PROJEK MASS RAPID TRANSIT LALUAN 2 :
SG. BULOH - SERDANG - PUTRAJAYA

MASS RAPID TRANSIT
CORPORATION SDN BHD

Detailed Environmental Impact Assessment

Volume 1

Executive Summary & Ringkasan Eksekutif

April 2015

ere consulting group
sensible environmental solutions

Projek Mass Rapid Transit Laluan 2 : Sg. Buloh – Serdang – Putrajaya

Detailed Environmental Impact Assessment
Volume 1 – Executive Summary & Ringkasan Eksekutif

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ERE Consulting Group Sdn Bhd
9 Jalan USJ 21/6
47630 Subang Jaya, MALAYSIA
Tel : 603-80242287
Fax : 603-80242320

Table of Contents

TABLE OF CONTENTS

Page

Table of Contents i
List of Figures i
List of Tables i
Senarai Rajah ii
Senarai Jadual ii

EXECUTIVE SUMMARY ES-1

RINGKASAN EKSEKUTIF RE-1

LIST OF FIGURES

Figure ES-1 Overview of SSP Line ES-65
Figure ES-2 Population and Density Comparison of Metro Network ES-66
Figure ES-3 Future Travel Demand Corridor for Greater KL/Klang Valley ES-67
Figure ES-4 Accessibility Map for Greater KL/Klang Valley ES-68
Figure ES-5 Northern Elevated Segment ES-69
Figure ES-6 Underground Segment ES-70
Figure ES-7 Southern Elevated Segment 1 ES-71
Figure ES-8 Southern Elevated Segment 2 ES-71
Figure ES-9 Feasibility Study Corridor and Alignment Options for SSP Line ES-73

LIST OF TABLES

Table ES-1 Proposed Stations ES-7
Table ES-2 Geology Along the SSP Line ES-13
Table ES-3 Broad-based Volume/Capacity Analysis ES-18
Table ES-4 Population Distribution by Segment and Ethnicity, 2010 ES-18
Table ES-5 Awareness of MRT/SSP Line ES-18
Table ES-6 Support for SSP Line ES-19
Table ES-7 Perceived Impacts on Individuals and their Families ES-20
Table ES-8 Perceived Negative Impacts during Construction ES-21
Table ES-9 Perceived Negative Impacts during Operations
Table ES-10 Stakeholder Engagement Sessions ES-22
Table ES-11 Potential Impacts During Pre-Construction and Construction Stage ES-24
Table ES-12 Predicted Noise Levels L_{eq} and Assessment ES-32
Table ES-13 Tentative Locations to be installed with noise barriers Northern Elevated Segment ES-41
Table ES-14 Tentative Locations to be installed with noise barriers Southern Elevated Segment 1 ES-42
Table ES-15 Tentative Locations to be installed with noise barriers Southern Elevated Segment 2 ES-42

TABLE OF CONTENTS

SENARAI RAJAH

Rajah RE-1	Gambaran Keseluruhan Laluan SSP	RE-53
Rajah RE-2	Perbandingan Populasi dan Kepadatan Rangkaian Kereta Api	RE-54
Rajah RE-3	Ramalan Permintaan Pengangkutan untuk 'Greater KL/Klang Valley'	RE-55
Rajah RE-4	'Accessibility Map for Greater KL/Klang Valley'	RE-56
Rajah RE-5	'Northern Elevated Segment'	RE-57
Rajah RE-6	'Underground Segment'	RE-58
Rajah RE-7	'Southern Elevated Segment 1'	RE-59
Rajah RE-8	'Southern Elevated Segment 2'	RE-60
Rajah RE-9	Koridor Kajian Feasibiliti dan Pilihan Jajaran	RE-61

SENARAI JADUAL

Jadual RE-1	Stesen yang Dicadangkan	RE-7
Jadual RE-2	Geologi Sepanjang Laluan SSP	RE-13
Jadual RE-3	Analisis Isipadu/Kapasiti Jalan	RE-16
Jadual RE-4	Pengagihan Penduduk Mengikut Segmen dan Kaum	RE-18
Jadual RE-5	Kesedaran Mengenai Projek MRT/Laluan SSP	RE-18
Jadual RE-6	Sokongan untuk Laluan SSP	RE-19
Jadual RE-7	Persepsi Impak ke atas Individu dan Keluarga	RE-20
Jadual RE-8	Persepsi Impak Negatif Semasa Pembinaan	RE-21
Jadual RE-9	Persepsi Impak Negatif Semasa Operasi	RE-21
Jadual RE-10	Senarai Sesi Perbincangan dengan Pihak Berkepentingan	RE-22
Jadual RE-11	Impak yang Dijangka Semasa Fasa Pra-pembinaan dan Pembinaan	RE-24
Jadual RE-12	Ramalan dan Penilaian Paras Bunyi	RE-32
Jadual RE-13	Lokasi Tentatif Untuk Pemasangan Penghadang Bunyi 'Northern Elevated Segment'	RE-41
Jadual RE-14	Lokasi Tentatif Untuk Pemasangan Penghadang Bunyi 'Southern Elevated Segment 1'	RE-42
Jadual RE-15	Lokasi Tentatif Untuk Pemasangan Penghadang Bunyi 'Southern Elevated Segment 2'	RE-42

Executive Summary

INTRODUCTION

1. This Detailed Environmental Impact Assessment (DEIA) report has been prepared for the **Mass Rapid Transit Laluan 2 : Sg. Buloh – Serdang – Putrajaya** (hereinafter known as "The Project" or the "SSP Line"). The Project involves the construction of a 52.2 km mass rapid transit line from Sg Buloh to Putrajaya **(Figure ES-1)**.

2. The SSP Line is part of the Klang Valley MRT (KVMRT). The KVMRT is an Entry Point Project of the Greater KL/Klang Valley National Key Economic Area (NKEA). The first KVMRT line from Sg. Buloh to Kajang (SBK Line) is currently under construction.

3. The Project Proponent is Mass Rapid Transit Corporation Sdn Bhd (MRT Corp), a company wholly owned by the Ministry of Finance Malaysia.

   Mass Rapid Transit Corporation Sdn Bhd
   Tingkat 5, Menara 1 & P1, No. 46, Jalan Dungun,
   Bukit Damansara, 50490 Kuala Lumpur.
   Tel : +603-20953030 Fax : +603-20952121
   Contact Person: Tuan Syed Mahdhar Syed Hussain

4. The Project Delivery Partner (PDP) is MMC Gamuda KVMRT (PDP SSP) Sdn Bhd.

   MMC Gamuda KVMRT (PDP SSP) Sdn Bhd
   Menara Gamuda, PJ Trade Centre,
   No. 8, Jalan PJU 8/8A, Bandar Damansara Perdana,
   47820 Petaling Jaya, Selangor Darul Ehsan.
   Tel : +603-74918288 Fax : +603-77286571
   Contact Person: Andy Lee Choon Foh

5. The Consultant undertaking the Detailed Environmental Impact Assessment is ERE Consulting Group Sdn Bhd.

   ERE Consulting Group Sdn. Bhd.
   9, Jalan USJ 21/6, 47630 Subang Jaya,
   Selangor Darul Ehsan.
   Tel : 603-80242287 Fax : 603-80242320
   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 of 1987 which stipulates that an EIA is mandatory for the construction of mass rapid transport projects. The Terms of Reference for the DEIA was approved by the Department of Environment (DOE) on 12th February 2015 via its letter ref. no.: AS(PN)91/110/622/1487(17).

STATEMENT OF NEED

Urban sprawl and traffic congestion

7. The expanding population in Klang Valley has led to an urban sprawl – the KL metropolitan area has extended from the city centre over a 20 km radius putting tremendous pressure on the city's transportation infrastructure. The major road systems which have been constructed, under construction or committed are unlikely to be able to satisfy Kuala Lumpur's needs even to 2020.

8. Traffic congestion is a major problem due to the increasing number of private vehicles. This problem is made worse by the declining public transport modal share from 34% in 1985 to 10-12% in 2008[1] largely due to decreasing ridership caused by inadequacy of existing rail coverage, insufficient inter-modal and intra-modal connectivity. KL's present rail network is only 15km per 1 million population while most global cities have over 40km per 1 million population (**Figure ES-2**). The rail density in KL is merely 0.05 km/km² compared to 0.3 – 0.4 km/km² in other major cities (**Figure ES-2**). KL lags behind most major cities in terms of mass rapid transit.

9. The forecast travel demand in the year 2030 **(Figure ES-3)** indicates large radial movement towards central Kuala Lumpur. These include demand from existing high density areas in Damansara, Cheras, Kajang as well as proposed Bandar Malaysia at Sg Besi, Rubber Research Institute Malaysia and Cochrane area. The demand is highest along the Petaling Jaya/Shah Alam/ Klang corridor where the rail network is grossly inadequate. The Kelana Jaya and Ampang LRT lines only serve the northeast and the southwest quadrants (**Figure ES-3, ES-4)**. The northwest and southeast quadrants are not served by urban rail lines. The entire corridor leading to Putrajaya is also rapidly growing but with inadequate public transport.

10. KL's current rail network has only 8 interchange stations which make transfers from one line or mode to another difficult. Without sufficient interchange stations, each line or mode operates as a stand-alone system. The present transportation network offers poor intra-modal and inter-modal integration between the various public transport modes (i.e. lack of good interchange between lines and also bus service).

Public transport targets

11. The Greater KL / Klang Valley Public Transport Master Plan (GKL/KV PTMP) calls for public transport, in both terms of coverage and modal share, to be increased significantly. The SSP Line will substantially improve rail accessibility through expanding network between modes and rail lines,

provide additional capacity to the radial corridors, and running through high travel demand areas as well as future major land use developments for instance Kampong Bharu Redevelopment, Tun Razak Exchange and Bandar Malaysia.

12. The other benefits of the Project include economically efficient urban environment in terms of improve productivity, social equality and quality of life in the Klang Valley. These include travel time savings (RM 7 billion/year in 2020 to over RM 20 billion/year in 2050), lower vehicle operating costs (RM 100 million/year in 2020 to RM 300 million/year in 2050), minimize accidents, noise reduction, improved local air quality as well as decreased greenhouse gases emission[2].

National Economic Transformation Programme

13. The Economic Transformation Programme (ETP) is a major effort by the Malaysian Government to transform Malaysia into a high-income nation by 2020. There are 12 National Key Economic Areas (NKEAs) at the core of the ETP – the Greater KL/Klang Valley NKEA being one of them. The KVMRT Project is one of the main Entry Point Project (EPP) for the Greater Kuala Lumpur initiative. The SSP Line is integral to the success of the Greater Kuala Lumpur/Klang Valley NKEA, which in turn is a key catalyst for the ETP.

PROJECT DESCRIPTION

Planning and Design Basis

14. The SSP Line will pass through the KL city centre and be integrated with the existing KTM Komuter, LRT, Monorail, Express Rail Link (ERL) and the proposed High Speed Rail (HSR). About 13.5 km of the SSP Line will be underground while the rest will be elevated. The SSP Line will have 36 stations.

15. The over-arching principle in the development of the KVMRT is improved network coverage, better entry into the city centre, siting of stations in densely populated areas and the ability to sustain future expansion. By 2022, the KVMRT comprising of the SBK line and SPP line is expected to carry approximately 1 million passengers per day.

[1] Greater Kuala Lumpur/Klang Valley Public Transport Master Plan. SPAD 2013.
[2] Feasibility Study for KV MRT Lines 2 and 3. Final Report. SPAD, 2013.

EXECUTIVE SUMMARY

Key Project Components

16. The SSP alignment is divided into four main segments:
    - ***Northern Elevated Segment*** (14km) – from Damansara Damai to Jalan Ipoh (**Figure ES-5**)
    - ***Underground Segment*** (13.5km) – from Jalan Ipoh to the Bandar Malaysia South (**Figure ES-6**)
    - ***Southern Elevated Segment 1*** (11.7km) – from the Bandar Malaysia South to UPM (**Figure ES-7**)
    - ***Southern Elevated Segment 2*** (13km) – from UPM to Putrajaya (**Figure ES-8**)

Northern Elevated Segment (Damansara Damai – to Jalan Ipoh)

17. The SSP Line starts just after the KTM Sg Buloh Station, crosses over to the south of Jalan Kuala Selangor towards Damansara Damai where **Station S01** is proposed. The line continues along Jalan Kuala Selangor, passing by Prima Damansara and Bandar Sri Damansara to the proposed **Station S02** near Wisma ING and 8trium.

18. The line runs crosses to the north of Jalan Kuala Selangor after Damansara Avenue to proposed **Station 03** near the PJU 9 Sri Damansara. The line continues along Persiaran Dagang towards proposed **Station 04** which will be an interchange station with KTM Komuter. After crossing KTMB tracks and Selayang-Kepong Highway, the line moves along Jalan Kepong before reaching proposed **Station 05** near AEON Metro Prima and then **Station 06** further up Jalan Kepong.

19. The line then travels parallel to Jalan Kepong as it heads towards the proposed **Station S07** and **Station S08**. After that, the line crosses Jalan Kuching and KTMB Railway tracks towards the proposed **Station S09**, another interchange station with KTM. The line then swings towards the south and travel towards Jalan Ipoh to **Station S10** near Taman Rainbow. The line continues along Jalan Ipoh and runs underneath the DUKE before reaching the proposed **Station S11** near Kompleks Mutiara.

Underground Segment (Jalan Ipoh – Bandar Malaysia South)

20. The underground section starts at Jalan Ipoh where there will be **Station S12**. The line then veers away from Jalan Ipoh near SK Sentul Utama towards the proposed **Station S13**, an interchange station with the LRT and KL Monorail at Titiwangsa.

21. The line then traverses close to the Pekeliling Mosque, Istana Budaya and Hospital KL where **Station S14** is proposed. The line then continues under Jalan Tun Razak and HKL Quarters Complex, heading towards Jalan Raja Muda Abdul Aziz in Kampong Bharu where **Station S15** is proposed near Setia Sky Residences.

22. The line then connects to the proposed **Station S16**, another interchange station with LRT below IMC Parkville Development and Ampang Park Shopping Centre, near Megan Avenue 1. **Station S17** near KLCC and **Station S18** at Jalan Conlay are the next destinations.

23. Then the alignment continues south and crosses Jalan Bukit Bintang towards **Station S19** at the Tun Razak Exchange (TRX) development, where there will be an interchange with the SBK Line (currently under construction). The line veers right and goes below the Maju Expressway, Jalan Tun Razak and the SMART Tunnel. It continues south towards the Jabatan Kerja Raya workshop where **Station S20** will be located. It will interchange with the existing Chan Sow Lin LRT Station.

24. After **Station S20**, the alignment heads south along Jalan Chan Sow Lin, passes Percetakan Nasional Berhad Malaysia and Chan Sow Lin industrial area, and heads towards the launch shaft area at the north of the *Pengkalan Tentera DiRaja Udara Malaysia* base (TUDM) where **Station S21** is proposed. The line continues south within the TUDM base until the proposed **Station S22**, where there will be an interchange with the proposed High Speed Rail (HSR).

Southern Elevated Segment 1 (Bandar Malaysia South – UPM)

25. After **Station S22**, the line will run below the East West Highway and along Kuala Lumpur-Seremban Expressway towards the Kuchai Lama industrial area where **Station S23** is proposed. The line veers left and continues south, crossing the Maju Expressway and Sg Besi Highway besides Kampung Baru Salak South and continues parallel to the Sg Besi Highway and then crosses to SK Salak South towards Taman Naga Emas and Institute Sosial Malaysia where **Station S24** is proposed. From **Station S24**, the line continues south towards Pekan Sg Besi where **Station S25** is proposed close to the existing LRT Station.

26. The line then crosses to the west of KTM Komuter and ERL as it moves south and crosses the Bukit Jalil Highway and the Kuala Lumpur Seremban Expressway until the proposed **Station S26** opposite the Serdang Raya Plaza. It then traverses the commercial area between Kuala Lumpur Seremban Expressway and Jalan Utama to arrive at the proposed **Station S27** at the end of Jalan Utama.

27. On its way to proposed **Station S28** near Balai Bomba dan Penyelamat Serdang, the line will cross Jalan Utama, Jalan Besar and Sg Kuyoh before swinging into Jalan Raya Satu in Seri Kembangan. The line continues along Jalan Raya Satu and Jalan Raya Tiga as it passes the Kawasan Perindustrian Seri Kembangan before it reaches the proposed **Station S29** which is located within the Universiti Putra Malaysia (UPM) land.

Southern Elevated Segment 2 (UPM – Putrajaya)

28. After **Station S29**, the line travels along the MARDI compound and splits towards the proposed Serdang Depot. The line then goes to the proposed **Station S30**, west of Institut Latihan Perkembangan Pertanian Selangor before travelling along Jalan Putra Permai and passing Taman Equine and Taman Pinggiran Putra to reach the proposed **Station S31.**

29. The line then continues along Jalan Putra Permai, passing Pusat Bandar Putra Permai, Kompleks Pasar Borong Selangor and Giant Hypermarket before it reaches **Station S32** near The Atmosphere. After moving through D'Alpinia and 16 Sierra, the line reaches the proposed **Station S33**.

30. At the end of Persiaran Sierra Utama, the line crosses Maju Expressway towards Cyberjaya area and follows Persiaran Apec where **Station S34** is proposed near the Sky Park. After this station, the line continues along Persiaran Apec, passes Limkokwing University before **Station S35**. The line then traverses towards **Station S36** (terminal station) which is also an interchange station with the ERL and the proposed HSR.

Stations

31. The SSP Line will have 36 stations, 11 of which will be underground. 10 will be interchange stations (**Table ES-1**). The criteria for determining station locations include the following network planning principles:

Land Use

- Existing land use and changes proposed over time
- Opportunities for transit oriented development, major developments
- Special generators e.g. shopping centres or sports stadiums
- Land use-related catchment distribution

Network Design

- Opportunity for mall interchange (bus, LRT, KTM. etc.)
- Distances between stations along alignment corridor

Engineering

- Constraints for instance clearances and topography
- Opportunities for station entrance placement
- Cost implication

Social and Environmental Impacts

- Disruption to the public (e.g. noise and special land use such as hospitals, etc.)
- Accessibility to station (e.g. roads, isolation of catchment, etc.)

EXECUTIVE SUMMARY

Table ES-1 Proposed Stations

Station Name	Station Location	Type	Interchange
Northern Elevated Segment (14.0km)			
S01	Damansara Damai	Island	
S02	Sri Damansara West	Island	
S03	Sri Damansara East	Side	
S04	Kepong Sentral	Island	Interchange with KTM Komuter
S05	Metro Prima	Island	
S06	Kepong Baru	Island	
S07	Jinjang	Island	
S08	Sri Delima	Island	
S09	Kampung Batu	Island	Interchange with KTM Komuter
S010	Kentonmen	Side	
S011	Jalan Ipoh	Island	
Underground Segment (13.5km)			
S12	Sentul West	Island	Interchange with future Circle Line
S13	Titiwangsa	Island	Interchange with Monorail and AG LRT Line
S14	Hospital Kuala Lumpur	Island	
S15	Kampung Baru North	Island	
S16	Ampang Park	Stacked	Interchange with KJ LRT Line
S17	KLCC East	Stacked	
S18	Conlay	Island	
S19	Tun Razak Exchange (TRX)	Double Stacked	Interchange with SBK Line
S20	Chan Sow Lin	Island	Interchange with AG LRT Line
S21	Bandar Malaysia North	Island	
S22	Bandar Malaysia South	Island	Interchange with KTM Komuter, ERL, proposed HSR
Southern Elevated Segment 1 (11.7km)			
S23	Kuchai Lama	Island	
S24	Taman Naga Emas	Island	
S25	Sungai Besi	Side	Interchange with AG LRT Line
S26	Serdang Raya North	Island	
S27	Serdang Raya South	Island	
S28	Seri Kembangan	Island	
S29	UPM	Island	
Southern Elevated Segment 2(13.0km)			
S30	Taman Universiti (Provisional)	Side	
S31	Equine Park	Island	
S32	Taman Putra Permai	Island	
S33	16 Sierra	Island	
S34	Cyberjaya North	Island	
S35	Cyberjaya City Centre	Island	
S36	Putrajaya Sentral	Island	Interchange with ERL and proposed HSR

Depot, Rolling Stock and System Operations

32. The depots for the SSP Line will be built at Bukit Serdang and occupy 44 ha of land. The depot will be a secondary depot, handling mainly minor maintenance work. The main depot for the KVMRT will be at Sg. Buloh.

33. The SSP Line will operate from 0600 to 2400 hours daily. The maximum operating speed for the train is 100 km/hr. However, the average route speed (speed for the whole stretch of the alignment) is 40 km/hr. The total journey time from Sg Buloh to Putrajaya will be about 84 minutes. At the initial stage of operation, the peak hour frequency for the train will be 200 seconds while the ultimate peak hour frequency of the train is 109 seconds.

34. Each train will be made up of 4 cars of 22m long, 3.1m wide and 3.7m high. The system will be driverless. Each car will have a maximum carrying capacity of about 250 passengers, comprising 45 seated and 204 standing.

Feeder Buses and Park & Ride Facilities

35. The SSP Line will be supported by a feeder bus system. A feeder bus system that will operate at a frequency of 10-20 minutes and serve areas within 3-5km radius of the stations is currently being planned. A total of 57 feeder bus routes have been identified.

36. 15 park-and-ride facilities will be provided. Out of this, 13 will be multistorey Park and Ride sites and two will be at-grade sites. There will be a total of 8900 parking bays.

Construction Methods

37. The construction methods that will be used for the Project are designed to be cost-effective, and relatively quick in order to reduce the construction period, minimize disruption to road traffic and risks to public safety. The main construction activities are:
    - Utilities relocation
    - Viaduct construction
    - Tunnel construction
    - Elevated station construction
    - Underground station construction
    - Depot construction

38. Before the construction begins, utilities (water and sewer mains, electrical cables, gas pipes, etc) along the SSP Line will be detected, piloted and relocated. In some cases, there may be a temporary loss of parking spaces or temporary closure of road lanes.

39. The viaducts (substructure, superstructure and long span crossing) will be generally located either in the road median or the side. In cases where a single column is not feasible due to the existence of narrow median, a portal or cantilever piers may be adopted. The portals may be reinforced or pre-stressed concrete members **(Plates ES-1 and ES-2)**.

Plate ES-1 Example of the pier constructed at the median of the road for SBK Line

Plate ES-2 Example of the long span for SBK Line

40. Two types of Tunnel Boring Machines (TBM) namely Earth Pressure Balance TBM or Mix Shield Slurry TBM will be used depending on the geological conditions. Twin bored tunnels will be constructed to house the pair of tracks. In most areas, the tunnel will be designed to be parallel to each other. In areas where space is limited, the tunnels will be vertically stacked. Slurry treatment plants will be built within the launch shaft to treat the slurry material that will be discharged from the tunneling process.

41. Launch shaft, retrieval shaft and escape shaft construction will involve construction of retaining wall using secant bored pile or diaphragm wall, installation of ground anchor and whaler beam after each stage of excavation followed by construction of base slab casting of tunnel eye. Once launch shaft is ready, the TBM will be assembled at site **(Plates ES-3 and ES-4)**.

Plate ES-3 Example of the excavated tunnel (Inai Launch Shaft)

Plate ES-4 Example of the retrieval shaft for SBK Line (Maluri Portal)

42. The elevated station construction will consists of construction of pile cap, column and crosshead, installation of pre-cast beam that will be launched using mobile or crawler crane, construction of concourse and platform level, architectural finishes and mechanical as well as electrical works.

43. The underground stations will be constructed using the "cut and cover" method. Diaphragm walls will be constructed along the perimeter of the station by excavating deep contiguous trenches using the slurry trench method. The station will be constructed either top-down or bottom-up method. For top-down construction backfilling works will be carried out over the completed top slab to reinstate the surface whilst construction below the roofslab is ongoing. For bottom-up construction struts are installed at various levels during excavation. Then the baseslab is constructed followed by the station walls and floors and backfilled after roof construction.

44. The construction of the depot will involve site clearing, earthworks and the construction of buildings and supporting infrastructure and utilities. The estimated volume of earthwork is 3,780,000m^3 for cut, 230,000m^3 for topsoil removal and 2,620,000m^3 for fill with an excess of 930,000m^3 in order to achieve the desired platform level.

45. The construction is expected to commence in April 2016 after all regulatory approvals are obtained. It is scheduled for completion in July 2022.

PROJECT OPTIONS

46. Various project options and design concepts have been considered in selecting the optimum project design. The options varied according to the physical characteristics and requirements of each route and location. The project options examined include :

- No-Project Option
- Alignment Options during Feasibility Study Stage
- Alignment Options during Preliminary Design
- Tunnelling vs Elevated Structure Options

<u>No Project Option</u>

47. The no-project option will not enable the Greater KL area to achieve a 40 : 60 modal split for public transport and its aspirations for efficient public transportation network. Without substantial investments in urban rail, the traffic congestion could continue, causing billions of ringgit in terms of loss of productivity, air pollution, health hazards and worsen the urban sprawl.

<u>Alignment Options During the Feasibility Stage</u>

48. Many alignment options were considered during the Feasibility Study[3]. Various alignment options within a 5 km corridor **(Figure ES-9)** from Sg. Buloh to Putrajaya were investigated. The preferred alignment then was decided based on an evaluation of various factors including :

[3] Feasibility Study for KV MRT Lines 2 and 3. Final Report. SPAD, 2013

- The route should improve connectivity to present and future major developments and areas that have potentially high ridership;
- The route must facilitate regeneration in areas like Batu Kentonmen area, Tun Razak Exchange development and Jalan Cochrane redevelopment.
- The route should provide connectivity to existing/ planned railway and other public transport systems including the KTM Komuter, LRT and monorail lines.
- The route should utilise highway land and other government reserves so as to minimise land acquisition.
- The social and environmental impacts should be kept to a minimum.

49. After a preliminary alignment was identified based on travel demand and ridership forecasts, substantial amount of investigations were focused on the following areas :

- Selayang Link line
- Jalan Ipoh
- Sentul to Kampong Bharu
- KLCC area
- Pasar Rakyat to Kg Pandan
- Kg Pandan to Plaza Phoenix
- Mines to Serdang
- Putrajaya Spur line

50. The preferred alignment, with options considered at selected stretches, was proposed at the end of the Feasibility Study. The alignment was deemed tentative at that point since detailed information was still being sourced. The options and preferred alignment during the Feasibility study were discussed with a variety of stakeholders via workshops and meetings.

<u>Alignment Options During the Preliminary Design Stage</u>

51. After the feasibility study was completed, MRT Corp, PDP and SPAD embarked on a thorough review of the alignment to ensure that the proposed alignment is the most optimum. Eight stretches were further analysed in detail:

- Location 1: Damansara Damai to Kepong Sentral
- Location 2: Jinjang to Batu
- Location 3: Batu to Titiwangsa (North Portal)
- Location 4: Titiwangsa
- Location 5: Titiwangsa to TRX
- Location 6: TRX to Serdang
- Location 7: Kuchai Lama
- Location 8: Serdang to Putrajaya

52. At each of these stretches, between 2 to 4 alternative alignments were investigated. The alignment alternatives were further assessed based on various criteria including ridership, short and long term social and environmental impacts, construction risk and costs in order to determine the most optimum alignment. The most optimum alignment was then chosen which is now called the SSP Line.

Tunnelling vs Elevated Structure Options

53. MRT Corp has considered the advantages and disadvantages of building elevated rail lines versus tunneled lines. The key factors include the availability of land, constructability, land acquisition, construction cost and social as well as environmental impacts. Based on these factors, it was decided that the Segment 2 (Jalan Ipoh – Bandar Malaysia South) stretch of the SSP Line should be underground while Segment 1, Segment 3 and Segment 4 shall be elevated.

EXISTING ENVIRONMENT

Terrain and Geology

54. The SSP Line traverses terrain ranging from RL 36m - 80m. The lowest points (RL 30m - 35m) are mainly in the city centre while higher areas are along the southern stretch of the alignment. The depot at Serdang is located on undulating terrain with elevations ranging from RL 84m - 140m.

55. The SSP Line is underlain by several geological formations, namely the Kenny Hills Formation, Kuala Lumpur Limestone, Hawthornden and Granite **(Table ES-2)**.

Table ES-2 Geology Along the SSP Line

Station Name	Station Location	Geological Formation
S01	Sg. Buloh	Granite
S02	Sri Damansara West	Granite
S03	Sri Damansara East	Granite
S04	Kepong Sentral	Hawthornden
S05	Metro Prima	KL Limestone
S06	Kepong Baru	KL Limestone
S07	Jinjang	KL Limestone
S08	Sri Delima	KL Limestone
S09	Kampung Batu	KL Limestone
S10	Kentonmen	KL Limestone
S11	Jalan Ipoh	KL Limestone
S12	Sentul West	KL Limestone
S13	Titiwangsa	Granite
S14	Hospital Kuala Lumpur	KL Limestone

Table ES-2 Geology Along the SSP Line (Cont'd)

Station Name	Station Location	Geological Formation
S15	Kampung Baru North	KL Limestone
S16	Ampang Park	Kenny Hill
S17	KLCC East	Kenny Hill
S18	Conlay	Kenny Hill
S19	Tun Razak Exchange	KL Limestone
S20	Chan Sow Lin	KL Limestone
S21	Bandar Malaysia North	KL Limestone
S22	Bandar Malaysia South	KL Limestone
S23	Kuchai Lama	Granite
S24	Taman Naga Emas	Kenny Hill
S25	Sungai Besi	KL Limestone
S26	Serdang Raya North	KL Limestone
S27	Serdang Raya South	Interface Kenny Hill & KL Limestone
S28	Seri Kembangan	KL Limestone
S29	UPM	Interface Kenny Hill & KL Limestone
S30	Taman Universiti	Kenny Hill
S31	Equine Park	Kenny Hill
S32	Taman Putra Permai	Kenny Hill
S33	16 Sierra	Kenny Hill
S34	Cyberjaya North	Kenny Hill
S35	Cyberjaya City Centre	Kenny Hill
S36	Putrajaya Sentral	Jelebu Schist

Land use

56. The SSP Line traverses along highways and densely built-up areas in Kuala Lumpur and Selangor. The Project traverses areas under the jurisdiction of six local authorities namely:
    - Majlis Bandaraya Petaling Jaya (MBPJ)
    - Majlis Perbandaran Selayang (MPS)
    - Dewan Bandaraya Kuala Lumpur (DBKL)
    - Majlis Perbandaran Subang Jaya (MPSJ)
    - Majlis Perbandaran Sepang (MPSp)
    - Perbadanan Putrajaya (PP)

57. The land use along the SSP Line consists of residential, commercial, industrial, institutional, and recreational. From Sg. Buloh to Jalan Ipoh, the land use is mainly residential and commercial uses. As the SSP Line enters the city centre of Kuala Lumpur, the land use becomes predominantly residential and commercial and remains so until Chan Sow Lin which is mostly consist of industrial and commercial. After Chan Sow Lin, the SSP Line traverses into the TUDM base at Sungai Besi where the future land use (Bandar Malaysia) is mixed use of residential and commercial.

58. The land use at the southern elevated segments is mixed, with a significant proportion of residential, commercial and institutional land uses. After Seri Kembangan, the SSP Line travels within institutional area of UPM and MARDI until Equine Park and Bandar Putra Permai where residential and commercial areas are the main land uses. The alignment then passes residential areas (e.g. D'Alpinia and 16 Sierra) making its way to Cyberjaya where the land use is mostly agriculture, commercial or institutional.

Climate, river system and water quality

59. The climate along the SSP Line is characterized by high annual rainfall and relatively uniform high humidity and temperature. Mean annual rainfall ranges from 1993 mm to 3190 mm (based on data from Subang, Sepang and Petaling Jaya). The mean annual 24-hour temperature ranges from 27.1^{o}C to 28.4^{o}C. The dominant wind directions are northwest (>12.6%), north (>15%) and east (>8.8%) respectively.

60. The SSP Line traverses three river basins, namely Sg Buloh (4.9km), Sg Klang (46.5 km) and Sg. Langat (0.8km). The SSP Line crosses several major tributaries of these rivers including Sg. Gasi, Sg. Keroh, Sg. Batu, Sg. Gombak, Sg. Bunus, Sg. Kerayong, Sg. Kuyoh and Sg. Gajah.

61. The Sg. Buloh, Sg. Klang and Sg. Langat are relatively urbanized catchments with numerous point and non-point sources of pollution. River water samples collected at 16 locations showed that the water quality of the rivers along the SSP Line ranges from Class I to Class III.

Air quality, noise and vibration levels

62. Measurements carried out at 13 locations showed that the air quality is generally within the Recommended Malaysia Air Quality Guidelines. The TSP level was good, ranging from 65 - 112 µg/m^3 and PM_{10} concentrations ranged from 34 - 67 µg/m^3. NO_2 was not detected while CO ranged from not detected to 5ppm.

63. 24-hour noise level monitoring was carried out at 67 locations. The L_{eq} levels ranged from 53 – 75 dBA (day time) and 48 – 72.7 dBA (night) as governed by existing land use at these locations. Noise levels at all, except one 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 only location where noise levels were within Schedule 1 limits was Taman Kaya.

64. Vibration levels, measured at the same 67 locations, ranged from 0.008 mm/s to 1.44 mm/s depending on local activities and road traffic. Vibration response curves were typically Curve 2 to 8. The vibration levels measured were well below level of structural damage concern and within human comfort level as assessed against limits stipulated in the DOE's Guidelines, except for 2 locations at Jalan Ipoh with relatively high vibration from road traffic and construction works.

Traffic

65. The SSP Line traverses busy roads and highways **(Table ES-3)**. The two-way traffic volume along Lebuhraya Kepong-Kuala Selangor is about 3000-5000 passenger car unit/hour (pcu/hr) at peak hour with a volume-capacity ratio 'E'. As the SSP Line progresses from Sri Damansara, traffic volume gets heavier with about 6000 pcu/hr and the volume-capacity ratio of 'E'.

66. The roads adjacent to the underground stations are Jalan Ipoh, Jalan Sultan Azlan Shah, Jalan Tun Razak, Jalan Raja Muda Abdul Aziz, Jalan Ampang, Jalan Binjai, Jalan Conlay and Jalan Chan Sow Lin. These roads cater for heavy traffic and are operating near their respective capacities.

67. From Kuchai Lama to Seri Kembangan, the major roads that may be affected are Sungai Besi Highway (BESRAYA), Jalan Utama and Jalan Besar as there are among roads having the highest v/c ratios.

68. The main roads adjacent to the elevated section from UPM to Putrajaya Sentral are Jalan Besar, Jalan Putra Permai, Persiaran Sierra Utama, Persiaran Apec and Jalan P7. With the exception of Jalan Besar, Jalan Putra Permai and Persiaran Apec which are operating at maximum capacity at peak hour, most of these roads are able to cope with current traffic.

Table ES-3 Broad-based Volume/Capacity Analysis

Road Section	No. of lanes	Two-Way Capacity (pcu/hr)	Two Way Peak		Highest v/c ratio
			AM Peak	PM Peak	
Jalan Kepong-Kuala Selangor	4	7,200	5,252	2,902	E
Persiaran Dagang	2	3,600	1,347	1,031	C
Selayang-Kepong Highway	4	7,200	6,182	5,478	E
Jalan Kepong	6	10,800	4,024	4,556	C
Jalan 1/18b	1	1,800	947	896	C
Jalan Ipoh	6	10,800	3,337	3,205	B
Jalan Sultan Azlan Shah	6	10,800	4,804	5,511	C
Jalan Tun Razak	6	10,800	10,931	8,179	F

Table ES-3 Broad-based Volume/Capacity Analysis (Cont'd)

Road Section	No. of lanes	Two-Way Capacity (pcu/hr)	Two Way Peak		Highest v/c ratio
			AM Peak	PM Peak	
Jalan Raja Muda Abdul Aziz	4	4,000	2,362	2,421	D
Jalan Ampang (West and East of Jalan Tun Razak)	6	6,000	5,225	3,923	F
Jalan Binjai	4	4,750	1,790	1,508	C
Jalan Conlay	2	1,800	525	632	B
Jalan Chan Sow Lin	4	4,750	2,000	1,500	C
Jalan Kuchai Lama	6	10,800	3,250	3,101	B
Jalan Merah Silu	2	2,600	537	281	B
Sungai Besi Highway	4	7,200	4,766	3,663	D
Jalan Utama	4	3,000	2,361	2,280	C
Jalan Raya Satu	6	7,500	1,812	2,089	B
Jalan Besar	3	4,500	2,822	3,249	F
Jalan Putra Permai	4	7,200	3,737	2,776	C
Persiaran Sierra Utama	4	6,000	666	1,522	B
Persiaran Apec	4	7,600	3,188	3,233	D
Jalan P7	4	7,200	2,046	1,984	B

Socio-economy

69. Within the 400m corridor of the SSP Line, the total population was estimated to be 322,885 in 2010 and this increased to 342,990 in 2014. The population distribution in the impact zone is as follows:
    - 23% in the Northern Elevated Segment
    - 21% in the Underground Segment
    - 46% in the Southern Elevated Segment 1
    - 10% in the Southern Elevated Segment 2

70. The largest ethnic group in the impact zone is the Chinese who make up 46% of the total population (**Table ES-4**). The second largest group is the Malay and other Bumiputera with a share of 34%. The Indians and Others have a combined share of 9%. The non-Malaysians are relatively large, at 10% of the population in the impact zone.

Table ES-4 Population Distribution by Segment and Ethnicity, 2010

Segment	Malay & Other Bumiputera (%)	Chinese (%)	Indians (%)	Others (%)	Non Malaysian Citizens (%)
Northern Elevated Segment	23.7	58.9	9.4	0.5	7.5
Underground Segment	32.7	39.7	9.2	0.6	17.7
Southern Elevated Segment 1	37.5	44.7	8.4	0.3	9.1
Southern Elevated Segment 2	51.3	28.2	8.2	0.6	11.7
Impact Zone	34.6	45.3	8.8	0.5	10.8

Source: Department of Statistics, Population & Housing Census 2010, "Special Request" (December 2014/February 2015)

Ecology

71. The SSP Line does not traverse through any ecologically sensitive areas. The proposed depot site located within MARDI and UPM land are mainly comprises of grasslands, plantations and secondary forest where small mammals and birds are expected to roam. No endangered rare flora and fauna is expected.

PUBLIC PERCEPTION AND STAKEHOLDER FEEDBACK

72. A public perception survey involving 1500 respondents was undertaken from 22 November 2014 to 26 February 2015. In addition, 33 interviews, FGDs and dialogues were conducted from 7 December 2014 to 9 March 2015. The public perception and stakeholder feedback are important inputs in the planning of the SSP Line.

Public Perception

73. Overall, the level of awareness about the MRT is low. Only about half the respondents have, read or heard about the SSP Line. In some areas such as in Seri Kembangan and Kepong/Jinjang, the level of awareness is very poor where only 34 - 40% have heard of the project (**Table ES-5**).

Table ES-5 Awareness of MRT / SSP Line

Zone	% Read or heard of SSP Line
Sri Damansara/ Menjalara	50.0
Kepong/ Jinjang	40.0
Batu/ Jalan Ipoh	60.0
Underground-Jalan Ipoh/ KLCC	54.7
Underground-TRX- Sg Besi Airfield	55.4
Kuchai Lama/ Salak South/ Sg Besi	64.0
Serdang Jaya	46.6
Seri Kembangan/ Sri Serdang	34.4
Equine/ Cyberjaya/ Putrajaya	64.8
Impact Zone average	**50.7**

Source: MRT2 Perception Survey December 2014 - February 2015

74. The respondents were shown a show card of the SSP alignment with explanations on approximate location of stations. Asked whether they would support the proposed SSP Line, there is a strong support at 89% (**Table ES-6**) with about 7% taking a neutral stance and only 4.4% who do not support. There are variations on the level of support across zones. The Batu/Jalan Ipoh zone had the highest proportion (10%) that does not support SSP Line, followed by Serdang Raya/Seri Kembangan zone (8%). Zones that showed strong support for SSP Line are Jalan Chan Sow Lin and Putrajaya.

Table ES-6 Support for SSP Line

Zone	Strongly/ Do not Support (%)	Neutral (%)	Strongly/ Support (%)
Sri Damansara/ Menjalara	4.1	4.5	91.4
Kepong/ Jinjang	4.4	8.9	86.7
Batu/ Jalan Ipoh	10.0	9.0	78.2
Underground-Jalan Ipoh/ KLCC	4.0	6.0	90.0
Underground-TRX- Sg Besi Airfield	0.0	1.6	98.4
Kuchai Lama/ Salak South/ Sg Besi	6.2	11.0	82.8
Serdang Jaya	3.8	8.5	87.7
Seri Kembangan/ Sri Serdang	8.0	12.0	80.0
Equine/ Cyberjaya/ Putrajaya	3.1	5.1	91.7
Total	4.4	6.9	88.7

Source: MRT2 Perception Survey December 2014 - February 2015

75. A vast majority of respondents believe that the project will not affect them adversely. This positive perception permeates throughout all the survey zones. There are, of course, some variations in opinions. For example, the highest proportions who believe they would not be impacted personally by SSP Line are in Jalan Chan Sow Lin/ Sg Besi Airfield area, and in Serdang Jaya/ Seri Kembangan.

76. Those who have indicated that they would be affected by the SSP Line were asked to list two impacts (**Table ES-7**). The most dominant perceived negative impact is traffic congestion, followed by noise. A comparison of among residential and commercial/industrial groups showed that residents are more worried over traffic congestion while the commercial/industrial groups fear a loss of business if the project takes too long to construct and a loss of customers as a result of parking problems and traffic congestion.

EXECUTIVE SUMMARY

Table ES-7 : Perceived Impacts on Individuals and their Families

Type	Type of Impact	%
Negative	Existing parking area will decrease with increasing number of vehicle during MRT operation	3.9
Negative	Safety of children is affected if MRT is close to home	2.6
Negative	Difficulties for outdoor activities if construction works being carried out	1.9
Negative	Dusty conditions will affect health, especially children and elderly	6.8
Negative	Cracks to houses during construction	1.9
Negative	Roads will be damaged	1.0
Negative	Traffic congestion will worsen	42.9
Negative	Loss of business if the project construction is too long	8.4
Negative	Loss of customers due to parking problem and traffic congestion	9.0
Negative	Noise	11.9
Negative	Safety of people and property could be compromised	5.8
Negative	Rental rates will increase	0.3
Negative	Forced to move, difficulty getting home near the workplace	1.9
Positive	Sales increase when businesses are near to the MRT station	1.0
Positive	Easy to get to work/ other places	0.6
Impact Zone (%)		100.0

Source: MRT2 Perception Survey December 2014 - February 2015

Negative Perceptions

77. The most widely perceived negative impact is safety and security during construction (90.3%) **(Table ES-8)**. This perception could be influenced by recent incidents at construction worksites. The second most widely perceived negative impact is traffic congestion (88.7%). Again, this perception could be influenced by experiences with ongoing construction works on the LRT and MRT. Other perceived negative impacts are dust and air pollution (84.3%), vibrations and cracks (83.1%), and noise (74.8%).

78. The five major negative impacts **(Table ES-9)** perceived by respondents during the operations of MRT are :
    - Inadequate parking at stations (84.9%);
    - Safety and security (82.9%);
    - Vibration and cracks (80.6%);
    - Dust and air pollution (80.6%); and
    - Inadequate or poor feeder bus services.

EXECUTIVE SUMMARY

Table ES–8 Perceived Negative Impacts during Construction

Impact Zone	Very important/ Important	Neutral	Very unimportant/ Unimportant	Total
Safety and security	90.3	0.1	2.3	92.6
Traffic congestion	88.7	0.1	2.1	90.8
Dust and air pollution	84.3	0.1	3.1	87.6
Vibration and cracks	83.1	0.1	3.0	86.2
Noise	74.8	0.1	3.2	78.1
Parking problems	74.1	0.2	3.3	77.6
Disruptions to utilities	67.6	0.2	3.3	71.1
Close proximity to worksites	63.6	0.2	5.1	68.9
Public inconveniences	63.1	0.2	6.8	70.1
Loss of privacy	61.7	0.2	10.2	72.2
Property acquisition & relocation	60.8	0.2	10.4	71.4
Reduction of property value	56.6	0.2	9.5	66.3
Flash floods	52.2	0.2	18.2	70.6
Loss of business income	47.5	0.3	22.3	70.1
Loss of aesthetics/ vista	28.0	0.4	22.0	50.4

Source: MRT2 Perception Survey December 2014 - February 2015

Table ES-9 Perceived Negative Impacts during Operations

Impact Zone	Very important/ Important (%)	Neutral (%)	Very unimportant/ Unimportant (%)
Inadequate parking at stations	84.9	12.4	2.7
Safety and security	82.9	14.3	2.7
Vibration and cracks	80.6	15.7	3.7
Dust and air pollution	80.6	15.5	3.9
Inadequate or poor feeder bus services	77.2	18.7	4.1
Traffic congestion	75.1	17.5	7.4
Noise	74.5	21.9	3.6
Parking problems near stations	74.5	22.0	3.5
Loss of privacy	58.8	30.8	10.4
Loss of property values due to close proximity to MRT Line	52.9	33.3	13.7
Loss of business income	46.5	31.9	21.7
Loss of aesthetics/ vista	40.1	40.5	19.4
Impact Zone	**69.5**	**22.5**	**8.0**

Note: Source: MRT2 Perception Survey December 2014 - February 2015

79. There are five actions that the respondents think will be most effective in dispelling their concerns are:
    - Feeder bus service to and from station (71.5%)
    - Safety and security measures (70.9%)
    - Traffic management plan (65.6%)
    - Noise buffering equipment (62.0%)
    - Physical barriers to protect privacy (61.0%)

EXECUTIVE SUMMARY

Feedback from stakeholder engagement

80. 33 stakeholder engagement sessions, in the form of focus group discussion, case interview or public dialogues, were held in different locations addressing a wide range of stakeholders such as local communities, non-governmental organizations, businesses and government agencies (**Table ES-10**). At these dialogues, the stakeholders were briefed about the proposed SSP Line, the EIA process and an overview of the anticipated environmental impacts.

Table ES-10 Stakeholder Engagement Sessions

No	Stakeholder	Social Group	Type of Engagement
1	Damansara Damai	Commercial	FGD
2	Sri Damansara – Menjalara	Commercial	FGD
3	Sri Damansara Community	Residential	Public Dialogue
4	Metro Prima-Kepong	Commercial	FGD
5	Taman Jinjang Baru	Residential	FGD
6	Jinjang-Jalan Kepong	Commercial	FGD
7	Kg Batu Delima	Residential	FGD
8	Pekan Batu PPR/Taman Rainbow/Taman Bamboo	Residential	FGD
9	Jalan Ipoh	Commercial	FGD
10	Hospital Kuala Lumpur	Institution	Interview
11	Istana Budaya	Institution	Interview
12	Perbadanan Pembangunan Kampong Bharu	Institution	Interview
13	Kompleks Kraftangan, Jalan Conlay	Institution	Interview
14	Ampang Park-Jalan Binjai	Commercial	FGD
15	PPR Laksamana Jalan Peel	Residential	Public Dialogue
16	Chan Sow Lin	Commercial//Industrial	FGD
17	Kuchai Lama	Commercial//Industrial	Public Dialogue
18	Salak Selatan Baru	Commercial/Residential	Interview
19	Taman Salak Selatan – Taman Naga Emas	Residential	Public Dialogue
20	Kg Malaysia Raya	Residential	FGD
21	Police Station, Pekan SgBesi	Institution	Interview
22	Pekan SgBesi	Commercial	Public Dialogue
23	PPR Raya Permai – Pangsapuri Permai	Residential	FGD
24	Serdang Raya	Corporate	Interview
25	Serdang Raya	Commercial	Public Dialogue
26	Serdang Raya	Residential	Public Dialogue
27	Seri Kembangan North	Residential	Public Dialogue
28	Seri Kembangan South (Taman Equine/ Taman Dato' Demang/ Taman Pinggiran Putra)	Residential	FGD
29	Seri Kembangan (Commercial & Industrial)	Commercial	Interview
30	Putrajaya (Presint 7, 8 & 9)	Residential	FGD
31	Perbadanan Putrajaya	Institution	Interview
32	Cyberview Sdn Bhd	Corporation	Interview
33	Putrajaya Holdings	Corporation	Interview

EXECUTIVE SUMMARY

Positive Perceptions

81. The general consensus is that the SSP Line is a much needed public transport project especially with enhanced connectivity to other public transport modes. In places like Damansara Damai, having the SSP Line reduces their need to rely on motor vehicles and the use of only one entry into their housing area. In other areas such as Pekan Batu and Kepong, stakeholders see the SSP Line as providing them with an additional public transport mode. Through integration with other urban rail lines, many stakeholders acknowledge that, with the SSP Line, they could have access to seamless connectivity across the entire Klang Valley using the MRT, LRT and KTM Komuter.

82. Business establishments, especially those near to proposed stations, perceive the SSP Line as an opportunity to increase their earnings. This view is found in Damansara Damai and Chan Sow Lin. The Hospital Kuala Lumpur and Kompleks Budaya also see SSP Line as beneficial to the public and this benefit does, to some extent, outweigh some of the concerns they have of the SSP Line being too close to them. In places like Cyberjaya and Putrajaya, having the SSP Line would serve as a strong catalyst for growth in their areas. Putrajaya is experiencing a tourism boom and sees the SSP Line as another mode of transport that would enhance its connectivity to Kuala Lumpur. When SSP Line is linked to the HSR, the communities here are seen to benefit further in many ways.

Negative Perceptions

83. The concerns over the SSP Line expressed by all groups met during the engagements vary according to their varying interests but top of their concerns are land acquisition, traffic congestion, and increase in noise levels and vibration. The main concerns raised were :

- Traffic congestion, diversion and reduced lane during construction;
- Park and Ride Facility
- Accessibility to stations and facilities;
- Land acquisition issues;
- Environmental pollution such as noise and vibration, dust and air pollution, flash flood, land subsidence;
- Safety and risk;
- Constructability of some MRT sections; and
- Appropriateness of some stations

POTENTIALLY SIGNIFICANT IMPACTS & MITIGATING MEASURES DURING PRE-CONSTRUCTION AND CONSTRUCTION STAGES

84. A range of potential impacts can be expected during the pre-construction and construction phases of the Project. The receptors of the potential impacts from the Project would include various communities and land uses located close to the line and the proposed stations. Since the SSP Line mainly traverses built-up area of urban and suburban areas, there are no ecologically sensitive areas. The potentially significant impacts during the pre-construction and construction stages of the Project are shown in **Table ES-11**.

Table ES-11 Potential Impacts During Pre-Construction and Construction Stage

Potential Impacts	Activities
Loss of land or properties	• Land and/or property acquisition
Damage to utilities	• Utilities relocation
Traffic congestion	• road diversion, closure and lane reduction for viaduct and station construction • construction vehicles transporting excavated materials, construction materials and equipment/ machinery
Public safety (residents, workers, road users and adjacent building)	• utilities relocation works • accidents from temporary closure or diversion of roads, transportation of construction material & equipment • occupational and safety hazard from use of heavy machinery, malfunction of machinery, working at height and confined space
Increased noise level	• tunneling and piling works • construction of viaducts and elevated stations • use of high noise generating machineries such as generators, power tools, hydraulic breaker and grinding and cutting equipment
Increased vibration level	• tunneling and piling works
Groundwater regime	• tunneling and underground station construction
Soil erosion and sedimentation	• site clearing and earthworks from depot construction • sedimentation from excavation works
Pollution of water courses	• the use of bentonite slurry for tunneling works • sedimentation from excavation works
Air pollution	• earthworks • movement of construction vehicles
Waste generation	• site office and workers camp • site clearing
Economic benefits	• economic growth, job creation, other multiplier effects and tax revenues to Government would accrue during the construction period.

EXECUTIVE SUMMARY

Pre-construction phase

85. The main potentially significant impacts expected during the pre-construction stage are related to the following activities:
    - Land and property acquisition
    - Utilities relocation

86. The land and property acquisition is an important issue during pre-construction stage in view of the potentially large number of land and properties that may be acquired for the Project. It is estimated that 704 lots are likely to be acquired for the SSP Line. Out of this, 201 located along the Northern Segment, 293 over Underground Segment, 141 within Southern Segment 1 and 69 along the Southern Segment 2.

87. The majority of the stakeholders' engagement sessions raised land acquisition as an important issue. The vital question for all of them is whether they could be affected by acquisition. Some of the impacts include:
    - Not able to relocate to a similar property due to lack of availability or affordability
    - Loss of social cohesion, sense of community and current lifestyle for long standing communities
    - In the case of businesses, there will be potential loss of customers – particularly businesses that rely on the local neighbourhoods.

88. Some of the mitigating measures proposed include:
    - Ensure a fair valuation of land or properties that will be acquired.
    - Develop communication and engagement plan with focus on dissemination of information on land acquisition process to the affected parties
    - Establish a dedicated team to handle the land acquisition
    - Maintain continuous engagement with the affected parties to address and attend to any queries to the whole spectrum of acquisition.
    - Provide due notice, information and assistance to the affected parties, giving them ample time to make alternative plans and minimize inconveniences

89. Before the construction proper begins, affected utilities along the Project corridor will be relocated or protected. Some of these relocation works may cause traffic congestion. Where necessary, the horizontal direct drilling method or pipe jacking method will be used to relocate the services as this method will minimize the need for open trenching on the road surface. Mitigation measures include having an effective safety management plan during utilities relocation, relocation of utilities by appropriate method to minimize threat or risk and traffic management plans

During Construction

90. Potentially significant impacts from the underground works include traffic congestion, increased noise and vibration levels, construction risks due to karstic geology as well as other construction risks, impacts to groundwater regime, pollution of water-courses and flooding.

91. Viaduct and elevated station construction is of concern to the adjacent communities particularly residential areas besides safety to road users. Some of the main potential impacts are traffic congestion, increased noise and vibration level as well as risks to the public safety.

92. The depot at Bukit Serdang might contribute to traffic congestion, noise, dust, soil erosion, sedimentation from site clearing, flooding and generation of wastes and sewage.

Traffic Congestion

93. The proposed construction works for elevated segments inevitably involve temporary closure of roads, the reduction of lane widths and working area being located on the road shoulder - effectively reducing the capacity of the roads and some roads where the elevated stations are located are expected to experience significant traffic congestion.

94. Along the Northern Elevated Segment, Jalan Kepong-Kuala Selangor and Jalan Kepong (near stations at Sri Damansara, Bandar Menjalara, Kepong Sentral and Jinjang Utara) and Jalan Ipoh (near stations at Batu and Kentonmen) are likely to be affected.

95. Along the Southern Elevated Segment 1, Sg Besi Highway (near stations at Kuchai Lama, Taman Naga Emas and Pekan Sungai Besi), Kuala Lumpur-Seremban Expressway (near stations at Kuchai Lama, Taman Naga Emas and Serdang Raya) and Jalan Sungai Besi (near station at Pekan Sungai Besi) are likely to be affected.

96. Along the Southern Elevated Segment 2, Jalan Putra Permai (near stations at Taman Universiti, Equine Park and Bandar Putra Permai) is most affected while traffic condition at Persiaran Sierra Utama and Persiaran Apec is expected to have lesser impacts due to smaller numbers of road users.

97. There may be a certain amount of traffic congestion in the vicinity of underground works due to reduction in lane sizes or road diversion to accommodate machinery and working space, especially at Jalan Tun Razak, Jalan Binjai and Chan Sow Lin and due to movement of construction vehicles or dump trucks and its surrounding land use.

98. The construction of depot is expected to increase the traffic congestion on Jalan Putra Permai and Jalan Indah. It is estimated that a total of 930,000 m^3 of materials will be excavated from the site. This will generate about 360 truck-trips per day from the site to the approved dump site. In addition, slow moving construction vehicles would reduce travel speed and thus create temporary bottlenecks that cause congestion.

99. Measures proposed to minimize traffic congestion include:
    - Proper traffic management with adequate warning signs and flagmen
    - Maintain number of lanes of major roads as much as possible
    - Minimum lane width of 2.75m-3.0m should be maintained for all the roads which involves reduction in lane width for construction activities
    - Dump trucks to operate at off-peak traffic hours (10am to 4pm and 8pm to 6am)
    - Specific traffic management plan for each construction site shall be prepared.
    - Adequate tow-trucks and emergency response teams shall be provided with a maximum response time of 15 minutes
    - Temporary route diversion is recommended during peak hours

Noise and Vibration Impacts

100. Construction of piers shall typically require piling. Some degree of noise and vibration impacts to houses close to the line is therefore anticipated. These include houses adjacent to the alignment for instance at Sri Damansara, Batu, Jalan Ipoh, Kampung Baru Salak Selatan, Taman Naga Emas, Kampung Malaysia, Pangsapuri PPR Raya Permai, Taman Serdang Raya, Kampung Baru Seri Kembangan, Taman Pinggiran Putra, Taman Dato' Demang, Taman Putra Permai, D' Alpinia and 16 Sierra. Piling and associated construction activities at proposed depot could cause noise and vibration impacts towards Taman Universiti.

101. Noise generated during underground works will come mainly from earth moving equipment, heavy vehicles, generators and piling. These noise sources are fairly localized relative to the entire Project work site, and are limited to specific locations where they are used. Critical areas include houses near the Taman Kaya, Komplex Mutiara, Sang Suria Condominium, The Maple, Titiwangsa area, Jalan Raja Muda area as well as Jalan Conlay area besides SMK P at Jalan Ipoh and Hospital Kuala Lumpur.

102. Measures to minimize noise and vibration include:
    - Traffic diversion plan to avoid local roads (where possible) and movement of construction vehicles during off-peak hours
    - Temporary noise barrier
    - Equipment shielding and enclosures
    - Use of low noise piling methods i.e. bored piling
    - Flexible noise shroud for piling machine
    - Trenches and oscillating type casting
    - Restrict piling activities to day time only
    - Continuous monitoring programme

Geotechnical Hazards and Construction Risks

103. Main risks posed by karstic geology are the uncertainties associated with the underground works in Limestone Formation. Discoveries of sinkholes and cavities during construction and tunneling works in this formation have been widely reported. Some of the associated risks are from tunneling, pile

foundation, deep excavation retaining structures and sub-surface investigation.

104. Measures to minimize risks from karstic geology include:
- Detailed soil investigation involving boreholes and geophysical methods
- Grouting and the proper selection of TBM operating parameters for tunnelling. For pile foundation and retaining structures, rock socketing, continuous bored pile and secant and grouting will be adopted

Ground water regime

105. The underground works could potentially lower the groundwater table and cause settlement, collapse or sinkholes. Any inflow of water into the tunnel will result in loss of face support which can lead to face collapse. The loss of face support may lead to large volume of ground loss and may even trigger huge collapse and formation of sinkholes, which could be fatal.

106. Measures to minimize impacts to groundwater regime include.
- Rock fissure grouting. Grouting of the annular void space between the concrete lining of the tunnel and the soil shall be adopted to prevent seepage of water through the tunnel lining
- Suitable TBM appropriate for use in Karstic Limestone

Public Safety

107. The construction of the elevated sections requires use of machinery at height thus poses risk to the public and workers directly below or close to the elevated works. Vehicular accidents and safety hazards during construction of elevated stations and viaduct are of concern. Some of the critical areas include Jalan Kepong-Kuala Selangor, Jalan Kepong, Jalan Ipoh, Sg Besi Highway, Kuala Lumpur-Seremban Expressway, Jalan Sungai Besi, Jalan Serdang Raya, Jalan Raya 1 and Jalan Putra Permai.

108. Underground works pose safety concerns in the likes of sudden settlement or cavity underground, blasting effect, flooding in tunnel and also safety hazard to the public and workers directly involved in the construction.

109. Proposed prevention and mitigation measures include:
- Pilot boring plan
- Install collapse detectors
- Control advance rate, cutter rotation and thrust
- Pre-ejecting grouting
- Work guide for dealing with cavities and ground settlement
- Monitoring of weak supports/areas, water pressure, water leakage, drainage water level during construction
- Work guide for trial blast
- Install emergency floodgate
- Safety procedures training
- First aid and emergency procedures training

EXECUTIVE SUMMARY

Air Quality

110. Short term to medium term air quality degradation mainly in the form of dust emission is also expected from elevated section constructions at minimal impact. The area of influence for the fugitive dust is anticipated to be localized within the construction area (usually less than 50 m away) as the work area will be small.

111. Dust emission is a concern during the construction of the depot at Bukit Serdang. Site clearing will be staggered over 2 months while earthworks will be carried out over 24 months. In the worst case scenario, dust dispersion could be a problem to receptors at Taman Universiti Indah, Taman Equine and Taman Putra Permai and MARDI located within the 1.5 km radius. However with the implementation of mitigating measures such as phasing development instead of total site clearing, watering of access road, wash trough, hoarding around the work area and control movement of construction vehicles, the dust concentration is expected to be within the Malaysian Ambient Air Quality Guidelines.

Soil Erosion and Sedimentation

112. Impact from soil erosion and sedimentation is expected to be minimal for elevated works since cleared areas for each station and pier are small. However, dewatering of the sub-structure working area might lead to sedimentation. Elevated structures near river crossings at Sg. Gasi, Sg. Keroh, Sg. Batu, Sg. Kerayong, Sg. Midah, Sg. Kuyoh and Sg. Gajah as well as the certain ponds may result in sedimentation of the river due its close proximity to the water during construction of viaduct piers and pile cap.

113. Impact from soil erosion and sedimentation at the shafts and underground stations are expected to be minimal due to small work area. In addition, all excavated material will be disposed into the bins prior to disposal at the dump site.

114. Site clearing and earthwork from the construction of the depot may cause soil erosion and result in sedimentation in the surrounding drainage and waterways. The main concern would be exposure of 44 ha of cleared area as this will increase erosion risks and lead to sedimentation of the receiving water way or drainage system. The Erosion and Sedimentation Control Plan (ESCP) for the depot has been prepared.

115. Common mitigation measures for soil erosion and sedimentation include:
- Portable silt trap to capture the runoff
- Silt fence being erected along the existing watercourses to filter the runoff
- Sand bags being placed along the working area to filter the sediment outflow
- Sheet pile to be installed at the river bank
- Temporary slope protection via installation of geotextile/ canvas at river banks
- Turfing to be carried out at areas where construction work has been completed

116. The ESCP has been prepared for the underground and elevated construction sites. Measures include silt traps, perimeter drains, containment bund, check dams, silt fence and wash troughs to be implemented depending on the site conditions and the space availability.

Flooding

117. Flooding may occur if the drainage system at the work area is obstructed, narrow and shallow or unable to accommodate the increase in surface run-off. Perimeter drains and berm drains for proper conveyance of surface runoff into the drainage system have been proposed in the ESCP.

Waste Generation

118. Slurry discharge from tunnelling works and erosion at the launch shafts and retrieval shafts could potentially cause water pollution which shall be treated at the wastewater treatment plants prior to discharge into the drainage system.

119. Biomass, solid wastes, scheduled wastes and construction wastes will be generated from depot construction. While biomass can be used temporarily for slope protection before being disposed at approved location, excavated or unsuitable material will be disposed at approved dumpsite, solid waste will be sent to permitted landfill and scheduled waste shall be stored and labelled properly before being transported to licensed handling facilities.

Benefits During Construction Stage

120. Increase in economic activities and employment are the major positive impacts during the construction stage. At the national level, the construction sector is expected to benefit from the Project due to its size and magnitude. The main beneficiaries in this sector include:

- Construction sector
- Construction material supplier (demand for construction material such as cement and steel is expected to increase)
- Engineering and support services companies that provide civil and structural works, survey works, transport planning and other related services.

121. 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.

POTENTIALLY SIGNIFICANT IMPACTS & MITIGATING MEASURES DURING THE OPERATIONAL STAGE

122. The main potentially significant impacts expected during the operations are:
- Noise - from the operations of the trains, particularly at the approach to stations and at bends and at locations close to receptors.
- Vibration - from the train operations particularly in the underground sections
- Traffic – the Project would contribute towards alleviating traffic in the Klang Valley. There are concerns of localized congestions in the vicinity of stations.
- Air quality – the Project will improve the overall air quality along the corridor. At the localized level, there could be increased pollution at certain stations.
- Visual impact – the elevated structures are likely to affect the landscape along the entire alignment.
- Social impacts – the majority of the residents in the KL Conurbation will benefit in terms of improved efficiency of transportation and enhanced economic activities. At some localized areas, adverse impacts in terms of nuisance and traffic congestion.

<u>Noise</u>

123. Noise modelling shows that the increase in L_{Aeq} is generally not significant **(Table ES-12)** due to the short term nature of train pass-bys except at several locations. The cumulative L_{eq} noise from the trains combined with the ambient noise typically increases by less than 5 dB during the day in most locations. However at some locations, especially in the Southern Elevated Segments 1 & 2, there could be increases between 10 – 27 dBA.

124. The maximum noise level, L_{max} (without noise barriers) during trains pass-by will be lower than 75 dB(A) at more than 75% of control locations. Some areas such as UPM, Mardi, Sg. Besi and Taman Naga could experience increases up to 15 dBA. It is therefore pertinent that noise barriers are installed to reduce the noise levels at the sensitive noise recipients. Without noise barriers, noise disturbance is anticipated for all dwellings located within 50m from the alignment with a line of sight to the tracks (typically high rise apartments), and also dwellings even without a direct line of sight but close to the alignment (i.e. 15 m away)

125. Noise mitigation for the SSP Line shall include the use of continuous welded tracks, noise barriers and acoustic absorption. The most common and practical mitigation of airborne noise transmission from the MRT tracks is the use of noise barriers built on the edge of the viaduct (on the parapet wall of the viaduct) for elevated tracks. Noise barrier design and constructions can either be of the absorptive type used in combination with diffusive or reflective panels. The absorption occurs when sound energy impinging onto the panels is substantially absorbed (typically more than 50% sound absorption). Noise barrier and enclosures, similar to those used on the SBK Line (**Plates ES-5a – ES-5-d)**, shall be adopted for the SSP Line. Locations that would require noise barriers are listed in **Table ES-13 to ES-15**.

EXECUTIVE SUMMARY

Table ES-12 Predicted Noise Levels L_{eq} and Assessment

Ref.	Location	Measured Existing Noise		Recommended Acceptance Limits*		Predicted Train Noise		Cumulative Noise		L_{eq} Noise Increase		Exceed Acceptance Limits	
		L_{eq} Day	L_{eq} Night	L_{eq} Day	L_{eq} Night	Pass by L_{max}	L_{eq}	L_{eq} Day	L_{eq} Night	Day	Night	L_{eq} Day	L_{eq} Night
N1	IGB International School, Sungai Buloh	66.0	58.7	69	62	74	64	70	68	4	10	Yes	Yes
1a	Sierramas New Villa	66.0	58.7	69	62	67	57	66	63	0	4	No	Yes
N2	Saujana Damansara Residential	63.5	58.6	65	60	67	57	64	61	1	2	No	Yes
2a	Saujana Damansara Shop Apartment	63.5	58.6	65	60	68	58	65	61	1	3	No	Yes
2b	Damansara Damai Residential	63.5	58.6	65	60	66	56	64	61	1	2	No	Yes
2c	Damansara Damai Shop Apartment	63.5	58.6	65	60	68	58	65	61	1	3	No	Yes
2d	Prima Damansara	63.5	58.6	65	60	71	61	65	63	2	4	Yes	Yes
N3	Sri Damansara Hotel	71.4	68.2	74	71	72	62	72	69	0	1	No	No
3a	Hotel under construction	71.4	68.2	74	71	75	65	72	70	1	2	No	No
3b	8trium	71.4	68.2	74	71	75	65	72	70	1	2	No	No
N4	Twintech	69.5	66.4	73	69	74	64	71	68	1	2	No	No
N5	Sri Damansara Clubhouse	72.3	70.1	75	73	72	62	73	71	0	1	No	No
5a	Sri Damansara Development(Persiaran Perdana)	72.3	70.1	75	73	74	64	73	71	1	1	No	No
N6	Persiaran Dagang	62.1	53.9	65	60	67	57	63	59	1	5	No	No
N7	Wisma Twintech	61.0	53.4	65	60	74	64	66	64	5	11	Yes	Yes
7a	Jalan 2/62a Menjalara	65.3	57.1	65	60	65	55	66	59	0	2	Yes	No
7b	Taman Bukit Maluri	66.0	64.4	69	67	67	57	67	65	1	1	No	No
7c	Persiaran Dagang	66.5	59.3	70	62	66	56	67	61	0	2	No	No
7d	Persiaran Dagang	66.5	59.3	70	62	66	56	67	61	0	2	No	No

*Note: Limits highlighted are based on L_{eq} + 3 criteria. Locations anticipated to exceed recommended limits from MRT operations are highlighted.

EXECUTIVE SUMMARY

Table ES-12 Predicted Noise Levels L_{eq} and Assessment (Cont'd)

Ref.	Location	Measured Existing Noise		Recommended Acceptance Limits*		Predicted Train Noise		Cummulative Noise		L_{eq} Noise Increase		Exceed Acceptance Limits	
		L_{eq} Day	L_{eq} Night	L_{eq} Day	L_{eq} Night	Pass by L_{max}	L_{eq}	L_{eq} Day	L_{eq} Night	Day	Night	L_{eq} Day	L_{eq} Night
N8	Hotel Sutera	66.5	59.3	70	62	75	65	69	66	2	7	No	Yes
8a	Taman Bukit Maluri(Jalan Burung Sintar)	66.0	64.4	69	67	71	61	67	66	1	2	No	No
8b	Kepong Sentral Condo	66.5	59.3	70	62	65	55	67	61	0	1	No	No
N9	Kepong Sentral Flat	69.0	65.3	72	68	78	68	72	70	3	5	No	Yes
N10	Taman Sri Ehsan	62.6	59.7	65	60	73	63	66	65	3	5	Yes	Yes
10a	Desa Jaya Kepong	62.6	59.7	65	60	70	60	65	63	2	3	No	Yes
10b	Masjid Al-Amaniah	65.0	60.0	65	60	75	65	68	66	3	6	Yes	Yes
10c	SJKC Kepong	62.9	59.0	65	60	73	63	66	64	3	5	Yes	Yes
N11	Casa Prima Condo	62.9	59.0	65	60	75	65	67	66	4	7	Yes	Yes
11a	Mutiara Metro Prima Flat	62.9	59.0	65	60	73	63	66	64	3	5	Yes	Yes
11b	Plaza Prima Apartment	62.9	59.0	65	60	73	63	66	64	3	5	Yes	Yes
N12	Vista Magna Apartment	69.2	66.2	72	69	69	59	70	67	0	1	No	No
12a	Apartment at Jalan Metro Perdana	65.0	60.0	65	60	73	63	67	65	2	5	Yes	Yes
N13	Vista Mutiara Condominium	73.5	71.1	77	74	67	57	74	71	0	0	No	No
13a	Apartment at Jalan Rimbunan Raya	65.0	60.0	65	60	72	62	67	64	2	4	Yes	Yes
N14	JinjangTemple	63.4	59.4	65	60	67	57	64	61	1	2	No	Yes
14a	JinjangTemple	63.4	59.4	65	60	69	59	65	62	1	3	No	Yes

*Note: Limits highlighted are based on L_{eq} + 3 criteria. Locations anticipated to exceed recommended limits from MRT operations are highlighted.

EXECUTIVE SUMMARY

Table ES-12 Predicted Noise Levels L_{eq} and Assessment (Cont'd)

Ref.	Location	Measured Existing Noise		Recommended Acceptance Limits*		Predicted Train Noise		Cummulative Noise		L_{eq} Noise Increase		Exceed Acceptance Limits	
		L_{eq} Day	L_{eq} Night	L_{eq} Day	L_{eq} Night	Pass by L_{max}	L_{eq}	L_{eq} Day	L_{eq} Night	Day	Night	L_{eq} Day	L_{eq} Night
N15	JinjangTemple and house	70.6	66.5	74	70	69	59	71	67	0	1	No	No
15b	DBKL Multipurpose Hall	70.6	66.5	74	70	68	58	71	67	0	1	No	No
15c	Houses at Kg Batu area	63.0	59.7	65	60	71	61	65	63	2	4	Yes	Yes
15d	Houses at Kg Batu area	63.0	59.7	65	60	72	62	66	64	3	4	Yes	Yes
N16	SMK Batu 5 and SJKC Mun Choong	63.0	59.7	65	60	73	63	66	65	3	5	Yes	Yes
N17	Alam Puri Condominium	60.9	54.0	65	60	72	62	64	63	4	9	No	Yes
N18	Permai Ria Conominium	63.6	59.1	65	60	74	64	67	65	3	6	Yes	Yes
18a	Flat Taman Batu Permai	63.6	59.1	65	60	71	61	66	63	2	4	Yes	Yes
N19	Sek. Keb Kg Batu	72.0	66.5	75	70	72	62	72	68	0	1	No	No
19a	Jalan Ipoh Shop Apartment	72.0	66.5	75	70	75	65	73	69	1	2	No	No
19b	Pelangi Indah Condominium	65.0	60.0	65	60	67	57	66	62	1	2	Yes	Yes
N20	Desa Alpha Condominium	61.2	56.2	65	60	74	64	66	65	5	8	Yes	Yes
N22	SMK P Jalan Ipoh	72.4	62.9	75	66	71	61	73	65	0	2	No	No
22a	Kompleks Mutiara	72.4	62.9	75	66	75	65	73	67	1	4	No	Yes
N23	Sang Suria Condominium	66.2	59.7	69	63	75	65	69	66	2	6	No	Yes
23a	The Maple	65.0	50.0	65	60	72	62	67	62	2	12	Yes	Yes
35a	Iris Apartment, Jalan Desa	68.0	64.0	71	67	63	53	67	64	0	0	No	No
35b	Flat Taman Sg Besi	68.0	64.0	71	67	68	58	68	65	0	1	No	No
N36	Jalan 5/116B, Kuchai Lama	70.5	66.1	74	69	74	64	71	68	1	2	No	No
36a	Flat, Jalan 7/116B Kuchai Lama	68.0	64.0	71	67	69	59	69	65	1	1	No	No
N37	De Tropicana Condo	70.0	64.3	73	67	78	68	72	70	2	5	No	Yes
N38	Jalan 35, Kg Baru Salak Selatan	65.8	58.8	69	60	72	62	67	64	2	5	No	Yes

*Note: Limits highlighted are based on L_{eq} + 3 criteria. Locations anticipated to exceed recommended limits from MRT operations are highlighted.

EXECUTIVE SUMMARY

Table ES-12 Predicted Noise Levels L_{eq} and Assessment (Cont'd)

Ref.	Location	Measured Existing Noise		Recommended Acceptance Limits*		Predicted Train Noise		Cummulative Noise		L_{eq} Noise Increase		Exceed Acceptance Limits	
		L_{eq} Day	L_{eq} Night	L_{eq} Day	L_{eq} Night	Pass by L_{max}	L_{eq}	L_{eq} Day	L_{eq} Night	Day	Night	L_{eq} Day	L_{eq} Night
N39	Jalan 36, Kg Baru Salak Selatan	64.6	57.7	65	60	72	62	67	63	2	6	Yes	Yes
39a	The Leafz	68.0	64.0	71	67	78	68	71	69	3	5	Yes	Yes
39b	Central Residence	68.0	64.0	71	67	79	69	72	70	4	6	Yes	Yes
N41	SMK Salak Selatan	61.0	54.1	65	60	73	63	65	64	4	9	Yes	Yes
N42	Flats, Jalan Gempita 1	64.1	57.4	65	60	69	59	65	61	1	4	Yes	Yes
42a	Jalan 5/140, Taman Naga Emas	61.0	54.1	65	60	73	63	65	64	4	9	Yes	Yes
42b	Jalan 3/140, Taman Naga Emas	62.0	52.0	65	60	70	60	64	61	2	9	No	Yes
42c	Flats, Jalan 4/140, Taman Naga Emas	62.0	52.0	65	60	82	72	72	72	10	20	Yes	Yes
42d	Flats adjacent to BB Sri Petaling St	58.0	54.0	65	60	75	65	66	65	8	11	Yes	Yes
42e	School near BB Sri Petaling St	58.0	54.0	65	60	73	63	64	64	6	10	No	Yes
42f	Institut Sosial Malaysia	58.0	54.0	65	60	68	58	61	59	3	5	No	No
42g	Hotel Institut Sosial Malaysia	68.0	64.0	71	67	76	66	70	68	2	4	No	Yes
N45	Jalan Badang	61.5	65.3	65	68	73	63	65	67	4	2	Yes	No
N47	Jalan Pauh Kijang	64.9	61.2	68	64	71	61	66	64	1	3	No	No
47a	Lorong Badang, BB Sri Petaling	61.5	65.3	65	68	68	58	63	66	2	1	No	No
47b	JKR Quarters (near Lorong Badang)	68.0	64.0	71	67	70	60	69	65	1	1	No	No
47c	High Rise, Bandar Tasek Selatan	65.0	60.0	68	63	79	69	70	70	5	10	Yes	Yes
47d	1 Petaling Residence	68.0	64.0	71	67	73	63	69	67	1	3	No	No
47e	Police Quarters, Sg Besi	65.0	60.0	68	63	90	80	80	80	15	20	Yes	Yes
47f	Masjid Jamek Sg Besi	61.2	59.8	65	60	71	61	64	63	3	4	No	Yes

*Note: Limits highlighted are based on L_{eq} + 3 criteria. Locations anticipated to exceed recommended limits from MRT operations are highlighted.

Table ES-12 Predicted Noise Levels L_{eq} and Assessment (Cont'd)

Ref.	Location	Measured Existing Noise		Recommended Acceptance Limits*		Predicted Train Noise		Cummulative Noise		L_{eq} Noise Increase		Exceed Acceptance Limits	
		L_{eq} Day	L_{eq} Night	L_{eq} Day	L_{eq} Night	Pass by L_{max}	L_{eq}	L_{eq} Day	L_{eq} Night	Day	Night	L_{eq} Day	L_{eq} Night
47g	Orphanage (ASDAT)	65.0	60.0	68	63	70	60	66	63	1	3	No	Yes
47h	Pangsapuri Permai	65.0	60.0	68	63	72	62	67	64	2	4	No	Yes
N49	PPR Kg Raya Permai	64.9	60.0	68	63	76	66	68	67	4	7	Yes	Yes
49a	Taman Tasik Damai	65.0	60.0	68	63	69	59	66	63	1	3	No	No
N50	Hotel Nouvell	75.1	72.8	78	76	76	66	76	74	1	1	No	No
N51	Jalan Serdang Raya	70.8	68.2	74	71	70	60	71	69	0	1	No	No
51a	Plaza Serdang Raya (mixed development)	68.0	64.0	71	67	78	68	71	69	3	5	Yes	Yes
51b	Jalan SR 6/1	68.0	64.0	71	67	75	65	70	68	2	4	No	Yes
51c	Mutiara Serdang	62.0	58.0	65	60	71	61	65	63	3	5	No	Yes
51d	Pangsapuri Seri Siantan	62.0	58.0	65	60	69	59	64	62	2	4	No	Yes
51e	Taman Serdang Raya	68.0	64.0	71	67	73	63	69	67	1	3	No	No
51f	Tunista Memorial	68.0	64.0	71	67	78	68	71	69	3	5	Yes	Yes
N52	Taman Serdang Raya (S)	70.9	67.6	74	71	71	61	71	68	0	1	No	No
N53	Flat Serdang Raya	69.7	66.6	73	70	76	66	71	69	2	3	No	No
53a	Jalan SK 11/1	72.0	68.0	75	71	72	62	72	69	0	1	No	No
53b	Balai Polis Seri Kembangan	68.0	64.0	71	67	72	62	69	66	1	2	No	No
N54	Police Quarters, Seri Kembangan	72.0	67.8	65	60	76	66	73	70	1	2	Yes	Yes
54a	Kuarters Bomba & Penyelamat SK	68.0	64.0	71	67	74	64	69	67	1	3	No	Yes
54b	Balai Bomba & Penyelamat SK	68.0	64.0	71	67	73	63	69	67	1	3	No	No
N55	Jalan 1/2, Taman Kembangsari	65.3	59.9	65	60	71	61	67	63	1	4	Yes	Yes

*Note: Limits highlighted are based on L_{eq} + 3 criteria. Locations anticipated to exceed recommended limits from MRT operations are highlighted.

EXECUTIVE SUMMARY

Table ES-12 Predicted Noise Levels L_{eq} and Assessment (Cont'd)

Ref.	Location	Measured Existing Noise		Recommended Acceptance Limits*		Predicted Train Noise		Cummulative Noise		L_{eq} Noise Increase		Exceed Acceptance Limits	
		L_{eq} Day	L_{eq} Night	L_{eq} Day	L_{eq} Night	Pass by L_{max}	L_{eq}	L_{eq} Day	L_{eq} Night	Day	Night	L_{eq} Day	L_{eq} Night
N56	Surau Al-Firdaus	69.7	65.5	73	69	68	58	70	66	0	1	No	No
56a	Kuil Sri Maha Kaliaman	68.0	64.0	71	67	72	62	69	66	1	2	No	No
N57	SJKC Serdang Baru 2	66.1	59.5	69	60	70	60	67	63	1	3	No	Yes
N58	Jalan 18/46, Taman Seri Serdang	59.4	50.1	65	60	70	60	63	60	3	10	No	Yes
58a	Taman Serdang Jaya	60.0	50.0	65	60	72	62	64	62	4	12	No	Yes
58b	UPM Quarters	62.0	55.0	65	60	67	57	63	59	1	4	No	No
58c	Jalan Keledang, Serdang	60.0	50.0	65	60	71	61	64	61	4	11	No	Yes
58d	UPM - MARDI	60.0	50.0	65	60	87	77	77	77	17	27	Yes	Yes
N60	Jalan Indah 1/1, Taman Universiti Indah	66.9	55.6	70	60	75	65	69	65	2	10	No	Yes
60a	Jalan Indah 2/1, Taman Universiti Indah	67.0	56.0	70	60	74	64	69	65	2	9	No	Yes
60b	Red Ruby Shop Apartment	65.0	60.0	68	63	71	61	66	64	1	4	No	Yes
60c	Flat, Jalan Indah 3, Tmn Univesiti Indah	65.0	60.0	68	63	65	55	65	61	0	1	No	No
60d	Taman Pinggiran Putra	65.0	60.0	68	63	68	58	66	62	1	2	No	No
60e	Pangsapuri Cemara	65.0	60.0	68	63	69	59	66	63	1	3	No	No
60f	Pangsapuri Rusella, Vista Pinggiran	65.0	60.0	68	63	73	63	67	65	2	5	No	Yes
60g	ZEVA @ Equine South	68.0	65.0	71	68	81	71	73	72	5	7	Yes	Yes
60h	Jalan Dd 3a/5, Taman Dato Demang	62.8	58.8	65	60	69	59	64	62	2	3	No	Yes
60i	Jalan PP 31 & Putra Raya Apartment	65.0	60.0	68	63	79	69	70	70	5	10	Yes	Yes
60j	Jalan PP 35, Tmn Pinggiran Putra	65.0	60.0	68	63	67	57	66	62	1	2	No	No
60k	Jalan PP 40, Tmn Pinggiran Putra	65.0	60.0	68	63	76	66	69	67	4	7	Yes	Yes

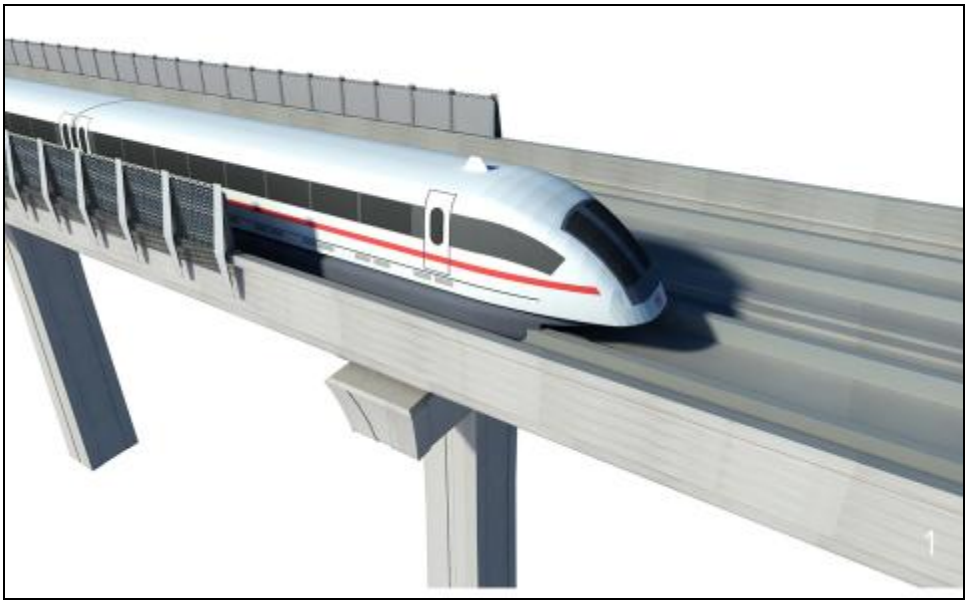
*Note: Limits highlighted are based on L_{eq} + 3 criteria. Locations anticipated to exceed recommended limits from MRT operations are highlighted.

EXECUTIVE SUMMARY

Table ES-12 Predicted Noise Levels L_{eq} and Assessment (Cont'd)

Ref.	Location	Measured Existing Noise		Recommended Acceptance Limits*		Predicted Train Noise		Cummulative Noise		L_{eq} Noise Increase		Exceed Acceptance Limits	
		L_{eq} Day	L_{eq} Night	L_{eq} Day	L_{eq} Night	Pass by L_{max}	L_{eq}	L_{eq} Day	L_{eq} Night	Day	Night	L_{eq} Day	L_{eq} Night
N62	Jalan Bpp7, Seri Kembangan	63.2	58.0	65	60	70	60	65	62	2	4	No	Yes
62a	Apartment Taman Pinggiran Putra	63.2	58.0	65	60	68	58	64	61	1	3	No	Yes
62b	Pangsapuri Mawar Jaya & Surau	65.0	60.0	68	63	71	61	66	64	1	4	No	Yes
62c	O2 Puchong	65.0	60.0	68	63	75	65	68	66	3	6	Yes	Yes
N63	Jalan D'Alphine	62.1	53.7	65	60	72	62	65	63	3	9	Yes	Yes
N64	16 Sierra - Odora Townhouse, Adenia & Aleca	60.8	53.5	65	60	74	64	66	64	5	11	Yes	Yes
64a	16 Sierra	65.0	60.0	68	63	82	72	73	72	8	12	Yes	Yes
64b	Sierra 9& Proposed Mosque	65.0	60.0	68	63	73	63	67	65	2	5	No	Yes
64c	Sierra 15 - Proposed High Rise	65.0	60.0	68	63	82	72	73	72	8	12	Yes	Yes
64d	16 Sierra - Adenia & Aleca	65.0	60.0	68	63	73	63	67	65	2	5	No	Yes
64e	16 Sierra - Future Development	65.0	60.0	68	63	74	64	68	65	3	5	No	Yes
64f	16 Sierra - Proposed High Rise	65.0	60.0	68	63	73	63	67	65	2	5	No	Yes
64g	Proposed School near 16 Sierra	65.0	60.0	68	63	71	61	66	64	1	4	No	Yes
N65	Sky Park	71.4	63.4	74	66	80	70	74	71	2	7	No	Yes
N66	Lim Kok Wing University	66.8	55.6	70	60	82	72	73	72	6	16	Yes	Yes
66a	Pangsapuri Putra Harmoni	65.0	60.0	68	63	72	62	67	64	2	4	No	Yes
N67	Jalan P9a/3, Presint 9, Putrajaya	64.1	59.0	65	60	69	59	65	62	1	3	Yes	Yes
67a	Fire Department	65.0	60.0	68	63	70	60	66	63	1	3	No	Yes
67b	Hospital Putrajaya	65.0	60.0	68	63	66	56	66	61	1	1	No	No

*Note: Limits highlighted are based on L_{eq} + 3 criteria. Locations anticipated to exceed recommended limits from MRT operations are highlighted.



Source: MMC Gamuda KVMRT (PDP)

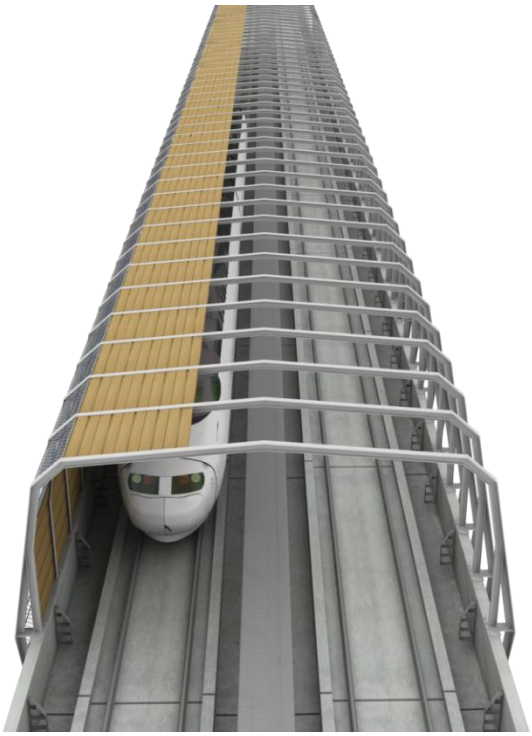
Plate ES-5a Half height noise barrier with architectural aesthetic screen

Source: MMC Gamuda KVMRT (PDP)

Plate ES-5b Full height noise barrier with architectural aesthetic screen

Source: MMC Gamuda KVMRT (PDP)

Plate ES-5c Extended height noise barrier with architectural aesthetic screen



***Source**: Muhibbah Samjung SVT JV (MRT SBK Line)*

Plate ES-5d Semi-enclosure with architectural aesthetic screen

Table ES-13 Tentative Locations to be installed with noise barriers* Northern Elevated Segment

#	Location	Barrier Type
1	IGB International School, Sungai Buloh	Category 1
2	Sierramas Park Manor Villas	Category 1
3	Saujana Damansara houses	Category 1
4	Damansara Damai houses	Category 1
5	Prima Damansara	Category 1
6	Persiaran Perdana Development, Sri Damansara	Category 1
7	Houses at Persiaran Dagang	Category 1
8	Kepong Sentral Condo	Category 1
9	Kepong Sentral Flats	Category 1
10	Taman Sri Ehsan	Category 1
11	Masjid Al-Amaniah, SJKC Kepong	Category 1
12	Casa Prima Condo	Category 1
13	Mutiara Metro Prima Flat	Category 1
14	Plaza Prima Apartment	Category 1
15	Vista Magna Apartment , Vista Mutiara Condo	Category 1
16	JinjangTemple and adjacent houses	Category 1
17	Houses at Kg Batu area	Category 1
18	Alam Puri Condominium	Category 2
19	SMK Batu 5, SJKC Mun Choong, Sek Keb Kg. Batu	Category 1
20	Permai Ria Conominium	Category 1
21	Flat Taman Batu Permai	Category 1
22	Pelangi Indah Condominium	Category 1
23	Desa Alpha Condominium	Category 1

* *Locations as listed above are not necessarily exhaustive. Barrier locations and design are subject to detailed noise analysis based on final alignment (viaducts RoW) to comply with EIA Approval noise limits.*

EXECUTIVE SUMMARY

Table ES-14 Tentative Locations to be installed with noise barriers* Southern Elevated Segment 1

#	Location	Barrier Type
1	Jalan 5/116B, Kuchai Lama	Category 1
2	De Tropicana Condo, The Leafz	Category 2
3	Central Residence	Category 1
4	Jalan 5/140, Jalan 3/140, Taman Naga Emas	Category 1
5	Flats at Jalan 4/140, Taman Naga Emas	Category 1
6	Flats and School, Bandar Baru Sri Petaling St	Category 1
7	Hotel Institut Sosial Malaysia	Category 1
8	High Rise Apartments, Bandar Tasek Selatan	Category 1
9	Police Quarters, Sg Besi	Category 1
10	PPR Kg Raya Permai	Category1
11	Plaza Serdang Raya (mixed development)	Category 1
12	Jalan SR 6/1	Category 1
13	Flat Serdang Raya	Category 1
14	Jalan SK 11/1	Category 1
15	Police and Bomba Quarters, Seri Kembangan	Category 1
16	Jalan 18/46, Taman Seri Serdang	Category 1
17	Jalan Keledang, Serdang	Category 1

* *Locations as listed above are not necessarily exhaustive. Barrier locations and design are subject to detailed noise analysis based on final alignment (viaducts RoW) to comply with EIA Approval noise limits.*

Table ES-15 Tentative Locations to be installed with noise barriers* Southern Elevated Segment 2

#	Location	Barrier Type
1	Jalan Indah 1/1 and Jalan 2/1, Taman Universiti Indah	Category 1
2	ZEVA @ Equine South	Category 1
3	Jalan PP 31 & Putra Raya Apartment	Category 1
4	Jalan PP 40, Tmn Pinggiran Putra	Category 1
5	O2 Puchong	Category 1
6	Jalan D'Alphine residential	Category 1
7	16 Sierra - Odora Townhouse, Adenia & Aleca	Category 1
8	Sierra 15 Proposed High Rise	Category 1
9	Sky Park	Category 1
10	Limkokwing University	Category 1

* *Locations as listed above are not necessarily exhaustive. Barrier locations and design are subject to detailed noise analysis based on final alignment (viaducts RoW) to comply with EIA Approval noise limits.*

Vibration

126. Train-induced vibrations in buildings depend on the severity of the vibration generation at source, transmission through the ground (ground borne vibrations) and interaction with the building (vibration response).

127. The ground-borne vibration propagation analysis showed that receptors in houses (1 to 2 storey buildings) at 15m away will experience vibrations below Curve 1 with good condition wheels/ tracks, but exceed Curve 2 with worn wheels/ tracks without vibration mitigation. For a receptor (at 1st floor) in a high rise building on piles (at 1st floor) at 15m 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 30m, 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. The DOE's Vibration Guidelines recommend an acceptance limit of Curve 2 in the night and Curve 2 to Curve 4 in the day for residential receivers and Curve 1 day and night for vibration sensitive receivers.

128. The mitigation of the ground borne vibration requires the control of vibration transmission from the tracks to the ground. This involves a vibration isolation medium introduced between the tracks and supporting structure. Vibration reductions from standard rail strips are similar to rail pads are typically in the order of 3 dBV, and no more than 6 dBV depending on rail pad stiffness. Resilient fixation devices or base plate may be necessary at some locations in the underground section of the alignment.

129. An improvement to standard rail pads is a highly resilient rail pads where a better vibration reduction can be obtained from the resilient (isolation) nature of the resilient pads. Vibration reductions from resilient rail pads can be up to 8 dBV depending on rail pad stiffness. Vibration reductions of between 10 dBV and 15 dBV are possible with proprietary track form isolation fasteners. With the use of one or a combination of the above tracks vibration reduction devices, ground borne vibration propagation from the SSP Line are anticipated to be within acceptable levels.

Traffic

130. The SSP Line is expected to greatly benefit thousands of people in the Klang Valley. Besides enabling people to commute efficiently and in comfort, the KVMRT will contribute towards avoiding further traffic congestion in the Klang Valley. The major roads that would experience a reduction are Jalan Kepong-Kuala Selangor, Jalan Kepong, Jalan Ipoh, Jalan Tun Razak, Jalan Conlay, Jalan Chan Sow Lin, Sg Besi Highway, Kuala Lumpur-Seremban Expressway, Jalan Besar and also Jalan Putra Permai.

131. It is anticipated that some of the stations would experience traffic related issues such as congestion of adjacent roads and secondary roads, parking and traffic circulation, roadside parking and pick-up/drop-off. Stations expected to experience traffic congestion include the proposed stations at Sri Damansara, Kepong Sentral, Jalan Ipoh, Kuala Lumpur City Center, Chan Sow Lin, Kuchai Lama, Pekan Sungai Besi, Seri Kembangan, Equine Park, and Bandar Putra Permai. MRT Corp has conducted detailed traffic impact assessment for all the stations with a view of understanding the potential traffic volumes, planning for traffic circulation, estimating parking spaces and designing traffic management measures.

Visual impacts

132. The SSP Line is expected to cause visual impacts along the landscape that it traverses. Along the Northern Elevated Segment, visual impacts of the SSP Line stretch along Jalan Kuala Selangor, passes Damansara Damai and Bandar Sri Damansara are considered low to medium. After leaving Damansara Damai, visual impacts along Jalan Kuala Selangor is low but when it comes to Persiaran Dagang, the visual impact is expected to be high. In general, the visual impacts along Jalan Kepong are not expected to be low and it is similar to Jalan Ipoh which has more residential areas.

133. Along the Southern Elevation Segment 1 from Kuchai Lama to Pekan Sungai Besi, the visual and aesthetic quality along this stretch is low except at Taman Naga Emas. At Serdang Raya, Seri Kembangan and UPM the visual impacts are expected to be minimal. Along the Southern Elevation Segment 2 from Taman Universiti to 16 Sierra, the visual impacts are between low and moderate while after 16 Sierra, the alignment follows the Persiaran Apec prior to reaching Putrajaya Sentral with minimum visual impact.

134. Measures to minimize the visual impacts of the elevated sections of the SSP Line include
- Develop and enhance the buffer and landscapes
- Restore the aesthetic values through physical readjustments and creative design
- Accommodate the needs of mobile receptors

Air Quality

135. The air quality issues related to the SSP Line are :
- The overall improvement in air quality along the SSP corridor
- Changes in air quality around stations

136. The air quality along the SSP Line corridor is expected to improve in the future as a result of reduction in future vehicular traffic and reduced fuel consumption. Depending on the proportion of vehicular traffic reduced, the concentrations of CO and NO_2 could potentially decline by 10 ppm and 0.06 ppm respectively compared to a situation without the SSP Line.

137. The operation of the SSP Line is expected to induce changes in the air quality in the vicinity of the stations. This is mainly due to the increase or changes in the traffic volumes on the roads leading to and adjacent to the stations.

Socio-economic impacts

138. For many of the communities that are located close to the alignment and stations, the major concerns are noise and vvibrations from train operations besides potential impacts such as traffic congestion in the vicinity of stations. Suggested mitigation measures include:

- Develop efficient feeder bus systems
- Provide sufficient car parking facilities
- Incorporate universal design in accessibility, safety, disabled friendly facilities, lighting into station planning
- Maintenance system
- Provide on-line feedback mechanism and continuous engagement

139. On the other hand, those staying located close to the stations (within 400m) will also benefit them due to easier and better access to the SSP Line besides opportunities to enjoy faster travel, affordable fares, easier travel mode, potential household saving, enhanced value of properties in close distance to stations, increased business opportunities as well as improved mobility for workers and job seekers.

140. The SSP Line, once operational, will provide greater connectivity for Kuala Lumpur and its conurbation via integration with other rail lines such as KTM Komuter, monorail, Ampang and Kelana Jaya LRT Lines. This will enable efficient travel which would reduce social cost of travel and enhance overall productivity.

141. Many economic benefits will accrue to the country, particularly the Klang Valley with the construction and operation of the KVMRT. Work contracts and jobs which are likely to boost Gross Domestic Product as well as improved connectivity through linked land development and associated tourism opportunities are positive impacts brought under the Project.

142. At the local level, business communities along the route are also expected to enjoy some economic benefits in long-term. There are economic repercussions across a whole spectrum of groups comprising traders, business operators, service providers and the property owners who, through interactions and interfacing, would not only find enhanced property values but a range of business and job opportunities that would have a multiplier effect on the local economy, especially at strategic locations where the stations would be located.

143. It is expected that the Project will lead to an increase in demand for land along the proposed alignment while changes in land use and/or development densities can be expected. Based on the SBK Line and LRT projects, demand for land or properties along the alignment and within certain radius from the stations have increased substantially. This is evident from numerous new developments that have sprung up over the last few years.

144. Most of these changes to the land use and land demands are secondary impacts of the Project and may be beyond the control of the MRT Corp. It may be necessary for all the 6 Local Authorities along the SSP Line (and future MRT lines) to revise their Structure and Local Plans to better plan for land use zoning and densities.

Public Safety

145. The likely risks and hazards during the operation of the SSP Line have been identified and risk minimization measures spelt out. The types of hazards include fire, flood, collisions, derailment, door accident, breakdown of power, intrusion, gap fall, train scrap and natural disasters.

146. A requisite to hazard treatment and mitigation are formulations of Emergency Response Plan and Programmes, Safety Management Plan, Automatic Train Protection System for train collision prevention, Automatic Train Supervision System to ensure train movement under satisfied safe condition, installation of Closed-Circuit Television System, provisions of high quality telecommunication system such as Public Address System, digital trunked radio as well as adopting International Design Codes and Standard as per SBK Line practiced. Proper maintenance of all machinery and equipment is paramount as is adequate staff training.

RESIDUAL IMPACTS

147. Although MRT Corp will implement various mitigation measures to minimize or eliminate the adverse impacts, some residual impacts may still remain. These include impacts relating to land acquisition, traffic congestion, noise and visual impacts.

148. Residents, whose houses will be acquired, will need to relocate elsewhere. This would lead to loss of community cohesion, loss of familiar landmarks and conveniences such as shops, markets, schools, etc. For business owners, acquisition would result in disruption in their business as they need to move elsewhere. For some this could affect them in long term due to the difficulty in re-establishing their business in a new location and losing their customer base.

149. Although MRT Corp will take all the precautionary measures during construction, traffic congestion may not be completely avoided. Given the fact that construction of the viaducts will take place along busy roads and the underground stations at busy commercial areas, the service level of the affected roads may be reduced. Of particular concern are Jalan Kuala Selangor, Selayang – Kepong Highway, Jalan Kepong, Jalan Sultan Azlan Shah, Jalan Tun Razak, Sg Besi Highway, Jalan Utama, Jalan Raya Satu and Jalan Besar. The residual impacts at any particular road could persist from several months to two years – depending the nature and duration of construction. When the SSP Line is operational, some amount of congestion can be expected to persist at some stations due to vehicles stopping to drop and pick up passengers and haphazard/illegal parking.

150. Piling vibration and noise represent potential areas of concern. Construction works will be carried out in stages along the entire elevated alignment, and at fixed locations at the underground stations, portals and shafts. It is therefore inevitable that there will be residual noise and vibration affecting residential and commercial receptors close to the alignment. Although mitigating measures such as bored piles shall be implemented to minimize noise and vibration impacts, the noise generated from piling activities remains the most intrusive by the community and potential source of disturbance. The residual impacts at specific locations could persist during the construction period but be much reduced once piling is completed.

151. Although noise levels from the trains can be adequately mitigated when the SSP Line starts operations, with the wear and tear of the track and wheels, noise levels may increase over time. This may be critical as each component approaches the end of its life and needs to be replaced. Rigorous maintenance is critical to keep this residual impact as low as possible.

152. The viaducts and the pillars supporting them will be prominent features along the SSP Line except at the underground stretches. Although hard and soft landscaping will be carried out, the impact of the structures on the landscape will remain. The problem may be compounded by illegal billboards and graffiti. The residual visual impacts will lessen over time as people get accustomed to the structures. Areas that may face residual impacts include Persiaran Dagang, Taman Naga Emas, recreational area near Institut Sosial Malaysia, Persiaran Sierra Utama and UPM.

ENVIRONMENTAL MANAGEMENT FRAMEWORK

153. An environmental management framework to ensure that relevant mitigating measures will be implemented and monitored during construction stage has been formulated. The framework will address the following components:

- Organization set-up –identify roles and responsibilities of parties involved in the Project
- Stakeholder engagement and communications plan including the complaints management system
- Environmental monitoring
- Environmental reporting - which will state the types of reporting required
- Emergency response plan – which will identify the responses to potential emergencies at site

154. Within MRT Corp, Safety, Health and Environmental Unit (SHE Unit) under the Standard and Compliance Department will be responsible for the environmental compliance and monitoring. The key roles and responsibilities for SHE Unit include the following:-

- establish of strategic planning for Safety, Health & Environment
- ensure environmental compliance and implementation of mitigating measures by PDP and WPC
- carry out investigation works on any major/critical incidents
- Engage with relevant local authorities and other technical agencies such as Department of Environment and Department of Occupational Safety & Health.

155. Effective communication with the relevant stakeholders is very important. As part of the environmental management framework, regular communications with relevant stakeholders, affected communities and the general public will be established and maintained to ensure a systematic, efficient and prompt response to any complaints and feedback. A Complaint Management System (CMS) has been established by MRT Corp. The CMS enables all complaints to be attended to quickly and effectively and procedures for investigation and closure. MRT Corp has established and will maintain several channels for stakeholders and public to provide feedback or lodge complaints

- MRT Hotline (1-800-82-6868)
- MRT Website
- MRT Information Centre

- MRT Information Truck
- MRT Information Kiosk
- Engagements with stakeholders

156. Various environmental reports will be prepared at various levels of the Project. The main objective of the environmental reporting is to document environmental status/progress and any issues arising from each work package to ensure that specific actions can be carried out. These include the overall and work package specific EMPs, ESCPs and monitoring reports as well as all the regulatory reporting requirements.

CONCLUSIONS

157. The KVMRT is a key Entry Point Project of the nation's Economic Transformation Programme (ETP). The ETP is a major effort by the Malaysian Government to transform Malaysia into a high-income nation by 2020. The KVMRT is integral to the success of the Greater Kuala Lumpur/Klang Valley NKEA, which in turn is a catalyst for the ETP.

158. The SSP Line aims to alleviate traffic congestion and provide a fast, convenient and reliable public transportation for the population of the Klang Valley. The SSP Line will provide the much-needed urban rail service for the densely populated northwestern and southeastern regions of the Klang Valley. It will contribute towards the KL Local Plan's aspirations of increasing the public transport modal share 40% by 2030. The SSP Line will close the gaps in the existing rail network, particularly the northwest – southeast corridor serving the city centre.

159. In the planning and designing of the SSP Line, various alignment options have been examined in detail to ensure that the most optimum alignment is chosen. The alignment has been optimized based on network efficiency, ridership, constructability, cost, social and environmental impacts and development opportunities. Extensive stakeholder consultation was carried out (perception survey involving 1500 respondents and 33 stakeholder engagement sessions) - which yielded much beneficial suggestions to improve the Project.

160. Acquisition of land and properties are the main impacts during the pre-construction stage. At this stage, based on the proposed alignment, 704 lots may be acquired. The Government is expected to compensate the affected parties in a fair manner. Nevertheless, resident affected by the acquisition and relocation could potentially endure problems such as temporary disruption to lives and loss of social cohesion. For business owners and operators, they may face difficulty in re-establishing their businesses at the new locations and losing their customer base. In order to minimize impacts from acquisition, MRT Corp will:

- provide a fair and equitable valuation of land or properties
- develop "Communication and Engagement Plan" – to ensure proper dissemination of information to affected parties to ensure that they are well-informed about acquisition process. Other information pertaining to compensation and mutual agreement will also be disseminated accordingly
- ensure continuous engagement with affected parties - to address and attend to any queries with regards to the whole spectrum of acquisition and relocation exercise.
- establish a dedicated team to assist those affected by acquisition.

161. The most significant potential impact during construction stage is traffic congestion due to construction works that will take place along the road median or sides. Such works result in road diversion, closures and lane size reduction which will inevitably reduce the capacity of the existing roads. Since significant portion of the alignment is along busy roads, the traffic congestion along these roads could be expected to worsen. Detailed Traffic Management Plans are being prepared by MRT Corp for each construction site to ensure that traffic is properly managed.

162. Noise and vibration impacts are the main concerns during SSP Line operations. It is predicted that L_{max} will exceed 75dBA in many locations without installation of noise barriers. Locations that require noise barriers as well as the type of barriers required have also been identified. In addition to noise barriers, the adoption of continuous welded tracks and acoustic absorption on track sides will further reduce noise levels. Vibration is also of concern at the underground sections of the SSP Line. Several types of vibration-reduction measures will be adopted– among others floating slab tract, direct fixation devices and under base plates.

163. During operation, localized traffic congestion may occur at certain stations due to their locations, particularly for stations situated along arterial roads or within residential areas. Both residential and commercial communities located close to the stations may experience traffic congestion. Various mitigation measures will be put in place to improve traffic circulation and accessibility of each station.

164. The SSP Line structures (station, viaducts and pillars) will be prominent feature along the whole stretch of the alignment. At certain stretches where it passes through residential areas such as 16 Sierra, Sri Damansara (near Persiaran Dagang) and Taman Naga Emas as well as the recreational area near Institut Sosial Malaysia and UPM area, the visual impacts would be significant. Visual impacts can be mitigated to a certain extent by the use of soft and hard landscaping but cannot be completely avoided.

Benefits

165. The SSP Line is expected to bring host of benefits both at local and regional levels. The SSP Line will greatly benefit thousands of people in the Klang Valley in many ways. Besides enabling people to commute efficiently, the SSP Line will to a certain extent, contribute towards improving air quality and alleviating traffic congestion. Some of the key benefits include:
- improving connectivity and mobility of the people
- providing a more reliable and safe mode of transport
- increasing productivity due to travel time saving

166. The SSP Line will provide greater connectivity for GKL/KV region via integration with other rail lines such as the LRT lines, Monorail, KTM Komuter and MRT SBK Line. The proposed integration with the proposed HSR is an added advantage for its users and for those living along its route. With this, its connectivity will extend beyond GKL/KV and will include people from as far as Johor and Singapore.

167. Speed and reliability of the trains will minimise delays and ensure schedules are observed, contributing to cost management of economic activities in the city. Less time spent on congested roads in motor vehicles which provide more time for productive and leisure activity. These would help towards improving the quality of life of the people. The SSP Line is also safer compared to motorcycles and cars.

168. Land and property values close to the SSP Line and stations will be enhanced. The SSP Line is expected to have positive impacts on land development along the southern segment (Seri Kembangan, Cyberjaya and Putrajaya) as well as the major redevelopment areas such as Kampong Bharu and the proposed Bandar Malaysia. At local level, there would be considerable multiplier effect on the economy through spin-offs on other related businesses, jobs and enhanced property values at strategic locations along the SSP Line.

169. In order to maximize the benefits of the Project and to minimize its economic costs, it is crucial that the identified mitigation measures are implemented effectively and the construction process be monitored diligently. Continuous communications and stakeholder engagement is important.

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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	• Not able to relocate to a similar property due to lack of availability or affordability • Loss of social cohesion, sense of community and current lifestyle for long standing communities • In the case of businesses, there will be potential loss of customers – particularly businesses that rely on the local neighbourhoods.	• Ensure a fair valuation of land or properties that will be acquired. • Develop communication and engagement plan with focus on dissemination of information on land acquisition process to the affected parties • Establish a dedicated team to handle the land acquisition • Maintain continuous engagement with the affected parties to address and attend to any queries to the whole spectrum of acquisition. • Provide due notice, information and assistance to the affected parties, giving them ample time to make alternative plans and minimize inconveniences	While the compensation to the affected communities is expected to fair, certain elements may be irreplaceable.	
• Utilities relocation	• Traffic congestion • Risk to workers and public	• Horizontal direct drilling method or pipe jacking method will be used to relocate the services • Implement an effective safety management plan and traffic management plans		

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
CONSTRUCTION STAGE				
• Elevated works • Underground works • Depot construction	• Traffic congestion due to: - Temporary closure of roads - Reduction of lane size/width - Road diversion to accommodate machinery and working space - Movement of the dumping truck reduce travel speed and thus created temporary bottlenecks a) Northern Elevated Segment: - Jalan Kepong-Kuala Selangor, Jalan Kepong, Bandar Menjalara, Kepong Sentral Jinjang Utara, Jalan Ipoh b) Southern Elevated Segment 1: - Sg Besi Highway, Kuala Lumpur-Seremban Expressway, Jalan Sungai Besi c) Southern Elevated Segment 2: - Jalan Putra Permai, Persiaran Sierra Utama, Persiaran Apec d) Underground works - Jalan Tun Razak, Jalan Binjai, Chan Sow Lin	• Proper traffic management with adequate warning signs and flagmen • Maintain number of lanes of major roads as much as possible • Minimum lane width of 2.75m-3.0m should be maintained for all the roads which involves reduction in lane width for construction activities • Dump trucks to operate at off-peak traffic hours (10am to 4pm and 8pm to 6am) • Specific traffic management plan for each construction site shall be prepared. • Adequate tow-trucks and emergency response teams shall be provided with a maximum response time of 15 minutes • Temporary route diversion is recommended during peak hours	Depending on the nature and duration of construction, the traffic congestion at any particular road could persist from periods ranging from several months to two years	

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
• Elevated works • Underground works • Depot construction	Noise and vibration impacts a) <u>Elevated works</u> • Piling activity • Areas of concern: (houses adjacent to the alignment): - Sri Damansara, Batu, Jalan Ipoh, Kampung Baru Salak Selatan, Taman Naga Emas, Kampung Malaysia, Pangsapuri PPR Raya Permai, Taman Serdang Raya, Kampung Baru Seri Kembangan, Taman Pinggiran Putra, Taman Dato' Demang, Taman Putra Permai, D' Alpinia and 16 Sierra. b) <u>Underground works</u> • Earth moving equipment, heavy vehicles, generators and piling • Areas of concern: - Taman Kaya, Komplex Mutiara, Sang Suria Condominium, The Maple, Titiwangsa area, Jalan Raja Muda area as well as Jalan Conlay area besides SMK P at Jalan Ipoh and Hospital Kuala Lumpur	• Temporary noise barrier • Equipment shielding and enclosures • Use of low noise piling methods i.e. bored piling • Flexible noise barrier and partial shielding for piling machine • Trenches and oscillating type casting • Restrict piling activities to day time only • Continuous monitoring programme	The noise and vibration impacts at specific locations could persist during the construction period but much reduced once piling works are completed	

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
• Elevated works • Underground works • Depot construction	Geotechnical Hazards and Construction Risks Ground water regime • Sinkholes and cavities from tunneling, pile foundation and deep excavation structures activities at Limestone Formation (underground works) • Settlement, collapse or sinkholes due to the potentially lower the groundwater table from the underground works	• Detailed soil investigation involving boreholes and geophysical methods • Grouting and the proper selection of TBM operating parameters for tunnelling. • For pile foundation and retaining structures, rock socketing, continuous bored pile and secant and grouting will be adopted • Rock fissure grouting. Grouting of the annular void space between the concrete lining of the tunnel and the soil shall be adopted to prevent seepage of water through the tunnel lining • Suitable TBM appropriate for use in Karstic Limestone		

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
• Elevated works • Underground works • Depot construction	Public Safety • Public and workers safety directly below or close to the elevated works due to the use of machinery at height • Areas of concern: - Jalan Kepong-Kuala Selangor, Jalan Kepong, Jalan Ipoh, Sg Besi Highway, Kuala Lumpur-Seremban Expressway, Jalan Sungai Besi, Jalan Serdang Raya, Jalan Raya 1, Jalan Putra Permai.	• Pilot boring plan • Install collapse detectors • Control advance rate, cutter rotation and thrust • Pre-ejecting grouting • Work guide for dealing with cavities and ground settlement • Monitoring of weak supports/areas, water pressure, water leakage, drainage water level during construction • Work guide for trial blast • Install emergency floodgate • Safety procedures training • First aid and emergency procedures training		
	Air Quality • Dust dispersion due to the site clearing and earthworks of depot, elevated and underground are expected to be minimal • Areas of concern surrounding depot: - Taman Universiti Indah, Taman Equine and Taman Putra Permai and MARDI	• Phasing development instead of total site clearing • Watering of access road • Wash trough • Hoarding around the work area and control movement of construction vehicles		

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
• Elevated works • Underground works • Depot construction	Soil Erosion and Sedimentation • Erosion and sedimentation from the depot site clearing and earthworks • Dewatering of the sub-structure at the elevated working area • Shafts and underground stations construction is expected to be minimal	• Silt trap to capture the runoff • Silt fence being erected along the existing watercourses to filter the runoff • Sand bags being placed along the working area to filter the sediment outflow • Sheet pile to be installed at the river bank • Temporary slope protection via installation of geotextile/ canvas at river banks • Turfing to be carried out at areas where construction work has been completed • Implementation of Erosion and Sedimentation Control Plan (ESCP)		
	Water Quality • Slurry discharge from the tunneling works and erosion at the launch shafts and retrieval shats could potentially cause water pollution	• Slurry discharge shall be treated at the wastewater treatment plant prior to discharge into the drainage system		

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
• Elevated works • Underground works • Depot construction	Benefits During Construction Stage • Increase in economic activities and employment are the major positive impacts during the construction stage. At the national level, 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.	NIL		

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
OPERATIONAL STAGE				
• SSP Operation	Increased in noise level • Noise modelling shows that the increase in L_{Aeq} is generally not significant **(Table ES-12)** due to the short term nature of train pass-bys except at several locations. • The cumulative L_{eq} noise from the trains combined with the ambient noise typically increases by less than 5 dB during the day in most locations. However at some locations, especially in the Southern Elevated Segments 1 & 2, there could be increases between 10 – 27 dBA. • The maximum noise level, L_{max} (without noise barriers) during trains pass-by will be lower than 75 dB(A) at more than 75% of control locations. Some areas such as UPM, Mardi, Sg. Besi and Taman Naga could experience increases up to 15 dBA.	• Use of continuous welded tracks, noise barriers and acoustic absorption. • Use noise barriers built on the edge of the viaduct (on the parapet wall of the viaduct) for elevated tracks. (**Plates ES-5a – ES-5-d)** • Locations that would require noise barriers are listed in **Table ES-13 to ES-15**.	Noise levels may increase over time due to wear and tear of the track and wheels	

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
OPERATIONAL STAGE				
• SSP Operation	Increased in vibration level • Receptors in houses (1 to 2 storey buildings) at 15m away (below Curve 1 with good condition wheels/ tracks) • Receptor (at 1st floor) in a high rise building on piles (at 1st floor) at 15m away (below Curve 1 good condition wheels/ tracks) At 30m, 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	• Control of vibration transmission from the tracks to the ground. Involves a vibration isolation medium introduced between the tracks and supporting structure. • Vibration reductions from standard rail strips are similar to rail pads are typically in the order of 3 dBV, and no more than 6 dBV depending on rail pad stiffness. • Resilient fixation devices or base plate may be necessary at some locations in the underground section of the alignment.	Ground-borne vibration may increase over time with the deterioration of the tracks, wheels and vibration reduction elements	
	Traffic Congestion • Some of the stations would experience traffic related issues such as congestion of adjacent roads and secondary roads, parking and traffic circulation, roadside parking and pick-up/drop-off. • Areas of concern at proposed stations at: - Sri Damansara, Kepong Sentral, Jalan Ipoh, Kuala Lumpur City Center, Chan Sow Lin, Kuchai Lama, Pekan Sungai Besi, Seri Kembangan, Equine Park, and Bandar Putra Permai.	• MRT Corp has conducted detailed traffic impact assessment for all the stations with a view of understanding the potential traffic volumes, planning for traffic circulation, estimating parking spaces and designing traffic management measures	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.	

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
• SSP Operation	Traffic Congestion (Cont'd) Benefits: • The SSP Line is expected to greatly benefit thousands of people in the Klang Valley. Besides enabling people to commute efficiently and in comfort, the KVMRT will contribute towards avoiding further traffic congestion in the Klang Valley. • The major roads that would experience a reduction are: - Jalan Kepong-Kuala Selangor, Jalan Kepong, Jalan Ipoh, Jalan Tun Razak, Jalan Conlay, Jalan Chan Sow Lin, Sg Besi Highway, Kuala Lumpur-Seremban Expressway, Jalan Besar and Jalan Putra Permai.			
	Visual Impacts • Expected to cause visual impacts • In general, visual impacts expected to be low except for the residential area at Persiaran Dagang	• Develop and enhance the buffer and landscapes • Restore the aesthetic values through physical readjustments and creative design • Accommodate the needs of mobile receptors		

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
• SSP Operation	Socio-economic impacts • Communities that are located close to the alignment and stations, the major concerns are : - noise and vvibrations from train operations - traffic congestion in the vicinity of stations Economic benefits: • Accrue to the country, particularly the Klang Valley with the construction and operation of the SSP Line • Work contracts and jobs which are likely to boost Gross Domestic Product • Improved connectivity through linked land development and associated tourism opportunities	• Develop efficient feeder bus systems • Provide sufficient car parking facilities • Incorporate universal design in accessibility, safety, disabled friendly facilities, lighting into station planning • Maintenance system • Provide on-line feedback mechanism and continuous engagement		
	Air Quality • Air quality along the SSP Line corridor is expected to improve in the future as a result of reduction in future vehicular traffic and reduced fuel consumption • Operation of the SSP Line is expected to induce changes in the air quality in the vicinity of the stations.	NIL		

EXECUTIVE SUMMARY

PROJECT ACTIVITIES AND IMPACT SOURCES	SIGNIFICANT ENVIRONMENTAL IMPACTS	PROPOSED / ADOPTED MITIGATION MEASURES	RESIDUAL IMPACTS	DOE'S COMMENTS
• SSP Operation	Public Safety • The types of hazards include : - Fire, flood, collision, derailment, door accident, breakdown of power, instrusion, gap fall, train scap and natural disaster	• Formulations of Emergency Response Plan and Programmes, Safety Management Plan, Automatic Train Protection System for train collision prevention, Automatic Train Supervision System to ensure train movement under satisfied safe condition • Installation of Closed-Circuit Television System • Povisions of high quality telecommunication system such as Public Address System, digital trunked radio as well as adopting International Design Codes and Standard as per SBK Line practiced • Proper maintenance of all machinery and equipment is paramount as is adequate staff training.	Public Safety • The types of hazards include : - Fire, flood, collision, derailment, door accident, breakdown of power, instrusion, gap fall, train scap and natural disaster	