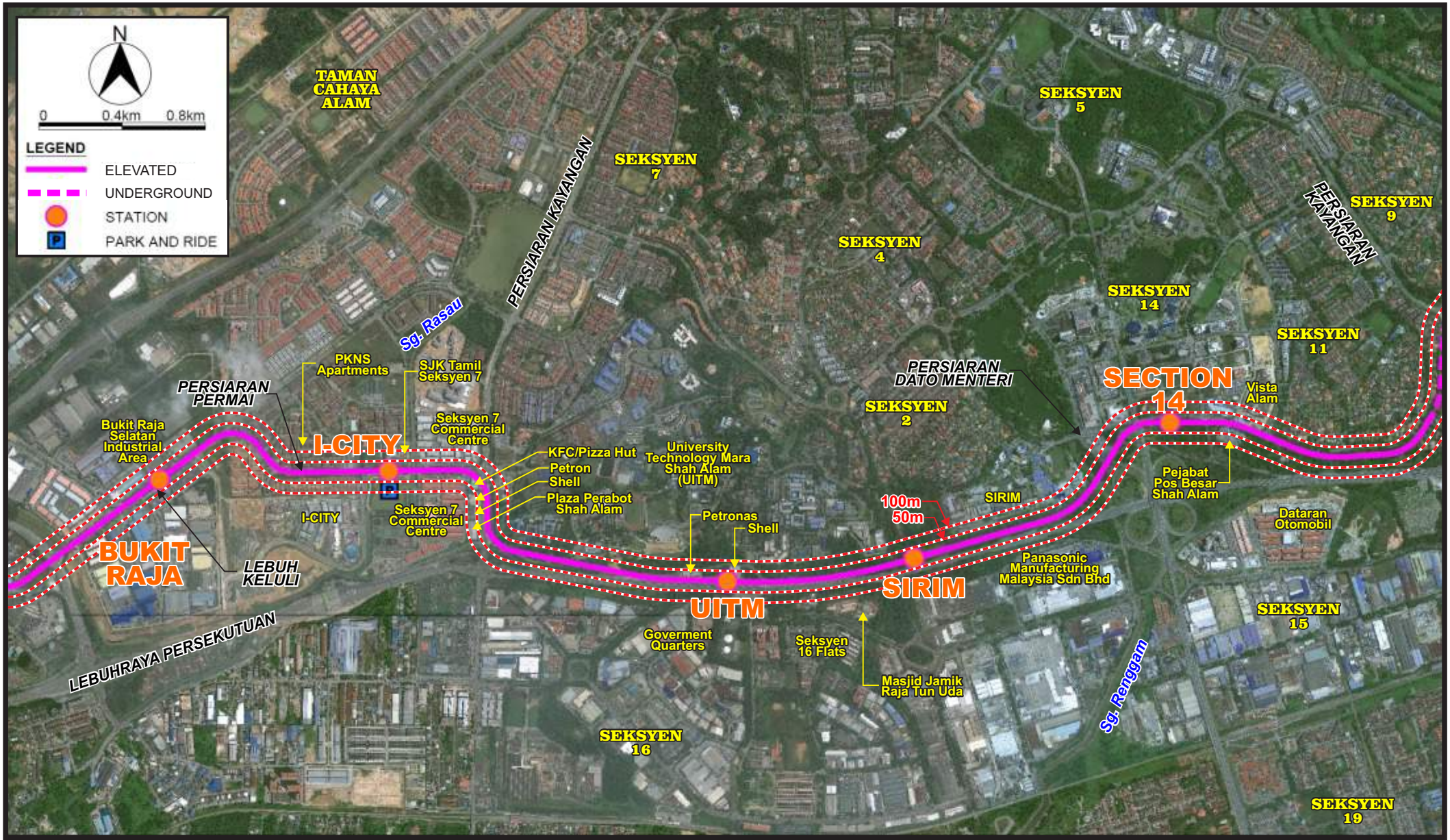

Figure ES-5d

Land Use along Segment 2B

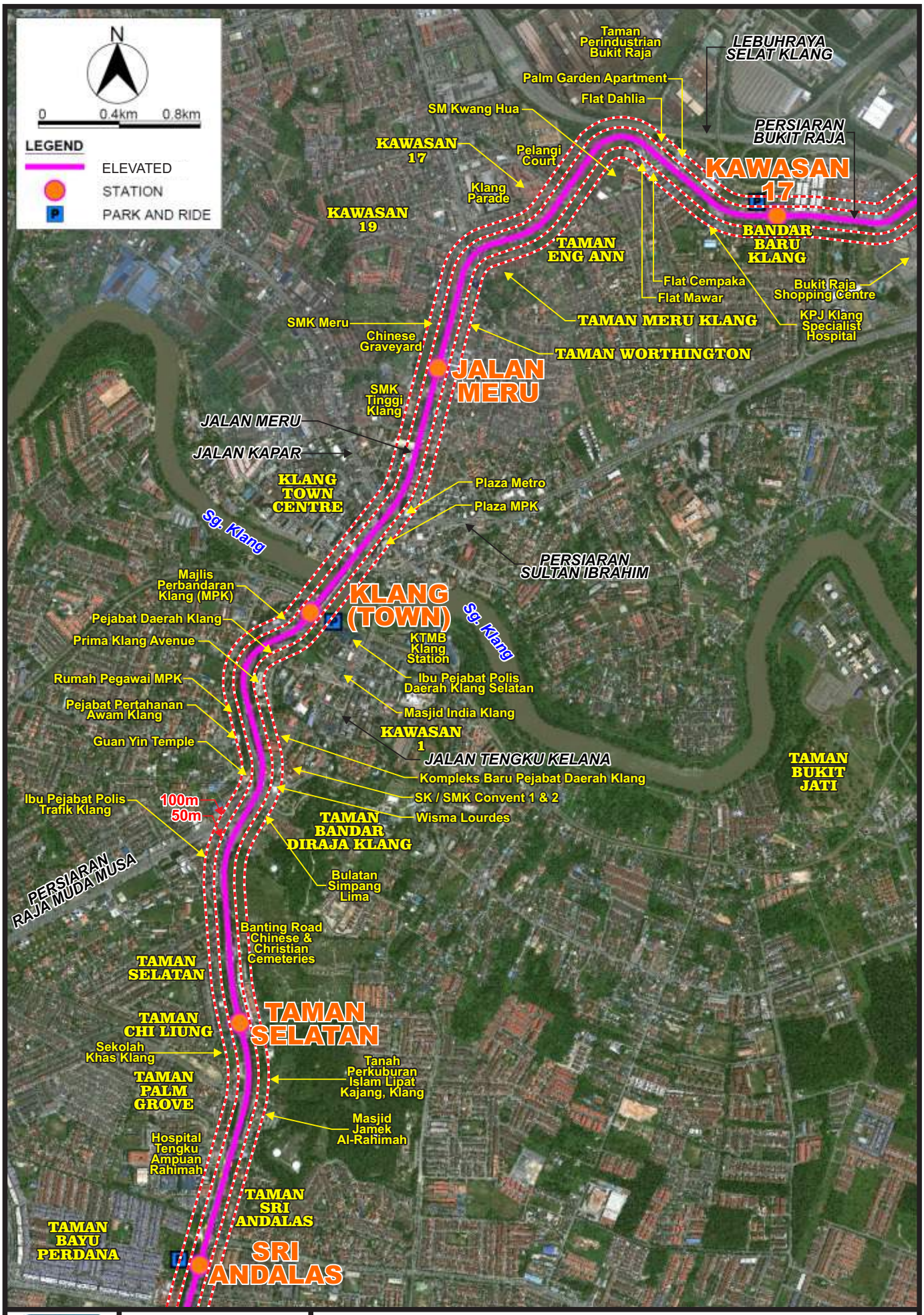

Figure ES-5e

Land Use along Segment 3A

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