

# ENVIRONMENTAL IMPACT ASSESSMENT (EIA)



## EAST COAST RAIL LINK PROJECT SECTION C (MENTAKAB TO PORT KLANG)



### VOLUME 1 EXECUTIVE SUMMARY & RINGKASAN EKSEKUTIF

FEBRUARY 2020

# EAST COAST RAIL LINK PROJECT SECTION C (MENTAKAB TO PORT KLANG)

## ENVIRONMENTAL IMPACT ASSESSMENT

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ES

EXECUTIVE SUMMARY

## INTRODUCTION

1. This EIA report is prepared for **Section C (Mentakab to Port Klang)** of the East Coast Rail Link project, hereinafter referred to as '**ECRL Section C**' or '**the Project**'.
2. ECRL Section C involves the construction of a rail link from Mentakab in Pahang to Port Klang in Selangor (**Figure ES-1**). ECRL Section C traverses Pahang, Negeri Sembilan, Selangor and Putrajaya and passes a number of major towns such as Temerloh, Mentakab (Pahang), Titi, Nilai (Negeri Sembilan), Beranang, Dengkil, Jenjarom (Selangor) and ends at Pulau Indah (**Table ES-1**).

**Table ES-1 : Alignment Lengths**

| <b>State</b>           | <b>Main Alignment (km)</b> | <b>Spurline (km)</b> | <b>Total (km)</b> |
|------------------------|----------------------------|----------------------|-------------------|
| Pahang                 | 44.4                       | 6.7                  | 51.1              |
| Negeri Sembilan        | 58.8                       | -                    | 58.8              |
| Selangor and Putrajaya | 39.9                       | 34.8                 | 74.7              |
| <b>Total (km)</b>      | <b>143.1</b>               | <b>41.5</b>          | <b>184.6</b>      |

3. The East Coast Rail Link (ECRL) is a vital national infrastructure that is expected to stimulate growth and help bridge the economic gap between the East and West Coasts of Peninsular Malaysia. The ECRL will strengthen connectivity of State capitals, major urban centres and industrial clusters, sea and inland ports, airports and tourism zones and enhance transport accessibility. The ECRL will increase freight transport capacity between the East Coast and West Coast and East Coast, facilitate increased trade and more efficient logistics.
4. The ECRL was originally approved by the Malaysian Government and commenced in 2017. Implementation of the Project was divided into two phases:
  - ECRL Phase 1 – Kota Bharu to Gombak
  - ECRL Phase 2 – Northern Extension (Kota Bharu – Pengkalan Kubor) and Southern Extension (Gombak to Port Klang)
5. The EIA for ECRL Phase 1 and ECRL Phase 2 was approved by DOE on 20 June 2017 and 20 April 2018 respectively. ECRL Phase 1 commenced construction in August 2017.
6. In July 2018, the Project was put on hold by the Malaysian Government for renegotiation. After months of negotiation, a Supplementary Agreement was signed on 12 April 2019 and the announcement was made by the Prime Minister of Malaysia on 15 April 2019 for the Project to resume. Based on the agreement, some changes have been made to the initial alignment (2017) in

## EXECUTIVE SUMMARY

terms of alignment route, number of stations, station locations and connectivity to other rail networks and major towns. The new ECRL alignment now runs from Kota Bharu to Port Klang, and the main alignment covers a distance of about 659.9 km with 21 stations. The alignment traverses five states which includes Kelantan, Terengganu, Pahang, Negeri Sembilan, Selangor and the Federal Territory of Putrajaya.

7. On 25 April 2019, a meeting was held between the Project Proponent and the Department of Environment (DOE) Headquarters to seek guidance on the way forward with regards to EIA requirements due to the changes to the Project. The decisions made during the meeting are as follows:
  - Section A (Kota Bharu to Dungun) – Revised alignment  
A new EIA needs to be carried out due to changes to the alignment.
  - Section B (Dungun to Mentakab) – Original alignment  
EIA approval for ECRL Phase 1 (Kota Bharu to Gombak) is still valid for Section B. Therefore, construction can resume based on ECRL Phase 1 EIA approval conditions.
  - Section C (Mentakab to Port Klang) – New alignment  
A new EIA, which includes submission of the TOR, is required for since it is a completely new alignment as compared to ECRL Phase 2 EIA.
  
8. The Project Proponent is Malaysia Rail Link Sdn Bhd (MRL), a company wholly owned by the Minister of Finance Incorporated, Malaysia. MRL was established as a government-owned special purpose vehicle to undertake the ECRL Project and is the asset owner of the ECRL Project.

**Malaysia Rail Link Sdn. Bhd.**

Level 15, Menara 1 Dutamas, Solaris Dutamas

No.1, Jalan Dutamas 1

50480 Kuala Lumpur

Tel: 03 – 6411 5800 Fax: 03 – 6411 5822

**Contact Person : Dato' Sri Darwis Abdul Razak**

9. The Consultant undertaking the 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: 03 – 8024 2287 Fax: 03 – 8024 2320

**Contact Person : Raja Nur Ashikin / Lee Hwok Lok**



## TERMS OF REFERENCE

10. The Project is classified as Prescribed Activity 16(b) : Construction of New Railway Route under the Second Schedule of the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015, and Section 34A of the Environmental Quality Act 1974, which stipulates that an Environmental Impact Assessment (EIA) report is required to be submitted to the Director-General of Environmental Quality for review and approval prior to project implementation.
11. The Terms of Reference (TOR) for Section C was submitted to the DOE HQ on 25 October 2019. The TORAC meeting was held on 21 November 2019, following which a Revised TOR was submitted on 16 January 2019. The TOR was endorsed on 6 February 2020.

## STATEMENT OF NEED

12. The ECRL is needed as there is currently no direct railway connection between the East Coast and the West Coast except for the KTMB railway line from Kota Bharu to Kuala Lumpur via Gemas. As such, the overall transportation infrastructure and capacity of the East Coast Economic Region (ECER) requires significant improvement and upgrading in order to support the economic growth.
13. The ECRL is designed for both passenger and freight. Considering that there is currently no existing freight transport on the KTMB Gemas-Tumpat line and no rail access along the coastal area of the East Coast, the ECRL is a very much needed catalyst to spur development within the ECER.
14. The ECRL, which is envisaged to comprehensively serve all main centres in the East Coast Region and connect to the overall rail network in Peninsular Malaysia, is advocated in several development plans, namely the National Physical Plan, ECER Master Plan and State Structure Plans.
15. The overall goal of the ECRL is to stimulate the economy of the East Coast Economic Region (ECER) and balance economic development between the East and West Coasts. The ECRL will also improve connectivity to East Coast state capitals and other important growth centres. While reducing the travel time within the East Coast Region, the ECRL will also facilitate increased trade and movement of people. Besides that, ECRL Section C will also have interchange stations with existing rail networks such as KTM in Temerloh and Nilai and ERL in Putrajaya

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16. The ECRL supports the aspirations of many national and state plans and policies. It represents the culmination of transport policies laid down in the National Physical Plans 1, 2 and 3 as well as the State Structure Plans of Pahang, Negeri Sembilan and Selangor. The ECRL is a key infrastructure in the East Coast Economic Region (ECER) Master Plan, which aims to accelerate economic growth in the East Coast. The ECRL also represents fulfilment of the strategic objective of the National Land Public Transport Master Plan for Peninsular Malaysia, that is to ensure that the nation is physically well-connected and the rural and inter-city connectivity is enhanced.

## PROJECT OPTIONS

17. For the ECRL Section C alignment, a number of alignment options were studied in order to determine the most preferred alignment from Mentakab to Port Klang. Among the factors considered in selecting the most preferred alignment were:
  - Construction cost
  - Land acquisition cost
  - Engineering and constructability
  - Social impact
  - Ecological impact
  - Operational issues
  - Connectivity

### Mentakab Options

18. In Mentakab, two options were studied to allow for interchange between ECRL and KTM where:
  - Option 1: Integration with the proposed Inland Port but alignment will encroach into Kemasul Forest Reserve (FR).
  - Option 2: No integration with the proposed Inland Port and alignment does not encroach into Kemasul FR. A new Inland Container Terminal, adjacent to the Temerloh Station is proposed by the Project Proponent which will be connected to the ECRL and KTM via an Interchange Yard and spurline.
19. **Option 2** was selected as the preferred option as it had the lowest ecological impact by avoiding encroachment into Kemasul FR and would reduce habitat loss, fragmentation and reduced risk of human-wildlife conflicts.

Titi to Jenjarom Options

20. The six options studied were:
- Option 1: Alignment travels southwest from Titi to Jenjarom via the Selangor-Negeri Sembilan state border.
  - Option 2: Alignment travels southwest from Titi to Jenjarom through Nilai 3 Industrial Area.
  - Option 3: Alignment travels southwest from Titi to Jenjarom through Bangi.
  - Option 4: Alignment travels northwest from Titi to Jenjarom through Kajang.
  - Option 5: Alignment travels northwest from Titi to Jenjarom through Kajang, along Jalan Reko.
  - Option 6: Combination of Option 1 and Option 2 where the alignment travels southwest from Titi to Jenjarom through Nilai 3 Industrial Area (Option 2) before merging at the Selangor-Negeri Sembilan state border (Option 1).
21. Option 1 and Option 2 were shortlisted as the two most preferred options in terms of lower social impact, lower ecological impact as well as a lower construction and land cost. Following a site visit that was conducted with Agensi Pengangkutan Awam Darat (APAD) from Titi to Jenjarom from 16th July 2019 to 18th July 2019, APAD advised to study a hybrid alignment (Option 6) which was a combination of Options 1 and 2 so as to avoid crossing over the Muslim cemetery and houses at Bukit Mahkota. As such, **Option 6** was selected as the preferred alignment option.

Putrajaya Options

22. Three options were studied for Putrajaya:
- Option 1: Construction of a passenger only spurline parallel to the ERL line towards Putrajaya Sentral. The spurline will provide an interchange opportunity between ECRL, ERL and MRT Line 2.
  - Option 2: Construction of an interchange station at Putrajaya Selatan to allow passenger transfer between ECRL, ERL and Future Monorail
  - Construction of a short spurline after the proposed operating station for connection to ERL and Putrajaya Sentral Station/KL Sentral for ECRL passenger services whilst the mainline will continue towards Port Klang.
23. **Option 1** was selected as the preferred option with a passenger only spurline running parallel to the existing ERL line towards Putrajaya Sentral which will allow for direct connection to Putrajaya and also integration between ECRL, ERL and the future Monorail.

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### Port Klang Options

24. Two options were studied for the alignment heading towards Port Klang which were:
- Option 1: From Jenjarom, alignment heads westwards onto Pulau Carey, running parallel to the SKVE for a short distance and continues straight on Pulau Carey before heading northwest, crosses Selat Lumut onto Pulau Indah.
  - Option 2: From Jenjarom, the alignment heads westwards onto Pulau Carey, running parallel to the SKVE until the Pulau Indah toll. After passing the toll, the alignment makes a left turn and runs parallel to Jalan Star Finder, along the southern edge of Pulau Indah before merging with Option 1.
25. **Option 1** was selected as the preferred option as it had lower construction cost, land acquisition cost and social impacts. In terms of ecological impact, both options would cross a small strip of the Jugra mangrove FR just before the Selat Lumut crossing.

## PROJECT DESCRIPTION

26. All project details are based on the Railway Scheme Report for ECRL Section C (October 2019). The ECRL will be an electrified single-track railway line built on a double track formation, approximately 143.1 km in length for the mainline with another 41.5 km of spur line (**Table ES-2**).

**Table ES-2 : Project Overview**

| Alignment Station               | Description               | Length (km) / Quantity (no.) |
|---------------------------------|---------------------------|------------------------------|
| <b>Mainline</b>                 | Elevated                  | 29.8                         |
|                                 | At-grade                  | 92.8                         |
|                                 | Tunnel                    | 20.5                         |
|                                 | Total Mainline Length     | <b>143.1</b>                 |
| <b>Spur Line</b>                | 1. Mentakab               | 6.7                          |
|                                 | 2. Putrajaya              | 7.3                          |
|                                 | 3. Port Klang             | 27.5                         |
|                                 | Total Spurline Length     | <b>41.5</b>                  |
| <b>Mainline &amp; Spur Line</b> | Total Project Length      | <b>184.6</b>                 |
| <b>Stations</b>                 | Passenger (P)             | 4                            |
|                                 | Freight (F)               | -                            |
|                                 | Passenger & Freight (P&F) | 2                            |
|                                 | Total Stations            | <b>6</b>                     |

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### Alignment

27. The alignment is divided into three main segments for ease of description:

- **Segment 1: Pahang** (MP Temerloh - MD Bera - MP Bentong) – 51.1 km
- **Segment 2: Negeri Sembilan** (MD Jelebu – MB Seremban) – 58.8 km
- **Segment 3: Selangor and Putrajaya** (MP Kajang – MP Sepang – MD Kuala Langat – Perbadanan Putrajaya – MP Klang) – 74.7 km

### Segment 1 :Pahang

28. The alignment will commence Kg. Tengah southeast of Temerloh from Ch426 of the Section B alignment. The alignment heads west and passes by Kg. Pulau Kujan and SK Seri Tualang and SMK Seri Tualang before reaching the proposed Temerloh station. From the station, the meter gauge Mentakab spurline branches off from the mainline and heads northwest to merge with the KTM track heading towards the Mentakab KTM station. The mainline alignment then travels southwest, circling the eastern and southern boundary of Kemasul Forest Reserve (FR) before reaching Jalan Utama Bukit Mendi – Felda Chemomoi (1518) near Felda Kemansul. The alignment travels southwest along this road, passing by Felda Chemomoi, where the Kemasul future station is proposed. The alignment then passes Kg. Chemomoi and Kg. Lembah and crosses Route C109 at Kg. Melan as it approaches the Pahang-Negeri Sembilan state border (**Figure ES-2**).

### Segment 2: Negeri Sembilan

29. From the Pahang-Negeri Sembilan state border, the alignment continues southwest, following the eastern boundary of Kenaboi FR. The alignment passes by Simpang Durian before tunneling through the hilly areas of the Triang FR and Kenaboi FR. The alignment then emerges and continues southwest passing by Titi town. The proposed Klawang station is located 600 m southwest from Kolej Komuniti Jelebu. The alignment then heads southwest passing by Kg. Gagu before tunneling through the Gapau FR and Lenggeng FR. The alignment then emerges again and continues southwest, passing by Kg. Orang Asli Lumut, Kg. Tarun, Kg. Lombong Jerneh in Lenggeng. After that, the alignment travels southwest into Selangor along more populated villages in Beranang before entering Negeri Sembilan again. From the state border, the alignment continues southwest, crossing College Heights Garden Resort and Kajang Seremban Highway before reaching the Nilai Station near Arab-Malaysian Industrial Park and Kawasan Perindustrian Nilai 3 in Nilai. After the industrial areas, the alignment continues northwest, passing by Desaria and enters Selangor near the abandoned Emville Golf Club (**Figure ES-2**).

### Segment 3: Selangor and Putrajaya

30. From the Emville Golf Club, the alignment travels west and passes Kg. Sg. Buah and crosses Kg. Jenderam Hilir and Kg. Orang Asli Bukit Jenuk in Dengkil before entering Putrajaya near Taman Selatan. At Taman Selatan,

## EXECUTIVE SUMMARY

the Putrajaya spurline will branch off and travel north towards Putrajaya Sentral running parallel to the existing ERL track and terminate at the proposed Putrajaya Sentral station. The mainline alignment will continue west as it crosses Kg. Tok Aminuddin and the Dengkil Bypass Highway before crossing the ELITE Expressway while passing Cybersouth and Selangor Cyber Valley. After ELITE Expressway, the alignment travels through the southern edge of the Kuala Langat Utara FR next to the upcoming Gamuda Cove development. The alignment heads northwest passing by Kg. Seri Cheeding and then southwest passing by Kg. Jenjarom and before terminating at the proposed Jenjarom station. After Jenjarom station, the Port Klang spurline passes by Kg. Sg. Rambai and crosses Sg. Langat at three locations, passes Kg. Sawah and Kg. Ayer Tawar. The alignment then heads west onto Pulau Carey. Towards the western end of Pulau Carey, the alignment heads northwest, crosses Selat Lumut and onto Pulau Indah where the spurline will terminate the future Westport expansion area. The EIA scope for ECRL Section C will end before the Westport reclamation boundary at CH 25700 (**Figure ES-2**).

### Stations

31. ECRL Section C will have six stations (**Table ES-3**).

**Table ES-3 : ECRL Section C Stations**

| No. | State           | District     | Station Name      | Station Type | Station Configuration | Coordinates |               | Interchanges        |
|-----|-----------------|--------------|-------------------|--------------|-----------------------|-------------|---------------|---------------------|
|     |                 |              |                   |              |                       | N           | E             |                     |
| 1.  | Pahang          | Temerloh     | Temerloh          | At-grade     | Passenger & Freight   | 3°25'21.76" | 102°22'58.27" | KTMB (via spurline) |
| 2.  |                 | Bentong      | Kemasul           | At-grade     | Future Passenger      | 3°15'10.73" | 102°14'23.73" | -                   |
| 3.  | Negeri Sembilan | Jelebu       | Klawang           | At-grade     | Passenger             | 2°58'24.90" | 102° 3'9.07"  | -                   |
| 4.  | Putrajaya       | Seremban     | Nilai             | Elevated     | Passenger             | 2°51'35.84" | 101°49'11.22" | KTMB                |
| 5.  |                 | -            | Putrajaya Sentral | Elevated     | Passenger             | 2°55'52.19" | 101°40'13.45" | ERL                 |
| 6.  | Selangor        | Kuala Langat | Jenjarom          | At-grade     | Passenger & Freight   | 2°53'50.80" | 101°30'21.60" | -                   |

Note: Station details are based on Railway Scheme Report (October 2019)

### Tunnels

32. As the ECRL traverses through hilly and undulating terrain, tunneling will be required at selected locations (**Table ES-4**). This is to minimize hill cutting and to ensure that the gradient along the ECRL alignment is not be greater than 0.9%.

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Table ES-4 : ECRL Section C Tunnels

| Tunnel | Length (km) | Tunnel Method               | State                            | Local Authority             | Land Use                        |             |
|--------|-------------|-----------------------------|----------------------------------|-----------------------------|---------------------------------|-------------|
| 1      | 0.5         | Drill & Blast               | Pahang                           | Majlis Perbandaran Temerloh | Agriculture                     |             |
| 2      | 0.3         | Drill & Blast               |                                  |                             | Agriculture                     |             |
| 3      | 0.2         | Drill & Blast               |                                  |                             | Agriculture                     |             |
| 4      | 0.6         | Drill & Blast               |                                  |                             | Agriculture                     |             |
| 5      | 2.6         | Drill & Blast               |                                  |                             | Triang FR                       |             |
| 6      | 2.7         | Drill & Blast               |                                  |                             | Majlis Daerah Jelebu            | Kenaboi FR  |
| 7      | 1.3         | Drill & Blast               |                                  |                             |                                 | Agriculture |
| 8      | 0.4         | Drill & Blast               |                                  |                             |                                 | Agriculture |
| 9      | 0.4         | Drill & Blast               |                                  |                             |                                 | Agriculture |
| 10     | 0.2         | Drill & Blast               |                                  |                             |                                 | Agriculture |
| 11     | 0.4         | Drill & Blast               |                                  |                             | Agriculture                     |             |
| 12     | 7.3         | Tunnel Boring Machine (TBM) | Negeri Sembilan (Total: 17.0 km) | Majlis Bandaraya Seremban   | Gapau FR and Lenggeng FR        |             |
| 13     | 0.3         | Mechanical Excavation       |                                  |                             | Residential Area                |             |
| 14     | 2.3         | Drill & Blast               | Selangor                         | Majlis Perbandaran Sepang   | Bukit Unggul                    |             |
| 15     | 0.8         | Mechanical Excavation       | Putrajaya                        | Perbadanan Putrajaya        | Hilly terrain, Gas reserve line |             |

Depot, Yards and Maintenance Bases

33. Maintenance bases will be established in Jerteh station, Dungun station, Maran station (ECRL Section A) and Nilai station (ECRL Section C). These maintenance bases will be Light and Medium Maintenance bases and will be responsible for daily inspection and detection and repair of infrastructure and minor systems issues which occur in their areas, and will provide facilities for parking, servicing and maintenance of large maintenance machinery. The main depot for the ECRL will be located at the Kuantan Port City (Section B of the ECRL).

Rolling Stock and Systems

34. Passenger trains will be power centralized EMUs and will comprise one motor car and seven trailer cars with a seating capacity of 440 passengers and design speed of 160km/h.

## EXECUTIVE SUMMARY



**Plate ES-1 : Example of Passenger Train**

35. Freight trains, which will have up to 45 wagons, will be powered by electric locomotives and have a design speed of 80km/h. The main wagons that will be used are open top box cars, closed box cars, tanker wagons and container flat-bed wagons.



**Plate ES-2 : Example of Freight Train**

36. The trackworks will be designed for a speed of 160 km/h for passenger trains and 80 km/h for freight trains. The maximum axle load will be 25 tonnes (standard gauge) and 20 tonnes (meter gauge) and the rails will generally be continuously welded. Ballasted track will be adopted for the majority of the main line.
37. The ECRL Operation Control Centre (OCC) will be established within the Kuantan Port City Depot (ECRL Section B), which is roughly at the centre of the ECRL alignment. The OCC will ensure the efficiency of the transport along the railway. Its major components will be Operation Dispatching Management, Centralised Traffic Control and a Power Supervisory Control and Data Acquisition system. All systems and subsystems will, wherever possible, be provided with duplicated and back-up facilities to ensure that the railway can continue to function at all times.

### Principal Project Activities

38. The key activities related to construction and operations of the ECRL include the following activities (**Table ES-5**).



**Table ES-5 : Principal Project Activities**

| Stage            | Activities  |
|------------------|---|
| Pre-Construction | <ul style="list-style-type: none"> <li>• Land acquisition</li> <li>• Utilities relocation</li> <li>• Soil investigation</li> </ul>  |
| Construction     | <ul style="list-style-type: none"> <li>• Site clearing and earthworks</li> <li>• Temporary works (utilities establishment, base camp, batching plant, access roads)</li> <li>• At-grade embankment construction</li> <li>• Railway bridge and viaduct construction</li> <li>• Tunnel construction</li> <li>• Station construction</li> <li>• Depot and maintenance base construction</li> <li>• Installation of railway tracks and systems</li> <li>• Testing and commissioning</li> <li>• Movement of vehicles transporting materials</li> </ul> |
| Operation        | <ul style="list-style-type: none"> <li>• Train operations (passenger and freight)</li> <li>• Station operations (passenger and freight)</li> <li>• Depot and maintenance base operations</li> </ul>   |

#### Land Acquisition

39. In areas where the proposed ECRL alignment passes through private land and property, land acquisition will be required in order to secure the right-of-way for the ECRL railway tracks and railway reserve. Land acquisition will also likely be required for the construction of stations, depots and maintenance facilities, which generally take up large plots of land.
40. There are 10,295.5 ha of land within 300m corridor along the alignment (as identified per Section 4 of the Land Acquisition Act) (**Table ES-6**). The number of lots that will actually be acquired will be much smaller, less than half this number.

**Table ES-6 : Lots within 300m Corridor**

| No.                    | Type of Land                               | No. of Lots/<br>Locations | Area Affected  |
|------------------------|--|---------------------------|----------------|
|                        |  |                           | Hectares       |
| <b>Pahang</b>          |  |                           |                |
| 1                      | Private Land                               | 709                       | 1,506.2        |
| 2                      | State Land/ Road/<br>JPS/ Utility/ Reserve | -                         | 420.1          |
| <b>SUBTOTAL</b>        |  | <b>-</b>                  | <b>1,926.3</b> |
| <b>Negeri Sembilan</b> |  |                           |                |
| 1                      | Private Land                               | 4,749                     | 1,998.4        |
| 2                      | State Land/ Road/<br>JPS/ Utility/ Reserve | -                         | 1,466.8        |
| <b>SUBTOTAL</b>        |  | <b>-</b>                  | <b>3,465.2</b> |
| <b>Selangor</b>        |  |                           |                |
| 1                      | Private Land                               | 1,538                     | 3,656.4        |
| 2                      | State Land/ Road/<br>JPS/ Utility/ Reserve | -                         | 1,091.7        |

## EXECUTIVE SUMMARY

| No.                             | Type of Land                               | No. of Lots/<br>Locations | Area Affected |
|---------------------------------|--|---------------------------|---------------|
|                                 |  |                           | Hectares      |
| SUBTOTAL                        |  | -                         | 4,748.1       |
| <b>Putrajaya</b>                |  |                           |               |
| 1                               | Private Land                               | 81                        | 81.4          |
| 2                               | State Land/ Road/<br>JPS/ Utility/ Reserve | -                         | 74.5          |
| SUBTOTAL                        |  | -                         | 155.9         |
| <b>Overall Land Acquisition</b> |  |                           |               |
| 1                               | Private Land                               | 7,077                     | 7,242.4       |
| 2                               | State Land/ Road/<br>JPS/ Utility/ Reserve | -                         | 3,053.1       |
| GRAND TOTAL                     |  | -                         | 10,295.5      |

Source : MRL, 2019

### Utilities relocation

41. Advanced works such as relocation of utilities will be carried out before the commencement of the construction works. Utilities located along the alignment will be detected and piloted. The types of utilities include TNB transmission line, water and sewer mains, electrical cables, telecommunication cables, gas pipes and other surface and underground utility lines. Certain roads and junctions may also need to be realigned and reconfigured to accommodate the railway alignment.

### Base Camps

42. In ECRL Section C, there will be 8 base camps equipped with selected facilities. Workers quarters will be available at selected base camps. Facilities such as living quarters, canteens and leisure areas are provided at the workers quarters. The exact layout of all the base camps will be determined at the design stage.

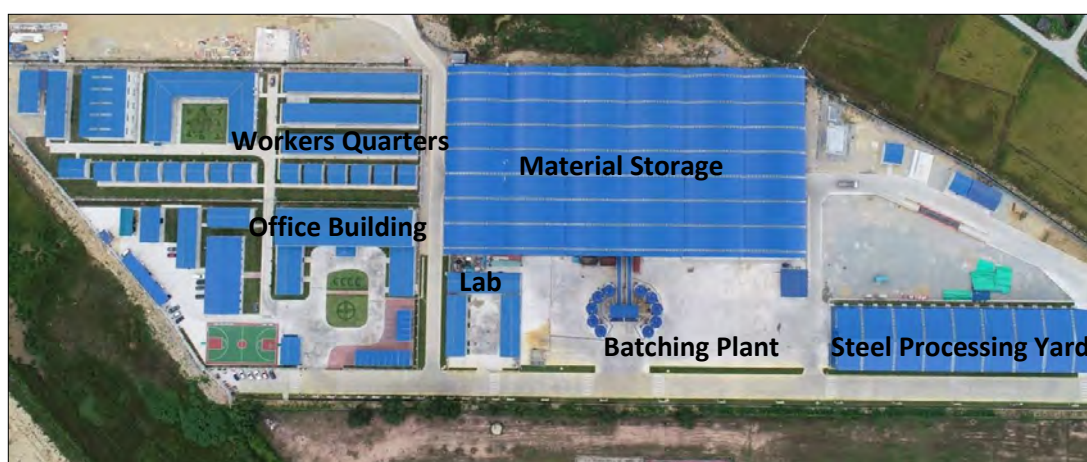


Plate ES-3 : Example of Main Base Camp in Tunjung (built in 2018)

### Access Roads

43. Temporary access roads will be constructed to provide access for construction vehicles and materials. Access roads will primarily be built

## EXECUTIVE SUMMARY

within the ROW along the length of the alignment. Some of the technical requirements for constructing access roads are:

- An average width of 3.5m
- One meeting lane of length 15m – 20m every 200m – 300m, with a pavement width of 7m, to allow for passing of vehicles
- Average thickness of the crusher material filling of 100cm, and a crusher run layer of 20cm
- At intersections with local roads, wash throughs will be provided to allow for cleaning of construction vehicles.
- A catch drain 60 cm wide by 40 cm deep along the access road
- Convex mirrors and appropriate signs (speed limit, warning, etc.) to be set up at sharp turns and road intersections

### Site Clearing

44. Site clearing and earthworks will be carried out within the Project boundary by means of bulldozers, excavators, tippers and other machineries. The site clearing will involve the removal of vegetation from agricultural areas (oil palms and paddy field), forested areas and scrubland/secondary forests. Site clearing will be carried out within the railway right-of-way, stations, yards, depots and access roads.

### Embankment Construction

45. Most of ECRL alignment will be built on earth embankment which will form the rail foundation. The excavation will be carried out when the subsoil which forms part of the embankment foundation is not suitable. The soft compressible cohesive soils are excavated out and replaced with compacted suitable fill that will provide a stronger and less compressible foundation for the railway track. Embankment or retaining walls are built either side of the track, using earth material. The ballast will then be laid on the track foundation.
46. For high embankments, stone columns will be utilised as ground treatment once the combination of temporary surcharge and geotextile basal reinforcement are found not viable. The presence of stone columns creates a composite material of lower compressibility and higher shear strength than the in-situ very soft to soft clay.

### Railway Bridge and Viaduct Construction

47. About 45 km of the alignment will be elevated (viaduct) at urbanized locations, flood prone areas and at areas with swampy/poor ground. In addition, bridges and culverts will be built to carry the railway over existing roads and rivers or streams. The viaduct superstructures are typically formed from beam and slab. Post-tensioned and/or pre-tensioned precast beams will be used.

## EXECUTIVE SUMMARY

### Tunnel Construction

48. The tunneling method considered for the tunnel construction is mostly the New Austrian Tunnelling Method. This drill and blast method involves drilling of blast holes, charging, ignition, mucking and scaling. The blast material will be transported out via trucks and suitable material will be used for other construction. After removal of blast material, scaling will be carried out to bring down potentially unstable blocks of rock around the tunnel and to prepare the rock surface for shotcreting and tunnel lining.
49. Only the longest tunnel in Lenggend FR (7.3 km) will be constructed using a Tunnel Boring Machine (TBM). The NATM method will be used to excavate the TBM launching portals at both ends of the tunnel, following which the TBM will be used to advance the tunnel.
50. Alternative mechanical excavation methods are proposed for sensitive areas tunnels cross under gas pipelines in Putrajaya and water tank near residential area in Nilai.

### Station Construction

51. The construction of station will involve the preparatory earthworks, foundation and substructure works, superstructure works, infrastructure and utility works. Earthworks will be carried out either cutting or filling to achieve the design platform levels. At areas where imported earth is required, dump trucks will bring in the material where bulldozers spread the earth which will then be compacted by rollers to the required density and level.
52. Ground treatment works will be carried out where required and the foundation works will include piling. The main structure will be constructed using steel beams and the building frame. Steel beams and columns will be delivered to site from the casting factory and installed at the site. The floor shall be concrete slab and will be cast with concrete delivered to the site.

### Installation of Tracks and Systems

53. After the earthworks and civil and structural works for the alignment have been completed, the railway tracks and systems for control and signalling will be installed. The trackworks system covers the track network that provides support and guidance to the rolling stock, including the major elements such as rails, rail fastenings, sleepers and ballast. The signaling and control system is important for controlling train movements, enforcing train safety and controlling operations. The system will ensure safe train separation functionality and allows the trains to travel at maximum consistent speed safely. After the installation of these components, testing and commissioning will be carried out.

## EXECUTIVE SUMMARY

### ECRL Operation

54. During the operation of the ECRL, trains will be running at regular intervals. The train operations will consist of passenger trains operating at 160 km/h and freight trains operating at 80 km/h. At passenger stations, the typical activities will occur, such as pick-up and drop-off of passengers, with the associated road traffic connecting to the stations. At freight stations, cargo in various forms will be transported and transferred. At maintenance bases, maintenance work will be carried out on a daily as well as scheduled basis.

### Ridership

55. The passenger ridership for the ECRL (**Table ES-7**) has been estimated based on the following factors:

- Population/employment
- GDP
- Transit times - railway/highway
- Cost of highway transport
- Tariff
- Value of travel time
- Upgrade plans for highway

**Table ES-7 : ECRL Passenger Journey Forecast**

| Year | Passenger Journeys<br>(Million) | Year | Passenger Journeys<br>(Million) |
|------|---------------------------------|------|---------------------------------|
| 2027 | 4.07                            | 2038 | 7.61                            |
| 2028 | 4.77                            | 2039 | 7.78                            |
| 2029 | 5.19                            | 2040 | 7.95                            |
| 2030 | 5.64                            | 2041 | 8.12                            |
| 2031 | 6.10                            | 2042 | 8.30                            |
| 2032 | 6.58                            | 2043 | 8.48                            |
| 2033 | 6.74                            | 2044 | 8.67                            |
| 2034 | 6.91                            | 2045 | 8.86                            |
| 2035 | 7.09                            | 2046 | 9.05                            |
| 2036 | 7.26                            | 2047 | 9.25                            |
| 2037 | 7.44                            | -    | -                               |

Source : ECRL Section C Railway Scheme (MRL)

### Freight Operations

56. Freight trains will be powered by electric locomotives with a design speed of 80 km/hr. Freight trains will operate 22.5 hours per day, 7 days per week. The type of goods to be carried by the freight trains include containers, coal, cement, steel, rubber, polyethylene and palm biomass, which may be transported in various forms such as containers, packages, dry bulk and liquid bulk (**Table ES-8**).

**Table ES-8 : Freight Traffic Forecast on the ECRL**

| Commodity                     | Freight Traffic             |                             |                             |                             |                             |
|-------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|                               | 2027<br>(Million<br>Tonnes) | 2032<br>(Million<br>Tonnes) | 2037<br>(Million<br>Tonnes) | 2042<br>(Million<br>Tonnes) | 2047<br>(Million<br>Tonnes) |
| Export / Import<br>Containers | 3.5                         | 6.0                         | 10.1                        | 15.8                        | 22.2                        |
| Iron Ore                      | 2.5                         | 3.8                         | 5.7                         | 8.3                         | 7.9                         |
| Coal                          | 0.5                         | 1.1                         | 2.1                         | 3.8                         | 5.4                         |
| Cement                        | 0.3                         | 0.9                         | 2.6                         | 4.9                         | 7.2                         |
| Steel Industry                | 0.3                         | 0.3                         | 0.4                         | 0.5                         | 0.5                         |
| Rubber<br>(containers)        | 0.2                         | 0.2                         | 0.5                         | 0.6                         | 0.7                         |
| Polyethylene                  | 0.2                         | 0.4                         | 0.5                         | 0.7                         | 0.7                         |
| Palm Biomass                  | 0.5                         | 1.3                         | 3.0                         | 6.0                         | 6.0                         |
| Iron Ore Fines                | 1.0                         | 1.2                         | 1.5                         | 4.3                         | 4.3                         |
| Other Goods                   | 0.0                         | 0.6                         | 1.0                         | 2.0                         | 4.0                         |

Source: ECRL Section C Railway Scheme (MRL)

#### Project Implementation Schedule

57. The entire ECRL project (Sections A, B and C) has a planned implementation period of seven years and is planned to commence with the advance work in August 2020 after regulatory approvals have been obtained (**Table ES-9**).

**Table ES-9 : Project Implementation Schedule**

| Activity  | Start Date   | Completion Date |
|---|--------------|-----------------|
| 1. Advance Works  | August 2020  | August 2021     |
| 2. Permanent works (Infrastructure)                         | January 2021 | January 2025    |
| 3. System Works (Procurement, manufacturing & installation) | April 2023   | August 2026     |
| 4. Testing & commissioning                                  | August 2026  | November 2026   |
| 5. Trial operation  | October 2026 | December 2026   |
| 6. Revenue Service Date                                     | January 2027 | -               |

Note: Advance Works include base camp and batching plants while permanent works include construction of, tracks stations and maintenance bases.

58. A Railway Scheme has been submitted for the ECRL Section C, in line with the Land Public Transport Act 2010 (Act 715). The schedule for ECRL Section C Railway Scheme is listed in **Table ES-10** below.

**Table ES-10 : ECRL Section C Project Railway Scheme Schedule**

| Activity                                     | Start Date      | Completion Date |
|--|-----------------|-----------------|
| 1. Commencement of Scheme Design             | April 2019      | -               |
| 2. Submission of Railway Scheme to APAD      | 1 November 2019 | -               |
| 3. Conditional Approval of Railway Scheme    | 10 January 2020 | -               |
| 4. Public Display of Scheme Design           | 14 January 2020 | 14 April 2020   |
| 5. Expected approval of Final Railway Scheme | 19 May 2020     | -               |

## EXISTING ENVIRONMENT

### Terrain

59. In Segment 1 (Pahang), the alignment passes through flat to undulating terrain, with an elevation range of 39 m to 91 m above sea level (m asl) with the highest point along the alignment being within agricultural area. The slopes in Segment 1 generally fall within Class I (0° - 15°).
60. In Segment 2 (Negeri Sembilan), the alignment traverses through undulating and hilly terrain where the elevation ranges between 39 m to 483 m asl. The highest elevation of 483 m is located within the Gapau Forest Reserve (FR) which the alignment will tunnel through. Class I (0° - 15°) and Class II (15° - 25°) slopes are encountered from the Pahang-Negeri Sembilan border to before the Triang FR, while slopes within Class I (0° - 15°) to Class III (25° - 35°) are encountered as the alignment crosses the Triang, Kenaboi, Gapau and Lenggeng FR.
61. In Segment 3 (Selangor and Putrajaya), the elevation ranges between 2 m to 259 m asl where the highest elevation is at Bukit Tunggul which the alignment will tunnel through. The slopes along the alignment in this segment are mainly within Class I (0° - 15°) except at Bukit Tunggul where it falls under Class II (15° - 25°) and Class III (15° - 25°).

### Geology and Soils

62. The alignment in Segment 1 (Pahang) would be on mostly argillaceous rocks consisting of mudstone, hornfels, phyllite, slate and occasional interbeds of sandstone. The tunnel in Pahang, would be founded in mudstone, hornfels, phyllite, and slate. No significant lineaments are close to the tunnel in Pahang.
63. Geology along the alignment in Segment 2 (Negeri Sembilan) is mostly of granite. On the eastern part, the bedrock is of argillaceous rocks consisting of mudstone, hornfels, phyllite and slate, occasional interbeds of sandstone. Significant areas are underlain by schist and gneiss and conglomerate. No significant lineaments are found close to the major tunnels from Simpang Pelangai to Klawang, but the shorter tunnels nearing Klawang are expected to hit the Kuala Lumpur Fault. The tunnel line between Klawang and Lenggeng is expected to encounter the Seremban Fault. The tunnel line west of Nilai is not near any major lineament.
64. Geology along the alignment in Selangor is mostly in sandstone with interbeds of argillaceous rock of phyllite, shale and slate. The alignment from Jenjarom to Port Klang is in the Quaternary alluvium with places being previously mined especially near Cyberjaya area. 13 km of the alignment in Dengkil and Jenjarom will be on peat.

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65. Geology along the alignment in Putrajaya is mostly in schist in the area east of Putrajaya Selatan and in sandstone with interbeds of argillaceous rock of phyllite, shale, slate and siltstone. Similar rock types of sandstone with interbeds of argillaceous rock underlie the west of Putrajaya Selatan and along the spurline to Putrajaya. Alluvium interfingering into the bedrock of schist and sandstone, so the alignment is expected to be constructed on the thin alluvium. The tunnel in Putrajaya is in sandstone, phyllite, shale and slate.

### Climate

66. For Segment 1 (Pahang), based on the data obtained from the Temerloh Meteorological Station (1985 - 2018), the average annual 24-hour temperature recorded is 26.9°C while the average annual rainfall recorded is 1,939.5 mm. The average annual 24-hour mean relative humidity is 83.5%. The predominant wind blows from the north and the annual mean speed was recorded at 0.7 m/s.
67. For Segment 2 and 3 (Negeri Sembilan, Selangor and Putrajaya), based on the data obtained from the KLIA Sepang Meteorological Station (1998 - 2018), the average annual 24-hour temperature recorded is 27.6°C while the average annual rainfall recorded is 2,035.3 mm. The average annual 24-hour mean relative humidity is 79.9%. The predominant wind blows from the north and the annual mean speed was recorded at 1.9 m/s.

### Land Use

68. In Segment 1 (Pahang), the alignment passes through the districts of Temerloh, Bera and Bentong where the dominant land use is agriculture (82.0%) followed by forest (10.4%). The alignment in Segment 2 (Negeri Sembilan) passes through the districts of Jelebu and Seremban and traverses through predominantly agriculture land (58.0%) followed by forest (26.2%). The alignment in Segment 3 (Selangor and Putrajaya) passes through the districts of Hulu Langat, Sepang, Kuala Langat, Klang and Putrajaya. The dominant land use in Selangor is agriculture land (62.8%) while in Putrajaya it is vacant land (27.3%).
69. The existing land use in the ECRL corridor (1 km either side of the alignment) is tabulated in **Table ES-11**.



Table ES-11 : Existing Land Use (%) within 1 km Corridor

| Segment                          | 1            | 2               | 3            |              |
|----------------------------------|--------------|-----------------|--------------|--------------|
| Land Use                         | Pahang       | Negeri Sembilan | Selangor     | Putrajaya    |
| Residential                      | 1.8          | 2.9             | 5.3          | 5.9          |
| Commercial                       | 0.1          | 0.6             | 0.9          | 0.5          |
| Industry                         | 0.7          | 2.3             | 1.9          | 0.0          |
| Institutional & Public Amenities | 1.1          | 1.3             | 0.7          | 11.2         |
| Open Space & Recreational        | 0.4          | 1.4             | 1.2          | 15.2         |
| Vacant Land                      | 0.2          | 0.2             | 5.1          | 27.3         |
| Transportation                   | 2.5          | 3.8             | 12.5         | 24.4         |
| Infrastructure & Utilities       | 0.4          | 0.8             | 0.4          | 5.6          |
| Agriculture                      | 82.0         | 58.0            | 62.8         | 2.3          |
| Forest                           | 10.4         | 26.2            | 4.1          | 0.0          |
| Waterbodies                      | 0.4          | 2.4             | 4.9          | 7.6          |
| <b>Total</b>                     | <b>100.0</b> | <b>100.0</b>    | <b>100.0</b> | <b>100.0</b> |

#### River system, water quality and beneficial uses

70. The alignment will traverse two major river catchments namely the south western part of the Sg. Pahang catchment and the Sg. Langat catchment. It will cross 10 major rivers making up to a total of 48 crossings including tributaries (**Figure ES-3**).
71. A total of 27 water samples were collected, where all samples were taken at the alignment's river crossings. Of the 27 samples, 26 were river water samples while one was a marine water sample. Water quality at most river crossings in Pahang fall within Class II (Clean/Slightly Polluted) and Class III (Slightly Polluted) with WQI ranging from 61.92 and 82.25. Water quality at most river crossings in Negeri Sembilan generally fall within Class II (Clean) and Class III (Slightly Polluted) with WQI ranging from 58.39 to 74.36. Water quality at most river crossings in Selangor generally fall within Class II (Clean) and Class III (Slightly Polluted) with a WQI ranging from 62.04 to 83.07. The results for the marine sample (WQ22) were compared to the parameter limits of Class E1 as WQ22 is representative of a coastal plain type estuary.
72. There are seven water supply infrastructures (water treatment plants (WTP) and/or water intakes) that are located downstream of the alignment (**Table ES-12**). The alignment does not traverse upstream of any dams.
73. In Selangor, there are several ponds earmarked as alternative water sources by Lembaga Urus Air Selangor (LUAS) within the Sg. Langat catchment. These ponds are declared as a zone of protection under the Zone of Protection (Declared Area and Restriction) Notification for the purpose of

## EXECUTIVE SUMMARY

protecting and preserving additional resources for water supply. Kolam Sumber Air Alternatif (KSAA) Kolam ABASS A, B & C (1.5 km north), KSAA Petaling Tin, Bukit Cheding & Kolam Agro-Tech, Olak Lempit (3 km southeast) and KSAA Labohan Dagang MC8 & MC9 (approx. 16.5 km southwest) are such ponds located downstream of the alignment.

74. There are aquaculture ponds located in Kg. Orang Asli Lumut, Negeri Sembilan. The fenced and gated site is approximately 5.15 hectares and the ponds are most likely breeding freshwater tilapia. The alignment crosses this aquaculture area.
  
75. In Kg. Ayer Tawar, Selangor, there is an area of aquaculture and recreational fish ponds that exists along Sg. Langat, spanning nearly 50 hectares. The ponds are less than 1 km downstream from the alignment and within 10 km of the coast. The fish found in these aquaculture and recreational ponds are brackish species such as siakap, jenahak, bawal emas and kerapu.

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Table ES-12 : Water Supply Infrastructure Downstream of Alignment

| No. | State           | Water Intake                |              |                                 | Alignment Crossing |                         | Water Treatment Plant   |                |
|-----|-----------------|-----------------------------|--------------|---------------------------------|--------------------|-------------------------|---|----------------|
|     |                 | Name                        | Intake River | Coordinates                     | River              | Distance to Intake (km) | Name  | Capacity (MLD) |
| 1   | Pahang          | Triang                      | Sg. Triang   | 3°14'33.45"N<br>102°24'1.08"E   | Sg. Pertang        | 25.3                    | Triang  | 14             |
| 2   |                 | Kg. Jawi-jawi               | Sg. Triang   | 3°11'5.18"N,<br>102°14'49.62"E  | Sg. Semei          | 6.8                     | Kg. Jawi-jawi   | 7              |
| 3   | Negeri Sembilan | Petaseh                     | Sg. Triang   | 3° 2'16.47"N,<br>102° 9'23.84"E | Sg. Kenaboi        | 1                       | Ngoi-Ngoi   | 150            |
| 4   | Selangor        | Semenyih@Jenderam Hilir     | Sg. Semenyih | 2°53'27.47"N,<br>101°44'8.33"E  | Sg. Bt. Tunggu     | 5.0                     | Semenyih  | 600            |
| 5   |                 | Kolam ABASS A, B & C, (ORS) | Sg. Langat   | 2°53'29.54"N,<br>101°42'29.37"E | Sg. Bt. Tunggu     | 9.6                     | Semenyih 2  | 100            |
| 6   |                 | Bukit Tampoi                | Sg. Langat   | 2°50'40.96"N,<br>101°40'39.57"E | Sg. Langat         | 5.1                     | Bukit Tampoi  | 37             |
| 7   |                 | Labohan Dagang ORS          | Sg. Langat   | 2°47'20.15"N,<br>101°36'43.03"E | Sg. Langat         | 16.5                    | <ul style="list-style-type: none"> <li>• Labohan Dagang</li> <li>• Proposed Labohan Dagang 2</li> </ul> | 200-400        |

ORS: Off-River Storage

## EXECUTIVE SUMMARY

### Air quality, noise and vibration levels

76. The air quality measured at eight locations were generally below the Interim Target (IT-2; 2018) of the Malaysian Ambient Air Quality Standard (MAAQS) 2013 limits except for the parameters of PM<sub>10</sub> and PM<sub>2.5</sub> at two locations (A6 and A7). This can be attributed to the elevated level of particulate matter in the air from the haze condition that was affecting Malaysia during the monitoring period. PM<sub>10</sub> readings ranged from 21 - 138 µg/m<sup>3</sup> and PM<sub>2.5</sub> from 13 - 75 µg/m<sup>3</sup>. SO<sub>2</sub>, NO<sub>2</sub> and O<sub>3</sub> levels were below detection limits of 5 µg/m<sup>3</sup> and 20 µg/m<sup>3</sup> respectively. CO ranged from below detection limits to 3.2 mg/m<sup>3</sup>.
77. 24-hour noise (Leq) levels were measured at 36 locations with readings ranging from 47.9 - 67.7 dBA (day time) and 41.8 - 63.0 dBA (night time). The readings were compared with the Fifth Schedule (Limiting Sound Level from Railway and Transit Trains) of DOE's Guidelines for Environmental Noise Limits and Control (Third Edition, 2019). Of the 36 locations, 5 locations measured readings that exceeded the Fifth Schedule for either day time or night time, while two locations exceeded the Fifth Schedule for both day time and night time.
78. Vibration levels, measured at 36 locations, ranged from 0.06 mm/s to 0.82 mm/s (vertical direction) and 0.07 mm/s to 0.69 mm/s (longitudinal direction) in the day time. Levels ranged from 0.08 mm/s to 0.69 mm/s (vertical direction) and 0.07 mm/s to 0.88 mm/s (longitudinal direction) in the evening. Vibrations readings were compared against DOE's recommended limits Schedule 5 (Recommended Limits for Human Response and Annoyance from Steady State Vibrations). Relatively higher vibration levels (>0.4 mm/s, Curve 4) were noted at some locations with road traffic induced vibrations from heavy vehicles (lorries pass).

### Ecology

79. The alignment in Pahang will traverse near the Kemasul (Temerloh) FR at the south-eastern section and will travel along the vicinity of Kemasul Tambahan (Bentong) FR. The alignment will go through small patches of alienated secondary forests located between oil palm plantations and agricultural land (**Table ES-13**). The Kemasul FR is an important habitat for Asian Elephants. Other species found during the survey (October 2019 - January 2020) include tapir, wild boar, large spotted civet and southern pig-tailed macaques. The shrinking of Kemasul FR has resulted in its surrounding areas experiencing the highest number of human-elephant conflicts (HEC) in Pahang. Within 5 km of the alignment, there were no human-elephant conflicts recorded between year 2014 to 2018.

Table ES-13 : Permanent Reserved Forests in Pahang

| Name                              | Size (ha) | Status            | Classification    | Alignment   |
|-----------------------------------|-----------|-------------------|-------------------|---|
| <b>Kemasul (Temerloh)</b>         | 22,006    | Production Forest | Plantation Forest | • Alignment nearing the tip at the southeast border (CH 435000 - CH 445500) |
| <b>Kemasul Tambahan (Bentong)</b> | 1,545     | Production Forest | Plantation Forest | • Alignment 1.8 km from the PRF (CH 458500 - CH 464000)                     |

Source: JPSM (2018)

■ Alignment traverse through the PRF

■ Alignment going near the PRF

80. In Negeri Sembilan, the alignment will traverse through four PRFs, namely Triang FR, Kenaboi FR, Gapau FR, and Lenggeng FR via tunnels (**Table ES-14**). The alignment will also traverse through several patches of shrublands and isolated forests in agricultural plantations. The wildlife surveys conducted at Kenaboi FR and Triang FR recorded mammals including the endangered Malayan tapir, critically endangered Sunda pangolin and the pig-tailed macaque. Other threatened mammals such as Malayan sun bear, smooth otter, and white-handed gibbon are found in Kenaboi PRF. Gapau and Lenggeng FR are less diverse but still recorded presence of the Malayan Tapir and Pig-tailed macaque. Within 5 km of the alignment, there were nine cases of human-tapir conflicts between year 2014 and 2018.

Table ES-14 : Permanent Reserved Forests in Negeri Sembilan

| PRF               | Size (ha) | Class             | ECRL Alignment (km)                                     | ECRL Chainage         |
|-------------------|-----------|-------------------|---|-----------------------|
| <b>Triang FR</b>  | 12,587.3  | Production Forest | Alignment cross the northern section of the reserve by: | CH 479000 - CH 483000 |
|                   |           |                   | Tunnel  | 2.6                   |
|                   |           |                   | Viaduct   | 0.45                  |
|                   |           |                   | Embankment  | 0.55                  |
|                   |           |                   | <b>Total length in PRF</b>                              | <b>3.6</b>            |
| <b>Kenaboi FR</b> | 44,202.6  | Production Forest | Alignment cross the southern section of the reserve by: | CH 483000 - CH 486000 |
|                   |           |                   | Tunnel  | 2.75                  |
|                   |           |                   | Viaduct   | 0.13                  |
|                   |           |                   | Embankment  | 0.33                  |
|                   |           |                   | <b>Total length in PRF</b>                              | <b>3.21</b>           |
| <b>Gapau FR</b>   | 5,281.7   | Protection Forest | Alignment cross the southern section of the reserve by: | CH 506500 - CH 509500 |
|                   |           |                   | Tunnel  | 2.84                  |

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| PRF                | Size (ha) | Class             | ECRL Alignment (km)                                     | ECRL Chainage        |
|--------------------|-----------|-------------------|---|----------------------|
|                    |           |                   | <b>Total length in PRF</b>                              | <b>2.84</b>          |
| <b>Lenggeng FR</b> | 5,417.0   | Protection Forest | Alignment cross the southern section of the reserve by: | CH 509500- CH 513500 |
|                    |           |                   | Tunnel  | 4.3                  |
|                    |           |                   | Embankment  | 0.16                 |
|                    |           |                   | <b>Total length in PRF</b>                              | <b>4.46</b>          |

- Alignment traverse through the PRF
- Alignment going near the PRF

81. In Selangor, the alignment will traverse through two PRFs (Table ES-15) which are the peat swamp forests of Kuala Langat Utara FR and mangrove forests of Jugra Kompok 2 FR. The alignment will also tunnel through a state land forest at Bukit Tunggul near the border of Negeri Sembilan (Table ES-16). Only wild boars were found in the peat swamp during the survey. Species expected from mangrove habitats include birds, wild boars, long-tailed macaques and dusky leaf monkeys. Bukit Tunggul still harbours leopard cat, Malayan porcupine and pig-tailed macaque. Human-wildlife conflicts in Selangor mostly involve human-macaque conflicts in Pulau Indah, Telok Panglima Garang and Dengkil.

Table ES-15 : Permanent Reserved Forests in Selangor

| PRF                          | Size (ha) | Class             | ECRL Alignment (km)                              | ECRL Chainage      |
|------------------------------|-----------|-------------------|--|--------------------|
| <b>Kuala Langat Utara FR</b> | 962       | Production Forest | Alignment cross the southernmost section by:     | CH 553500 - 557250 |
|                              |           |                   | Viaduct  | 0.75               |
|                              |           |                   | Embankment                                       | 3                  |
|                              |           |                   | <b>Total length in PRF</b>                       | <b>3.75</b>        |
| <b>Jugra Kompok 2 FR</b>     | 97        | Protection Forest | Alignment cross the middle of mangrove strip by: | CH 23403 - 23335   |
|                              |           |                   | Viaduct  | 0.07 (70m)         |
|                              |           |                   | <b>Total length in PRF</b>                       | <b>0.07 (70m)</b>  |

- Alignment traverse through the PRF
- Alignment going near the PRF

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Table ES-16 : State/Private Land Forest along the Alignment in Selangor

| Area/Approximate Coordinates                               | Alignment Type & Length  | Note  |
|--|--|---|
| <b>Bukit Tunggul SLF</b><br>2°52'19.51"N<br>101°44'59.74"E | Tunnel for approx. 2.3 km<br>CH 537000 -<br>CH 539300                      | <ul style="list-style-type: none"> <li>Existing land use is Institution &amp; Public Facilities + Agriculture</li> <li>Future land use is Institution &amp; Public Facilities + Open Space &amp; Recreational Facilities</li> </ul> |
| <b>Jugra SLF</b><br>2°52'54.37"N<br>101°17'57.44"E         | At-grade for approx. 290 m<br>Viaduct for approx. 110m<br>CH 22800 - 23500 | <ul style="list-style-type: none"> <li>Existing land use is forest</li> <li>Future land use is forest</li> </ul>  |

Source: PLAN-Malaysia (2018)

Socio-economic

82. Pahang holds more than 5% of the nation's population and almost 5% of its employment while contributing 3.2% to national GDP. For Negeri Sembilan, it holds almost 3.5% of the nation's population and 3.3% of its employment while contributing almost 2.7% to the national GDP. Selangor is more developed economically than Pahang and Negeri Sembilan. Selangor holds more than 20% of the nation's population and more than 23% of its employment while contributing more than 23% to the national GDP. Putrajaya, on the other hand, holds the least out the four states to the nation's population which is at almost 0.5%. Although the population is small, Putrajaya contributes the second highest among the four states to the national GDP, at more than 11%.

Table ES-17 : Regional Key Socio-economic Parameters

|                 | Population ('000) | Employment ('000) | Per Capita GDP (RM) | GDP (RM million) | % GDP Annual Growth | Capital Investment Manufacturing (RM million) | Median Monthly Household Income (RM) | Mean Monthly Household Income (RM) | Incidence of Poverty % |
|-----------------|-------------------|-------------------|---------------------|------------------|---------------------|---|--------------------------------------|------------------------------------|------------------------|
| Pahang          | 1,674.6           | 716.6             | 38,559              | 46,800           | 2.0                 | 8,028.4                                       | 4,579                                | 5,887                              | 0.2                    |
| Negeri Sembilan | 1,130.3           | 488.6             | 32,244              | 38,839           | 3.5                 | 2,430.8                                       | 3,979                                | 5,012                              | 0.2                    |
| Selangor        | 6,528.4           | 3,446.7           | 51,528              | 333,642          | 4.8                 | 18,947.4                                      | 7,225                                | 9,463                              | 0.0                    |
| Putrajaya       | 103.8             | 38.4*             | 101,420*            | 169,971*         | 5.9*                | 167.1*  | 8,275                                | 11,555                             | 0.0                    |
| Malaysia        | 32,587.4          | 14,776            | 44,682              | 1,446,914        | 4.2                 | 87,375.6                                      | 4,585                                | 6,958                              | 0.4                    |

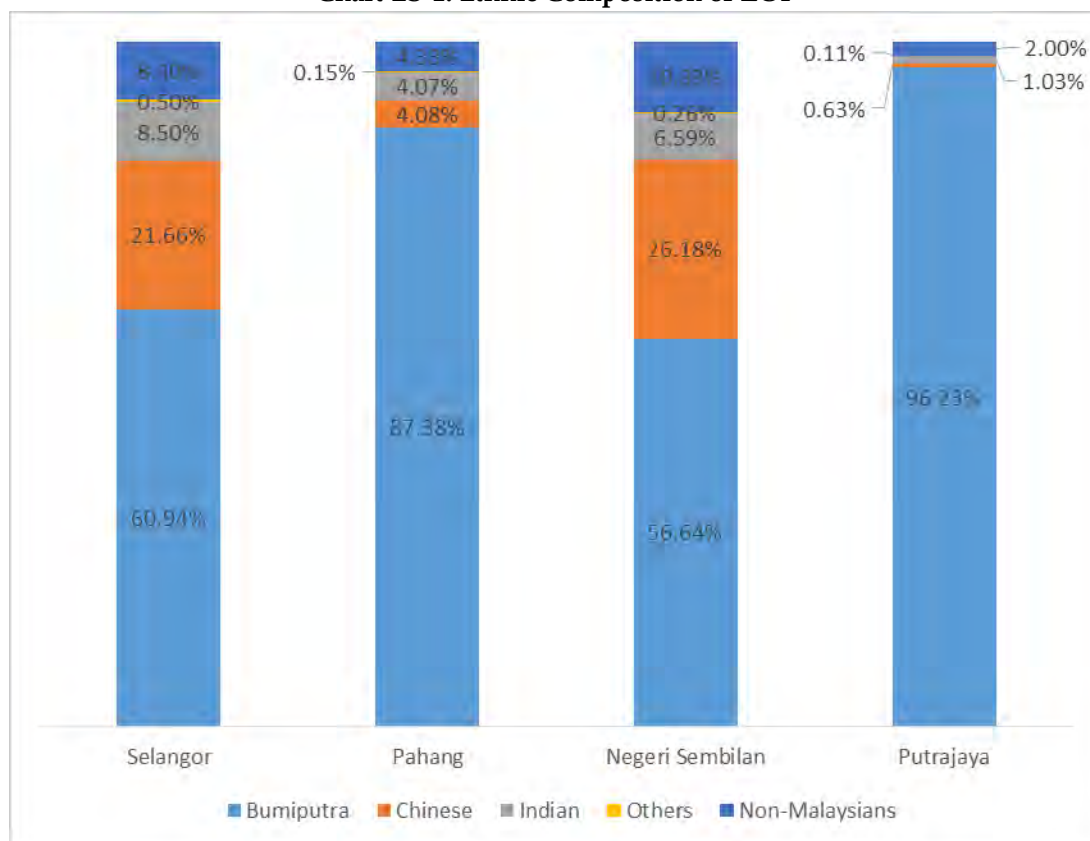
Note : 1. (\*) Putrajaya is calculated together under W.P. Kuala Lumpur.

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- Sources: 1. DOSM, Current Population Estimates 2019, Tables 4.5, 4.6, 4.12; (July 2019)  
 2. DOSM, Labour Force Survey Report 2018, Table B4-1, p 201 (May 2019)  
 3. DOSM, Household Income Survey 2016, Table 1.6a and Table 3.2, p 45 & 87 (October 2017)  
 4. DOSM, National Accounts. GDP by State, 2010-2016, Table 1, Table 2, Table 18 and Table 27 (September 2017)  
 5. MIDA, Malaysia Investment Performance Report 2018, Approved Manufacturing Projects by State, Appendix 6, p 126

83. The total population along the alignment corridor is estimated at more than 143,000 people. More than 22% of the total population along the corridor are within the primary Zone of Influence (ZOI) whereas the population for the secondary ZOI makes up 77.62%. The total household is estimated more than 35,000 household that is affected under ECRL Section C. The average household size is 4.0 persons for household for the entire corridor. In the primary ZOI, the average household size is 3.7 people per household whereas for secondary ZOI, it is estimated at 4.2 people per household.
84. The shares of Non-Bumiputera population including Non-Malaysian citizens are relatively small. For Chinese ethnic group, the percentage is relatively high for Selangor and Negeri Sembilan with the percentage of 21.7% for Selangor and 26.2% for Negeri Sembilan (**Chart ES-X**).

**Chart ES-1: Ethnic Composition of ZOI**



85. There are 14 *orang asli* settlements along the alignment (**Table ES-18**). There are two Orang Asli settlements that are directly affected by the alignment,



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namely Kg. Orang Asli Bukit Jenuk in Sepang, Selangor and Kg. Orang Asli Lumut in Seremban, Negeri Sembilan.

**Table ES-18 : List of Orang Asli Settlements along ECRL Section C alignment**

| State           | District     | Kampung Name            | Distance from ECRL | No. of Residents   |     |
|-----------------|--------------|-------------------------|--------------------|--|-----|
| Selangor        | Sepang       | KOA Batu Jenderam Hilir | 28 1km             | 164  |     |
|                 | Sepang       | KOA Bukit Jenuk         | 0km                | 86   |     |
|                 | Sepang       | KOA Air Terentang       | 1km                | 127  |     |
|                 | Sepang       | KOA Bukit Damar         | 1km                | Similar to Kg. OA Air Terentang as it is an extension of Kg OA Air Terentang |     |
|                 | Sepang       | KOA Bukit Baja          | 1km                |  |     |
|                 | Kuala Langat | KOA Pulau Kempas        | 1km                |  | 343 |
|                 | Kuala Langat | KOA Bukit Cheeding      | 2km                |  | 268 |
|                 | Kuala Langat | KOA Busut Baru          | 2km                |  | 465 |
|                 | Kuala Langat | KOA Sungai Bumbun       | 2km                |  | 521 |
|                 | Kuala Langat | KOA Sungai Judah        | 3km                | 477  |     |
|                 | Kuala Langat | KOA Sungai Kurau        | 1.5km              | 235  |     |
| Negeri Sembilan | Seremban     | KOA Lumut               | 0km                | 93   |     |
|                 | Seremban     | KOA Jeram Kedah         | 3km                | 522  |     |
|                 | Jelebu       | KOA Rangoi              | 3km                | 174  |     |

Source: JAKOA, 2019

86. The alignment will also cut through Malay Reserve Land in Hulu Langat district and Sepang district. They are Malay Reserve Land Beranang, Malay Reserve Land Jenderam and Malay Reserve Land Dengkil.

### Waste

87. In Pahang, the alignment will pass through three districts that are governed by Majlis Perbandaran Temerloh, Majlis Daerah Bera, and Majlis Perbandaran Bentong. Each of the local authority has its own dedicated landfill, and two of them are sanitary (level 4) (Table ES-19 and Figure ES-5).
88. In Negeri Sembilan, the alignment will pass through two districts under the jurisdiction of Majlis Daerah Jelebu and Majlis Bandaraya Seremban where the wastes are disposed at Sg. Muntuh Landfill and Tanah Merah Sanitary Landfill in Port Dickson respectively (Table ES-19 and Figure ES-5).
89. In Selangor and Putrajaya, the alignment will pass through four districts and one federal territory under the jurisdiction of Majlis Perbandaran Kajang, Majlis Perbandaran Sepang, Majlis Daerah Kuala Langat, Majlis Perbandaran Klang and Perbadanan Putrajaya. All of the municipal solid waste in these areas is disposed at Tanjung Dua Belas Sanitary Landfill and Jeram Sanitary Landfill (MP Klang). There is also an inert landfill located in

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Dengkil that only accepts inert waste such as construction and demolition waste (**Table ES-19** and **Figure ES-5**).

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Table ES-19 : Waste Disposal Facilities along the Alignment

| Local Authority                 | Landfill (Tapak Pelupusan) | Area (ha) | Waste Received (tonne/day) | Landfill Capacity | Farthest Distance from Alignment (km) | Waste Type Received   | Landfill Type      | Waste Source (from this Project)                      | Operator                        |
|---------------------------------|----------------------------|-----------|----------------------------|-------------------|---------------------------------------|-----------------------|--------------------|---|---------------------------------|
| <b>PAHANG</b>                   |                            |           |                            |                   |                                       |                       |                    |   |                                 |
| MP Temerloh                     | TPS Belenggu               | 40.0      | 200                        | 50%               | 10.3                                  | Municipal solid waste | Sanitary (Level 4) | • Temerloh  | DHES Sdn Bhd                    |
| MD Bera                         | TP Kg. Chuat               | 26.0      | 37                         | n/a               | 24.7                                  | All types             | Not sanitary       | • Bera<br>• Temerloh                                  | Alam Flora Sdn Bhd              |
| MP Bentong                      | TPS Sg. Padang Sertik      | 40.5      | 140                        | 40%               | 42.2                                  | Municipal solid waste | Sanitary (Level 4) | • Bentong   | Alam Flora Sdn Bhd              |
| <b>NEGERI SEMBILAN</b>          |                            |           |                            |                   |                                       |                       |                    |   |                                 |
| MD Jelebu                       | TP Sg. Muntuh              | 5.0       | 35                         | n/a               | 22.8                                  | All types             | Not sanitary       | • Jelebu  | SWM Greentech Sdn Bhd           |
| MP Port Dickson                 | TPS Ladang Tanah Merah     | 120.0     | 665                        | 20%               | 24.2                                  | Municipal solid waste | Sanitary (Level 4) | • Nilai / Seremban                                    | Cypark Smart Technology Sdn Bhd |
| <b>SELANGOR &amp; PUTRAJAYA</b> |                            |           |                            |                   |                                       |                       |                    |   |                                 |
| MP Sepang                       | TP Dengkil                 | 59.0      | 400                        | 60%               | 41.1                                  | Inert waste only      | Inert landfill     | • Sepang<br>• Kajang                                  | Worldwide Landfills Sdn Bhd     |
| MD Kuala Langat                 | TPS Tanjung Dua Belas      | 160.0     | 1,650                      | 45%               | 38.1                                  | Municipal solid waste | Sanitary (Level 4) | • Putrajaya<br>• Sepang<br>• Kuala Langat<br>• Kajang | Worldwide Landfills Sdn Bhd     |
| MD Kuala Selangor               | TPS Jeram                  | 64.7      | 3,000                      | 60%               | 35.9                                  | Municipal solid waste | Sanitary (Level 4) | • Klang   | Worldwide Landfills Sdn Bhd     |

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## POTENTIALLY SIGNIFICANT IMPACTS AND MITIGATION DURING PRE-CONSTRUCTION AND CONSTRUCTION STAGES

90. A range of potential impacts can be expected during the pre-construction and construction phases of the Project (**Table ES-20**). The receptors of these potential impacts include various communities and land uses located close to the line, stations, depots and yards.

**Table ES-20 : Potential Impacts During Pre-Construction and Construction Stage**

| Potential Impacts  | Activities  |
|--|---|
| Relocation/displacement  | <ul style="list-style-type: none"> <li>• Land acquisition</li> </ul>  |
| Soil erosion and sedimentation                                 | <ul style="list-style-type: none"> <li>• Utilities relocation</li> </ul>  |
| Soil erosion and sedimentation                                 | <ul style="list-style-type: none"> <li>• Site clearing and earthworks</li> <li>• Excavation works, piling works and spoil disposal</li> <li>• Tunneling works</li> <li>• Temporary works (Base camps and access roads)</li> </ul> |
| Risk of aggravating flood                                      | <ul style="list-style-type: none"> <li>• Construction of embankments</li> <li>• Stream crossings</li> <li>• Construction of temporary bridges / access roads</li> </ul>   |
| Waste generation   | <ul style="list-style-type: none"> <li>• Site office and workers camp</li> <li>• Site clearing (biomass)</li> <li>• Demolition of structures</li> <li>• Spoil/unsuitable material disposal</li> </ul>                             |
| Increased noise level  | <ul style="list-style-type: none"> <li>• Concreting and piling works</li> <li>• Use of high noise generating machinery such as generator sets, power tools, hydraulic breaker, grinding and cutting equipment</li> </ul>          |
| Increased vibration  | <ul style="list-style-type: none"> <li>• Movement of construction vehicles</li> <li>• Operation of construction machinery</li> <li>• Blasting</li> </ul>  |
| Air pollution/ dust  | <ul style="list-style-type: none"> <li>• Earthworks</li> <li>• Movement of construction vehicles and machinery</li> </ul>   |
| Habitat destruction, fragmentation and disturbance to wildlife | <ul style="list-style-type: none"> <li>• Site clearing and earthworks</li> </ul>  |
| Loss of agricultural land/properties                           | <ul style="list-style-type: none"> <li>• Land acquisition</li> </ul>  |
| Community fragmentation  | <ul style="list-style-type: none"> <li>• At-grade alignment and embankment</li> </ul>   |
| Social conflict  | <ul style="list-style-type: none"> <li>• Presence of foreign workers</li> </ul>   |
| Damage to buildings  | <ul style="list-style-type: none"> <li>• Vibration from construction activities</li> </ul>  |
| Disruption in road traffic flow                                | <ul style="list-style-type: none"> <li>• Construction vehicle traffic at alignment, stations, yards and depot</li> <li>• Road diversions</li> </ul>   |
| Public safety  | <ul style="list-style-type: none"> <li>• Hazards to public due to construction activities</li> </ul>  |
| Risk of peat fire  | <ul style="list-style-type: none"> <li>• Construction on peat land</li> </ul>   |

**Pre-construction phase**

91. The main potentially significant impacts expected during the pre-construction phase are related to the following activities:
- Land and property acquisition;
  - Potential relocation of Chinese Cemetery;
  - Encroachment into indigenous land;
92. Land and property acquisition are the main impacts during the pre-construction phase. 7,087 of private lots of land within the 300m corridor along the alignment (as identified per Section 4 of the Land Acquisition Act) would be frozen which encompasses an area of 7,242.44 ha. The number of lots that will actually be acquired will be much smaller, less than half this number. The Government is expected to compensate the affected parties in a fair manner. Nevertheless, people affected by the acquisition could potentially endure problems such as disruption to lives and loss of social cohesion. These will include houses in Kg. OA Lumut and Kg OA Jenuk as well as part of their farms/ponds. A Social Impact Assessment is currently being prepared and will be submitted to PLANMalaysia.
93. Majority of the stakeholders were concerned that the amount of compensation might not be sufficient and the timing of compensation to be paid to the affected individuals.
94. In order to minimise impacts from acquisition, MRL will provide early and adequate information to the affected parties to ensure that they are well-informed about acquisition process and ensure continuous engagement. Some of the mitigating measures proposed include:
- Ensure a fair valuation of land or properties that will be acquired.
  - Provide due notice, information and assistance to the affected parties, giving them ample time to make alternative plans and minimise inconveniences.
  - Maintain continuous engagement with the affected parties to address and attend to any queries to the whole spectrum of acquisition.
95. The alignment will cross existing graves at Ulu Beranang & Broga Chinese Cemetery and Temerloh Memorial Park. From the social perspective, the acquisition of cemetery is always considered as highly sensitive due to its religious and cultural significance. Some of the mitigating measures proposed include:
- The project proponent bear the cost of relocating the graves to new cemetery area;
  - The grave relocation must follow the religious procedure and burial rites;

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- Efforts should be made to identify the family members of the deceased so that they can be consulted about the reation of grave;
  - Maintain continuous engagement with the affected parties to address and attend to any queries to the whole spectrum of acquisition.
96. There are at least eight Orang Asli communities potentially affected by the ECRL alignment into their land. Significant impacts are expected at Kg. OA Lumut (Negeri Sembilan), OA Bukit Jenuk (Selangor) as well as the clusters of Orang Asli communities near to Kuala Langat Utara PRF (Selangor). The impacts vary from the loss of fish farming pond, acquisition of houses, removal of plantation areas and encroachment into roaming areas.
97. The Project Proponet is expected to maintain a continuous engagement with the affected indigenou communities together with the cooperation with JAKOA at state and district levels. Acquisition procedure into indigenou land will follow procedures as stipulated in the Land Acquisition Act 1960, Indigenou Act 1954 and National Land Code 1965.

### Construction Phase

98. The potential environmental impacts during the construction phase include soil erosion and sedimentation from site clearing and earthworks, flooding due to restriction of waterways, waste and spoil generation from construction activities, geological risks, increased noise and air pollution levels, ecological impacts, disruption to traffic, social impacts and issues related to public safety.

### Soil Erosion & Sedimentation

99. The project traverses a variety of terrain. Earthworks will be a major activity. In flat and low-lying areas, especially in Selangor, earth embankments will be built which will require substantial movement of earth. In undulating and hilly terrain (especially in Negeri Sembilan), earth cutting will be a major activity.
100. Some parts of the alignment have relatively high soil erosion risk (**Table ES-21 and Figure ES-4**). The potential impacts from soil erosion and sedimentation (if not mitigated) includes degradation of water quality, disruption in water supply, increased flood risks and threatening economic activities which depends on the impacted river water supply.

**Table ES-21 : High risk areas for soil erosion**

| Location               | Chainage Start | Chainage End |
|------------------------|----------------|--------------|
| <b>Pahang</b>          |                |              |
| Kg. Chemomoi, Bentong  | 461000         | 463260       |
| <b>Negeri Sembilan</b> |                |              |
| Triang FR              | 479200         | 482200       |

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|   |        |        |
|---|--------|--------|
| Kenaboi FR                                      | 483500 | 488500 |
| Gapau FR  | 504500 | 509200 |
| Lenggeng FR                                     | 509200 | 513800 |
| Plantation area near Emville Golf Resort, Nilai | 531500 | 535500 |
| <b>Selangor and Putrajaya</b>                   |        |        |
| Bukit Tunggal, Sepang                           | 535500 | 539000 |

101. To mitigate soil erosion and sedimentation, Land Disturbing Pollution Prevention and Mitigating Measures (LD-P2M2) have been prepared for erosion hotspots along the alignment. Soil erosion and sediment will pollute waterways thus affecting sensitive receptors surrounding and/or downstream of these hotspots. These include suburban and rural residential areas/ villages and water intakes.
102. The LD-P2M2 addresses planning and phasing of works, surface run-off control, provision of temporary earth drainage system, silt fence, interceptor drain, berm drain, cascading drain and toe drain. Other erosion and sediment control measures include temporary slope protection, turfing, compaction and silt traps. Active treatment system will be provided at construction area crossing rivers which has water intake downstream. ATS may also be considered if silt traps are not able to treat TSS to 50mg/l or soil analysis results show that the soil contains more than 10% of dispersible material. Construction access roads will be limited and controlled.
103. The control of of erosion is crucial because of the presence of 7 water intakes downstream of the alignment.

### Water Pollution

104. The other sources of water pollution are sewage and sullage from workers' camp, wastewater from tunneling works and batching plants, maintenance of plants and vehicles, and improper discharge or spillage. Potential water pollution impacts from the Project could affect the water quality of rivers and surrounding drainage which the alignment will cross (**Table ES-22**).

**Table ES-22 : Sensitive Receptors for Water Pollution due to Construction Work**

| <b>Hotspots<br/>(Estimated Chainage)</b>             | <b>Receiving River</b>   | <b>Receptors Downstream</b>         | <b>Distance<br/>Downstream</b> |
|--|--------------------------|-------------------------------------|--------------------------------|
| S2: At-grade: Kg. Melan, Bentong (CH48600)           | Sg. Semei → Sg. Triang   | Kg. Jawi-jawi Water Treatment Plant | 7.1 km                         |
| S3: Tunnel: Petaseh Intake Pumping Station (CH48600) | Sg. Kenaboi → Sg. Triang | Petaseh Water Intake                | 0.8 km                         |
| S4: At-grade: Kg.                                    | Sg. Selat → Sg.          | Aquaculture (Kg. Orang Asli Lumut)  | At crossing                    |



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| Hotspots<br>(Estimated Chainage)                       | Receiving River                           | Receptors Downstream                              | Distance<br>Downstream |
|--|---|---|------------------------|
| Orang Asli Lumut<br>(CH514000)                         | Belau → Sg.<br>Beranang → Sg.<br>Semenyih | Semenyih Water Intake<br>@ Jenderam Hilir         | 31.2 km                |
| S5: Tunnel: Bukit<br>Tunggul, Sepang<br>(CH535500)     | Sg. Bt. Tunggu →<br>Sg. Semenyih          | Semenyih Water Intake<br>@ Jenderam Hilir         | 7.1 km                 |
|  |   | KSAA Kolam ABASS<br>A, B & C                      | 10.7 km                |
| S6: Viaduct: Taman<br>Selatan, Putrajaya<br>(CH544500) | Sg. Langat                                | Bukit Tampoi Water<br>Intake & Treatment<br>Plant | 5.2 km                 |
|  |   | Labohan Dagang WTP<br>and off-river storage       | 16.6 km                |
| S7: Viaduct: Segenting,<br>Banting (CH5500-6500)       | Sg. Langat                                | Aquaculture<br>(Kg. Bandar)                       | 1.4 km                 |

105. Sanitation facilities will be provided in accordance with MOH and DOSH requirements. Wastewater from tunneling works and batching plant will be treated using either settling ponds and/or wastewater treatment system to reduce the TSS content to below 50 mg/L. All maintenance works to be carried out at designated areas to ensure that any spillage or leakage can be contained. Storage and handling of scheduled wastes will be done according to the Environmental Quality (Scheduled Wastes) Regulations 2005. Centralised scheduled waste storage will be implemented.

### Waste

106. Tunneling, construction of railway infrastructure, site clearing and demolition of encumbrances will generate substantial amount of excavated materials and construction waste (Table ES-23).

**Table ES-23 : Estimated Waste During Construction**

| Waste Category                          | Pahang                 | Negeri Sembilan           | Selangor & Putrajaya     | Total                     |
|---|------------------------|---------------------------|--------------------------|---------------------------|
| Biomass                                 | 3,555 tonnes           | 4,388 tonnes              | 5,148 tonnes             | 13,091 tonnes             |
| Construction and demolition (C&D) waste | 104,191 tonnes         | 179,494 tonnes            | 258,483 tonnes           | 542,168 tonnes            |
| Domestic waste                          | 2,086 tonnes           | 2,405 tonnes              | 3,056 tonnes             | 7,547 tonnes              |
| Excavated material                      | 296,000 m <sup>3</sup> | 10,471,000 m <sup>3</sup> | 1,872,000 m <sup>3</sup> | 12,639,000 m <sup>3</sup> |

107. Poor waste management has the potential to cause water pollution, flooding, and air pollution. Whereas, in the case of proper waste management, the substantial amount of waste generated can still cause strain to the capacity of receiving landfills.
108. To mitigate the waste impacts, the waste management shall be based on sustainable waste management hierarchy (reduce, reuse, recycle). Steps to reduce waste generation will be adopted such as good housekeeping. Suitable materials will be reused in the construction work. For example,

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excess earth as embankment, rock debris as aggregates and biomass as slope protection. Recyclable materials like paper, aluminium and steel rebar will be recycled. Finally, all residual waste will be disposed at appropriate locations with approval from respective local authority.

### Risk of Aggravated Flooding

109. There is potential risk that the existing flooding may be aggravated by the construction of the ECRL (**Table ES-24** and **Figure ES-6**), due to:
- obstruction and/or diversion of floodwaters due to presence of embankments;
  - blockage of drains or streams during construction (rubbish);
  - blockage in temporary culverts during construction;
  - construction works on peat soil that can subside below river or sea levels
  - Possible conflicts between the ECRL and the existing/on-going flood mitigation works.

**Table ES-24 : High risk areas for flooding**

| Location  | Chainage                               |
|---|--|
| <b>Pahang</b>                                       |  |
| <sup>2</sup> Ladang Mengkarak                       | CH.447500 - CH.451500                  |
| <sup>2</sup> Klinik Kesihatan Chemomoi              | CH.458000                              |
| <sup>1</sup> Kg. Bukit Gajah                        | CH.469500                              |
| <sup>1</sup> Kg. Jawi Jawi                          |  |
| <sup>2</sup> Felda Chemomoi                         | Kemasul Station, CH.460000 - CH.461000 |
| <sup>2</sup> Kawasan perindustrian Temerloh         | CH.6000 - CH.6676                      |
| <b>Negeri Sembilan</b>                              |  |
| <sup>2</sup> Kg. Batang Benar                       | Nilai Station                          |
| <sup>2</sup> Arab Malaysian Industrial Park         |  |
| <sup>1</sup> Kg. Simpang Durian                     | CH.476700- CH.477000                   |
| <sup>1</sup> Kg. Teriang (200m)                     | CH.503500                              |
| <sup>1</sup> Kg. Gagu (400m)                        |  |
| <sup>2</sup> Perindustrian Nilai 3                  | CH. 531000 - CH. 532750                |
| <sup>2</sup> Houses along Jln Kg. Kapal             | CH.515000                              |
| <sup>1</sup> Kg. Chempedak                          | Klawang station                        |
| <sup>2</sup> MRSM Kuala Klawang                     | CH.498500                              |
| <sup>2</sup> Drainage along Chicken farm            | CH.473000                              |
| <sup>2</sup> Drainage along St. Augustine church    | CH.496500                              |
| <sup>2</sup> Drainage along Kolej Komuniti Jelebu   | CH.498500                              |
| <sup>1</sup> Kg. Gagu                               | CH.504000-CH. 504600                   |
| <b>Selangor</b>                                     |  |
| <sup>2</sup> Putrajaya Sentral Station              | Putrajaya Sentral Station              |
| <sup>1</sup> Kg. Sesapan Bukit                      | CH. 519000                             |
| <sup>2</sup> Kg. Sesapan Batu Rembau                | CH. 520700                             |
| <sup>1</sup> Kg. Sesapan Batu Rembau                | CH. 521500                             |
| <sup>2</sup> Kg. Sungai Buah                        | CH. 535500                             |
| <sup>1</sup> RTB Sg. Jenderam                       | CH.541500                              |
| <sup>2</sup> Kona Village                           | CH. 547500                             |
| <sup>2</sup> Drainage along Kilang Batu Bata Deluxe | CH. 557500                             |

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| Location   | Chainage                |
|--|-------------------------|
| Brickworks   |                         |
| <sup>2</sup> Cyberview Gardens Villa                                   | CH.5500                 |
| <sup>2</sup> Cyberview Lodge & Spa                                     | CH.6000                 |
| <sup>1</sup> Taman Pertiwi   | CH.500 -                |
| <sup>1</sup> Taman Makmur  | CH.3500                 |
| <sup>1</sup> Taman Desa Jarom 2  |                         |
| <sup>1</sup> Kg. Sawah   | CH.5500 -               |
| <sup>1</sup> Kg. Bandar  | CH.6500                 |
| <sup>2</sup> Kg. Jenjarom  | Jenjarom Station        |
| <sup>2</sup> Kg. Sesapan Bukit   | CH.520000               |
| <sup>2</sup> Kg. Sesapan Batu Rembau                                   | CH.521000               |
| <sup>2</sup> Kg. Sesapan Batu Rembau                                   | CH.522000               |
| <sup>2</sup> Kg. Jln Enam Kaki   | CH.525000 - CH.525500   |
| <sup>2</sup> Kg. Sungai Buah   | CH. 536000 -CH. 536500  |
| <sup>2</sup> Kg. Jenderam Hulu   | CH.539500               |
| <sup>2</sup> Drainage along Jln Banting- Semenyih towards Tiara Hills  | CH. 543000              |
| <sup>2</sup> Kg. Orang Asli Bukit Jenuk                                | CH. 543500              |
| <sup>2</sup> Drainage along Jln Banting- Semenyih towards Kona Village | CH. 547500              |
| <sup>2</sup> Kg. Bukit Cheeding  | CH. 560000              |
| <sup>2</sup> Kg. Sg. Jarom   | CH. 565000 - CH. 567500 |
| <sup>2</sup> Taman Kota Sg. Rambai                                     | CH. 0 -CH. 500          |
| <sup>2</sup> Taman Rambai Indah  |                         |
| <sup>2</sup> Sime Darby Division D Labor quarters                      | CH.7500                 |
| <sup>2</sup> Sime Darby Executive Bungalows                            |                         |
| <sup>2</sup> Sime Darby Division 6 - Labour Quarters, West Estate      | CH.18500                |
| <sup>2</sup> Sime Darby labors quarters                                | CH.21000                |
| <sup>2</sup> Nearby PKFZ area  | CH.24500                |

Note: 1 means flooding due to high intensity of rainfall  
2 means flash flood record

110. The construction of the embankments and stations could potentially restrict the flow of water and aggravate flooding. The mitigation measures to be implemented during the construction phase includes provision of cross culverts and balancing culverts, maintenance of culvert to prevent sediment choke up, best management practices, maintenance and inspection of the BMPs, good housekeeping as well as Flood Contingency Plan.
111. The Project Proponent and engineers are currently working on the railway scheme design for the entire alignment. The complete Hydrology and Hydraulic Report for ECRL Section C is expected to be completed by end of 2020 and will be submitted to Jabatan Pengairan dan Saliran (JPS) state (Pahang, Negeri Sembilan and Selangor) for comments and submitted to JPS HQ for approval. A Flood Action Plan which includes identification of elevated sections, provision of balancing culverts and detention has been formulated at this stage to serve as a basis for the subsequent stages of the Project design.

Geotechnical & Geological

112. The alignment will traverse through a range of geological formations and soils including peat areas, steep slopes and areas of mineral occurrence (**Table ES-25**). Peat areas will be treated prior to construction. Peat fires will have to be mitigated comprehensively. Detailed soil investigation will be carried out throughout the Project site to fully understand the geotechnical and geological profiles.

**Table ES-25 : Areas of concern for geology and geotechnics**

| Location                          | Cause for concern   |
|-----------------------------------|---|
| <b>Selangor</b>                   |   |
| Cyberjaya and Jenjarom area       | 13 km of alignment is on peat which is known to be soft and settle through time as well as being prone to fire.   |
| Alignment in Port Klang area      | Alluvium of Quaternary age with fine particles of silt and clay with variable characteristics and strength. The clay is soft with SPT N-values of 0.  |
| <b>Putrajaya</b>                  |   |
| Putrajaya                         | The area is underlain by schist, sandstone, phyllite, shale and slate, and there is a tunnel going to be constructed. Layered rocks normally have the tendency to be unstable and break along the plain and slow down the tunneling process   |
| <b>Negeri Sembilan</b>            |   |
| Tunnelling within Negeri Sembilan | There are 15 proposed short tunnels in the Section C alignment, and 12 of them in Negeri Sembilan; including the longest tunnel of 7.3 km. Tunnels are mainly in granite, however tunnelling produced tunnel spoil which will have to be utilised sustainably. Tunnelling in weak geological zones such as in Klawang and Lenggeng which is expected to encounter the Seremban Fault which requires significant strengthening. Potential geohazard in the steeper slope area such as slope failure, debris flow, presence of colluvium and landslide scars, and daylighting beds which require proper treatment |
| Klawang                           | Potentially mineral rich area, if minerals are found to be economically viable, necessary steps will have to be taken in order not to sterilise the area  |
| <b>Pahang</b>                     |   |
| Temerloh                          | There is a short tunnel west of Temerloh in layered rock which have tendency to be unstable and break off   |

Noise & Vibration

113. Noise & vibration impacts from the construction works are anticipated at the stations, tracks, tunnelling works and depot construction. Noise generation during construction stage is anticipated from earth moving equipment (dozers, tractors), heavy vehicles (lorries), diesel generator sets, piling and blasting works. Primary sources of vibrations during construction are from blasting works (at the tunnel sections) and piling.

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114. The construction of stations and piers supporting the elevated sections shall typically require piling. Piling vibrations and noise from construction works are potential concern when such works are located within built up residential and other sensitive receptors. Tunnelling at the tunnel sections in principle shall be by drill & blasting method with potential concern of groundborne vibrations. This shall require mitigation and where appropriate alternative tunnelling methods at sensitive locations. Construction works are undertaken progressively in linear segments along the entire alignment; and potential concerns arises when the construction works encroach into sensitive built up areas along the alignment. Locations with risk of noise & vibration disturbance are listed in **Table ES-26**.

**Table ES-26 : Locations with risk for noise & vibration disturbance**

| Location           | Receptors  | Land Use              | Distance  |
|--------------------|--|-----------------------|-----------|
| Titi               | St Augustine Church  | Worship Place         | 50m       |
| Kuala Klawang      | Kg. Gagu   | Residential           | 40m - 60m |
| Lenggeng           | Kg. Kapal  | Residential           | 40m - 70m |
| Beranang           | Pusat Latihan Kesihatan, Kampung Sesapan Kelubi, Jalan Kaki Enam | Residential           | 30m -70m  |
|                    | College Heights Garden, Taman Desaria                            | Residential           | 30m - 70m |
| Nilai              | Warehouses at Jalan Mekanikal 1                                  | Industrial            | 20m - 30m |
|                    | Taman Desa Seringin Nilai 3                                      | Residential           | 25m       |
|                    | Water tank at Taman Desa Serigin                                 | Infrastructure        | 10m       |
| Dengkil            | Kg. Sungai Buah, Kg. Jenderam Hulu, Kg. Orang Asli Bukit Jenuk   | Residential           | 30m - 60m |
|                    | Bukit Unggul Kampung Houses at Jenderam Hilir                    | Residence             | 15m       |
| Putrajaya Spurline | Cyberview Garden Villa, Cyberview Lodge                          | Residential and Hotel | 10m - 20m |
|                    | Kg. Tok Aminuddin  | Residential           | 10m       |
| Putrajaya          | Petronas Gas Pipeline  | Utility               | 25m       |
|                    | Kg. houses off Jalan P5, Dengkil                                 | Residential           | 75m       |
| Jenjarom           | Kg. Sungai Jenjarom  | Residential           | 10m - 60m |
| Klang              | Taman Sg. Rambai, Kg. Sawah, Oil Palm Estate Settlement          | Residential           | 50m - 70m |

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115. Measures to minimise 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/ hoardings
  - Equipment shielding and enclosures
  - Use of low noise piling methods i.e. bored piling
  - Restrict piling activities to day time only
  - Mechanical excavation method for tunnelling at sensitive locations.

### Air Pollution

116. The construction activities could lead to potential impacts in terms of air pollution particularly at the depots, yard and stations which involve large work areas. The fugitive dust impact during construction is not expected to cause residual impact as it will occur temporarily during the construction period.
117. 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 controlled within the Malaysian Ambient Air Quality Standard.

### Ecology

118. The alignment has undergone number of revisions in the planning and design stage. Based on field surveys, design improvements and consultation with stakeholders, the alignment was redesigned. It is now skirting the edge of Kemasul FR, Pahang and traversing through most of other forest reserves via tunnels (**Table ES-27**). As such, habitat loss and fragmentation have been significantly reduced. The estimated loss of forest reserves is 28.9 ha.

**Table ES-27 : Areas of Concern and Permanent Reserved Forests along ECRL Section C**

| PRF                           | Size (ha) | Type              | ECRL Alignment   | Loss of Forest Reserve (ha) |
|-------------------------------|-----------|-------------------|--|-----------------------------|
| <b>PAHANG</b>                 |           |                   |  |                             |
| Kemasul FR                    | 22,006    | Production Forest | Alignment skirting the tip of south-eastern section of Kemasul FR. | -                           |
| Kemasul Tambahan (Bentong) FR | 1,545     | Production Forest | Alignment 1.8 km distance away from the PRF                        | -                           |
| <b>NEGERI SEMBILAN</b>        |           |                   |  |                             |
| Triang FR                     | 12,587.30 | Production Forest | Alignment tunnel through northern of the reserve at 2.6 km         | 2                           |

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|                       |           |                   |   |             |
|-----------------------|-----------|-------------------|---|-------------|
| Kenaboi FR            | 44,202.60 | Production Forest | Alignment tunnel through southern of the reserve at 2.7 km                  | 1.34        |
| Gapau FR              | 5,281.70  | Protection Forest | Alignment tunnel through middle of the reserve by 2.84 km                   | 0           |
| Lenggeng FR           | 5,417.00  | Protection Forest | Alignment tunnel through the middle of the reserve by 4.3 km                | 0.73        |
| <b>SELANGOR</b>       |           |                   |   |             |
| Kuala Langat Utara FR | 957.6     | Protection Forest | Alignment cross the southernmost section of the reserve on ad-grade at 3 km | 21.7        |
| Jugra Blok 2 FR       | 97        | Protection Forest | Alignment cross the middle of thin mangrove strip at 70 m                   | 3.1         |
| <b>TOTAL</b>          |           |                   |   | <b>28.9</b> |

119. For the construction of tunnel portals and other temporary works, there may be additional forest clearance. This can only be determined at the design stage. The potential ecological impacts include (i) habitat fragmentation; (ii) habitat loss and disturbance; (iii) human-wildlife conflicts; and (iv) poaching (**Figure ES-7**). Fragmentation could potentially lead to human-wildlife conflicts in surrounding areas. Some of the areas that the ECRL traverses are known to harbor wildlife including large mammals such as sun bears and tapirs. Vegetation clearing to build the tunnel portal at Kenaboi FR will result in direct loss of the few endangered timber species such as the Resak, Keruing gombang and Chengal. Constructing the viaduct at Jugra 2 FR will result in loss of mangrove trees such as bakau minyak (*Rhizophora* sp.) and nipah along the river.
120. There will be 15 tunnels along the ECRL Section C alignment. These tunnels will traverse undulating to hilly terrain, most of which are still covered in forests. These tunnels will minimise habitat fragmentation throughout the landscape along the alignment and retain ecological connectivity. Other mitigation measures include phasing and minimisation of vegetation clearing as well as best management practices at construction sites. A comprehensive Wildlife Management Plan is being developed and will be implemented.

### Traffic

121. Traffic congestion due to construction works that will take place along existing roads is a potential problem. Such works result in road diversion, closures and lane size reduction which will inevitably reduce the capacity of the existing roads. Since some portions of the alignment are along busy roads, the traffic congestion along these roads could be expected to worsen. Some are at sensitive rural locations such as Orang Asli villages. Detailed Traffic Management Plans are being prepared for each construction site to ensure that traffic is properly managed.
122. Measures proposed to minimise traffic congestion include:
- Proper traffic management with adequate warning signs and flagmen

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- Maintain number of lanes of major roads as much as possible
- Dump trucks to operate at off-peak traffic hours
- Traffic management plan for each construction site shall be prepared.

### Public Safety

123. Blasting activities during tunnelling and occupational and safety hazard for the construction poses high risk which has potential to cause fatality. Tunneling under gas pipelines in Putrajaya also poses high risks. Other hazard scenarios such as utilities relocation, flash floods and vehicular accident poses medium risk. Public safety will be compromised in the event any hazardous events occurred during construction, particularly if such event take place near to populated areas such as residential areas.
124. Mitigation measures include precise timing delays and proper explosive charge to avoid blast damage or over-break. Nearest residential or sensitive receptors will be notified of blasting time prior to the blasting event. Proper ventilation will be provided within the tunnel construction area. Mechanical excavation instead of blasting is proposed for tunnels under gas pipelines. Specific controls to address occupational and safety hazard include competency certificate for workers handling heavy machinery and safety nets erected for elevated portion to prevent objects from dropping to the ground.

### Social impacts

125. The public perception survey conducted for this Project (1,750 respondents) has indicated that 98% of the respondents support the Project.
126. Public perception survey and stakeholder engagements have indicated that the people's main concerns during the pre-construction stage are mostly centred around the timing and amount of compensation. The main concerns during the construction stage are dust and air pollution, cracks to house structures caused by vibration, traffic congestion, risk of flooding/flash flood, presence of foreign workers and risk to public safety.
127. Sixteen stakeholder engagement sessions were conducted between 10 November 2019 to 23 February 2020 (**Table ES-28**). The summary of feedback from the stakeholder engagements showed that the participants' frequently mentioned concerns were presence of foreign workers, risk to public safety, risk of flooding/flash flood

**Table ES-28: Locations of Stakeholder Engagement Sessions**

| Date       | Stakeholder   | Type of receptor       |
|------------|---|------------------------|
| 10/11/2019 | Kg. Sungai Jarom, Taman Kota Sg Rambai, Kg. Sg Rambai | Residential            |
| 11/11/2019 | Felda Chemomoi  | Residential/Management |
| 12/11/2019 | Kampung Chemomoi                                      | Residential            |
| 12/11/2019 | Temerloh Memorial Park Sdn Bhd (Chinese               | Private company        |



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|            | Cemetery)  |                         |
|------------|--|-------------------------|
| 13/11/2019 | Kg Sesapan Batu Rembau & Kg Sesapan Bukit Rembau                       | Residential             |
| 13/11/2019 | Taman Titi & Taman Nagamas   | Residential             |
| 14/11/2019 | Jelebu Community College   | Educational Institution |
| 14/11/2019 | Kg. Jenderam Hulu, Kg. Jenderam Hilir                                  | Residential             |
| 14/11/2019 | St. Augustine Church   | Worship place           |
| 19/11/2019 | MCT Berhad (Cybersouth Developer)                                      | Developer               |
| 4/12/2019  | Kg. Orang Asli Lumut and Jeram Kedah                                   | Residential, JAKOA      |
| 8/12/2019  | MPKK Kg. Batang Benar Hilir  | Residential             |
| 12/12/2019 | Sime Darby Plantation HQ   | Plantation Company      |
| 30/1/2020  | Sime Darby Plantation Pulau Carey                                      | Plantation Company      |
| 19/02/2020 | Representatives from indigenous communities in Sepang and PKOAD Sepang | Residential, JAKOA      |
| 23/2/2020  | Taman Desa Seringin, Nilai 3   | Residential             |

128. The stakeholders were concerned over the proximity of the Project site to their establishments which bring about the issue of safety. Participants from Kg. Chemomoi (Pahang), Kg. Jenderam Hulu and Kg. Jenderam Hilir highlighted the concern over movement of heavy vehicles that could increase the risk of accidents especially among the motorcyclists.
129. The main mitigation measure is to establish Emergency Response Plan (ERP) which could help to ease fear over accidents, danger on sites and any possible death-related danger. The safety measures on site will be implemented such as securing the construction site perimeter, provide safe pedestrian paths and install signage and lighting.
130. There will be several thousand construction workers during the peak of construction - located at various locations along the alignment and stations. Presence of large numbers of construction workers, especially in rural settings, could result in social conflicts between the workers and the local communities due to differences in culture and customs. The issue of foreign construction workers is a main concern of the communities along the Project corridor. Participants from FELDA Chemomoi (Pahang), Kg. Batang Benar Hilir, Taman Titi, Taman Nagamas (Negeri Sembilan), Kg. Jenderam Hulu and Kg. Jenderam Hilir (Selangor) have expressed their concerns over the influx of foreign construction workers.
131. To minimise conflicts, there will be centralised workers accommodation (**Plate ES-4**) along the alignment. This will enable monitoring of workers activities and minimisation of potential conflicts with local population. Similarly, the hygiene levels at the workers' accommodation needs to be maintained to prevent outbreak of diseases.



**Plate ES-4 : Base Camp at Tunjong with Complete Facilities including Workers Quarters**

132. Risk of flooding is one of the major concerns raised during the stakeholder engagement sessions. Many of them had highlighted the perennial issue of flooding which usually occurs annually. The participants from Kg. Batang Benar Hilir (Negeri Sembilan), Kg. Sg. Rambai, Kg. Jenjarom, Kg. Sg. Jarom, Kg. Sesapan Batu Rembau (Selangor) raised the issue of flooding due to the drainage system that is insufficient to accommodate excess water flow
133. Noise and vibration is considered as a nuisance to the residential communities as FELDA Chemomoi and Kg. Batu Benar Hilir have expressed concern over noise intrusion and concern over cracks to the building structures due to vibration. Jelebu Community College also believed that the construction noise could disrupt the students' attention during the lecture.

**Table ES-29 : Institutions and Place of Worship Adjacent to the Alignment**

| No. | Location   | Distance from the alignment (m) |
|-----|--|---------------------------------|
| 1   | Jelebu Community College                         | 35                              |
| 2   | St. Augustine Chapel Church                      | 60                              |
| 3   | Pusat Latihan Kesihatan Masyarakat (PULAKEM) UKM | 56                              |

134. Impacts described above will be more significant for Kg. Orang Asli Bukit Jenuk in and Kg. Orang Asli Lumut due to their close proximity with the alignment. Land acquisition of houses, farms and fish ponds are expected. Residents of these villages expressed the need for just compensation during engagements.

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135. The ECRL is a large infrastructure project that it will induce significant impacts on the economy throughout the entire project construction cycle. The expected activities that would boost the national, regional and local economy are:
- Business opportunities from contractors and subcontractors;
  - Trading opportunities;
  - Opportunities for provision of basic and other services for the contractors;
  - Influx of workers and their expenditures on local goods and services;
  - Provision of housing for construction key personnel;
  - Increased revenue and taxes from construction activities
136. Increase in economic activities and employment are the major positive impacts during the construction stage. Direct employment opportunities will be created for both skilled and non-skilled labour in the community. A significant number of jobs will be generated to fulfill the demand for 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.
137. Consultation and engagement with affected communities is crucial to minimise impacts from the Project. It is important that the local population, where possible, are provided with employment and business opportunities from the Project. In addition to employment for construction workers during construction, there will also be demand for professionals and technical, managerial and administrative workers who are skilled. The demand for highly skilled workers would help raise skill level there as well as offer these skilled workers access to better income, and allowing them to enjoy a higher standard of living.

## POTENTIALLY SIGNIFICANT IMPACTS & MITIGATING MEASURES DURING THE OPERATIONAL STAGE

138. A range of potential impacts can be expected during the operational phases of the Project (**Table ES-30**). The receptors of the potential impacts from the Project would include various communities and land uses located close to the line, stations, depots and yards.

**Table ES-30 : Potential Impacts During Operational Stage**

| Potential Impacts   | Activities  |
|---|---|
| Catalyst for development in the East Coast  | <ul style="list-style-type: none"> <li>Improved connectivity and accessibility for East Coast communities and businesses</li> </ul>   |
| Enhanced economic activities and opportunities in the East Coast; Economic multiplier and spin-off due to improved transport system | <ul style="list-style-type: none"> <li>Increased passenger and freight transport capacity between East and West Coast, and within East Coast</li> <li>Reduced travel time</li> </ul>                    |
| Increased noise and vibration level   | <ul style="list-style-type: none"> <li>Train movement</li> </ul>  |
| Risk of aggravated flooding   | <ul style="list-style-type: none"> <li>Presence of railway embankment through flood prone area</li> <li>Presence of piers in the river, if any</li> </ul>   |
| Fragmentation of forest. Barriers to wildlife movement;   | <ul style="list-style-type: none"> <li>Presence of railway track through forests</li> <li>Train movement</li> </ul>   |
| Fragmentation of land use and settlements; Physical barrier splitting existing communities  | <ul style="list-style-type: none"> <li>Presence of railway tracks cutting through existing communities and settlements</li> <li>Railway tracks being restricted and off-limits to the public</li> </ul> |
| Reduced greenhouse gas emissions  | <ul style="list-style-type: none"> <li>Increased efficiency of transport system</li> <li>Reduction in road traffic</li> </ul>   |
| Risks from quarry operation   | <ul style="list-style-type: none"> <li>Blasting activities at quarries in Bukit Yong</li> </ul>   |
| Hazards & public safety   | <ul style="list-style-type: none"> <li>Hazards to public due to railway operations</li> </ul>   |

### Noise

139. Noise generation from trains operations are primarily from wheel tracks interaction that are speed dependent and wheels tracks rolling contact (that amongst other factors are dependent on roughness and tracks conditions). The cumulative  $L_{Aeq}$  noise from the trains combined with the ambient noise typically increases by less than 5 dB during the day in most locations. Although the increase in the steady state equivalent noise levels  $L_{Aeq}$  is generally not significant due to the short-term nature of train pass-bys, noise disturbance are anticipated when the transient pass by noise are significantly above existing background noise levels in residential areas at close proximity to the tracks (within 75 m corridor) that has pre-existing low ambient noise.

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140. In urban and built up areas, there are additional concerns when the alignment is located adjacent high-rise buildings affecting receptors overlooking the tracks. Trains pass by noise events at residential receptors in Putrajaya, Cyberjaya and Nilai, for example are predicted to exceed the DOE Guidelines  $L_{max}$  noise limits without mitigation measures.
141. Noise mitigation for trains operations noise consist of reduction at source with use of continuous welded tracks and rolling stock design, and noise barriers for shielding of affected sensitive receptors -either at the railway ROW or at receptor boundary.
142. Locations where noise barriers are required have been identified and listed in **Table ES-31** and **Figure ES-8**. These, in general, are at residential areas and other sensitive receptors (schools, institutions of learning) located typically within 50m from the alignment with a direct line of sight to the tracks whose noise levels were shown to exceed DOE recommended noise limits ( $L_{Aeq}$  and  $L_{max}$ ) or when there is a significant noise level increase (>10 dBA) above pre-existing low ambient noise levels.

**Table ES-31 : Proposed locations where noise barriers shall be required**

| Location        | Approximate Chainage (ch) | Receptors                                 | Description                  | Estimated Distance from ROW (m) |
|-----------------|---------------------------|---|------------------------------|---------------------------------|
| Pahang          | 430000                    | Taman Bukit Tualang                       | Terraces                     | 70                              |
|                 | 429500                    | Kuarters Pusat Latihan Guru, Temerloh     | Quarters                     | 125                             |
|                 | 447000                    | Felda Mengkarak 3                         | Village Houses               | 100                             |
|                 | 458000                    | Quarters and Klinik Kesihatan Chemomoi    | Quarters, Public Facility    | 105                             |
|                 | 460500                    | Felda Chemomoi                            | Village Houses               | 170                             |
| Negeri Sembilan | 494000                    | Titi Eco Resort                           | Homestay                     | 170                             |
|                 | 496500                    | St Augustine Church, Taman Desa Permai    | Public Facility, residential | 40 -100                         |
|                 | 497700, 498700            | Taman Bukit Kempas, Kolej Komuniti Jelebu | Residential, Institution     | 75 - 120                        |
|                 | 503500, 505500            | Kg. Gagu                                  | Village Houses               | 45 - 100                        |
|                 | 514000                    | Kg. Orang Asli Lumut                      | Village Houses               | 25                              |
|                 | 515500                    | Kg. Kapal                                 | Village Houses               | 30                              |
|                 | 526500                    | College Heights Garden                    | Bungalows                    | 60 - 120                        |

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| Location  | Approximate Chainage (ch) | Receptors   | Description             | Estimated Distance from ROW (m) |
|-----------|---------------------------|---|-------------------------|---------------------------------|
| Selangor  | 528500, 529000            | Taman Bukit Citra, Kg. Batang Benar                                       | Terraces                | 120 -150                        |
|           | 532500                    | Taman Desaria   | Terraces                | 30                              |
|           | 520000, 522000            | Kg. Sesapan Batu Rembau   | Village Houses          | 30 -70                          |
|           | 522500, 523500            | Quarters Pusat Latihan Kesihatan Masyarakat, Beranang, Kg. Sesapan Kelubi | Quarters, Village house | 60                              |
|           | 525000                    | Kg. Jalan Enam Kaki   | Village Houses          | 30 -100                         |
|           | 535500                    | Kg. Sungai Buah   | Village Houses          | 60                              |
|           | 539500                    | Kg. Jenderam Hulu   | Village Houses          | 20 -70                          |
| Putrajaya | 544000                    | Kg. Orang Asli Bukit Jenuk  | Village Houses          | 30                              |
|           | Spurline - 2000           | Sri Maha Mariamman Temple   | Worship                 | 120                             |
|           | Spurline - 5500           | Cyberview Garden Villa  | Condos                  | 20                              |
| Selangor  | 547500                    | Kg. Tok Aminuddin   | Village Houses          | 30                              |
|           | 566500, 567000, PK - 500  | Kg. Jenjarom, Taman Kota Sg. Rambai                                       | Village Houses,         | 40 -80                          |
|           | PK- 5500, 7500            | Kg. Sawah, Oil Palm Estate Labour Quarters                                | Village houses          | 50 -100                         |

### Vibration

143. Train-induced vibrations in buildings depend on the severity of the vibration generation at source, wheels and tracks conditions, transmission through the ground (ground borne vibrations) and interaction with the building (vibration response).
144. Ground-borne vibration were predicted to be in the order of Curve 2 from passenger trains operations without mitigation for good condition wheels/tracks condition, and Curve 4 with worn wheels/tracks for receptors at 25m away from the tracks' median. With vibration mitigation on the railway tracks, vibration levels were shown to be within Curve 1 with good wheels/tracks, and below Curve 2 with worn wheels/rails conditions. Higher vibrations from cargo trains were also anticipated consistent with measurements from existing KTM Double Tracks. For cargo trains, receptors at 25m away were estimated to have vibrations of Curve 4

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with good condition wheels/tracks condition, and in the order of Curve 8 with worn wheels/tracks without railways vibration mitigation.

145. The mitigation of ground borne vibration propagation 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 typically under-sleeper pads, ballast mats, low vibration trackform fasteners or resilient baseplates. Locations where trackwork isolation are recommended are given in **Table ES-32**.

**Table ES-32 : Proposed locations where trackworks mitigation shall be required**

| Location           | Approximate Chainage (ch)  | Receptors  | Description                 | Distance of tracks to Receptors |
|--------------------|----------------------------|--|-----------------------------|---------------------------------|
| Titi               | 496500                     | St Augustine Church  | Worship Place               | 50m                             |
| Kuala Klawang      | 503500, 505500             | Kg. Gagu   | Village houses              | 40m - 60m                       |
| Lenggeng           | 515500                     | Kg. Kapal  | Village houses              | 40m - 70m                       |
| Branang            | 522500, 523500             | Pusat Latihan Kesihatan, Kg. Sesapan Kelubi, Kg. Jalan Enam Kaki | Institution, Terrace houses | 30m - 70m                       |
| Nilai              | 526500                     | College Heights Garden, Taman Desaria                            | Bungalows                   | 30m - 70m                       |
|                    | 530500                     | Taman Desa Seringin, Nilai                                       | Terrace houses              | 25m                             |
| Dengkil            | 535500<br>539500<br>544000 | Kg. Sungai Buah, Kg. Jenderam Hulu, Kg. Orang Asli Bukit Jenuk   | Village houses              | 30m-60m                         |
| Putrajaya Spurline | Spurline -5500             | Cyberview Garden Villa, Cyberview Lodge                          | Condos, Hotel               | 10m - 20m                       |
| Putrajaya          | 547000                     | Petronas gas pipeline Crossing                                   | Gas pipeline                | 25m                             |
|                    | 547500                     | Kg. Tok Aminuddin  | Village houses              | 10m                             |
| Jenjarom           | 566500, 567000             | Kg. Jenjarom   | Village houses              | 10m - 30m                       |

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### Water pollution

146. The operation of the Project, particularly the stations, depot, yards and maintenance bases, could lead to water pollution while water pollution along the alignment will be limited to accidental spills and leakages of cargo. As the ECRL trains are fully electric powered, the potential of spills and leakages of fuel from trains will be minimal. Toilet on-board trains will be equipped with wastewater holding tanks which will be emptied regularly at the depots or or maintenance bases.
147. The sewage treatment facilities at the stations will be designed by competent persons to meet regulatory requirements (Standard A) and be adequate to cater for future expansion. Two types of sewage treatment facilities will be built, namely for 150 PE and 80 PE. Adequate oil and grease traps will be installed at all premises. Oil interceptors will be installed at all maintenance bases, yards and depots. Sewage sludge disposal will be monitored and tracked with chain-of-custody documentation.

### Air Quality

148. The ECRL is expected to contribute towards improving air quality. By reducing the vehicular traffic on roads, the ECRL will reduce the amount of pollutants that will be emitted into the atmosphere. The cumulative net CO<sub>2</sub>e emission avoided by the implementation of the ECRL for year 2027 is 343,566 MT CO<sub>2</sub>e/yr. With the shift from private transport to rail, air pollution related to vehicular emission i.e. particulate matters (PM<sub>10</sub> and PM<sub>2.5</sub>) and gaseous (NO<sub>x</sub>, SO<sub>2</sub>, CO<sub>x</sub>) pollutants will also be reduced accordingly.

### Waste

149. Waste will be generated from the operation of station, operation of yards and depot as well as maintenance works. Various types of waste will be generated including domestic wastes and scheduled wastes (**Tables ES-33**).

**Table ES-33 : Estimated Waste During Operation**

| <b>Waste Category</b>                                       | <b>Pahang</b> | <b>Negeri Sembilan</b> | <b>Selangor &amp; Putrajaya</b> |
|---|---------------|------------------------|---------------------------------|
| Solid waste from passengers, office/shops, café/restaurants | 221 kg/day    | 229 kg/day             | 375 kg/day                      |

150. If the waste is disposed indiscriminately and poorly managed, there could be impacts to the surrounding areas including health and hygiene problems, blockage of the existing nearby drainage and watercourses, and water and land contamination.
151. To mitigate waste impacts, waste minimisation, recycling, and reuse will be prioritised. All domestic solid wastes will be disposed of at approved landfills. Scheduled wastes will be managed according to the Environmental



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Quality (Scheduled Wastes) Regulations 2005 and centralised scheduled waste storage will be implemented.

### Ecology

152. Among potential ecological issues during the operational phase are restriction of wildlife movement, wildlife mortality and human-wildlife conflicts (HWC). The permanent presence of the railway will hinder wildlife movements, especially for larger mammals (sun bears, tapirs) and primate (e.g. gibbon, monkeys) (**Table ES-34**). HWC can happen in nearby human settlements and plantations if the animals are forced to roam elsewhere. The potential of wildlife-train collision will be minimal since the railway tracks will be fenced with precast concrete base.
153. Mitigation measures to minimise ecological impacts during the operational stage comprises of monitoring activities, specifically on habitat conditions and wildlife populations. Barriers (precast walls with fencing) will be built along the alignment to prevent both human and wildlife encroachment onto the rail tracks. In possible elephant roaming areas, the barriers will be fortified. Barriers will also be constructed around the tunnel entrances to deter wildlife from encroaching into the tunnels. Habitat enrichment will be carried out in forested areas that was cleared and disturbed during construction. Wildlife monitoring will be carried out specifically in areas with high wildlife movement.

**Table ES-34 : Areas of Concern for Ecology in ECRL Section C**

| Location   | Cause for Concern  |
|--|--|
| <b>PAHANG</b>  |  |
| Minimal ecological impacts but possible encroachment of elephants around Kemasul FR area |  |
| <b>NEGERI SEMBILAN</b>   |  |
| Kenaboi FR and Triang FR<br>Gapau and Lenggeng FR  | Areas with high wildlife diversity. Possible encroachment of wildlife into tunnel entrances. Poachers might use the left-over temporary access roads to trespass the reserves. Embankments acts as barrier between forests and coast |
| <b>SELANGOR</b>  |  |
| Kuala Langat <b>Utara</b> FR   | Possible wild boar conflicts in surrounding settlements. Risk of forest fire at peat swamp forests can further degrade the forest.   |

### Traffic

154. On the whole, the ECRL will help improve traffic conditions in the major roads of the region, particularly in the East Coast. It provides improved connectivity between urban centres. The biggest benefit from the ECRL is the improvement in public transport as it will significantly improve the rail connectivity within the East Coast as well between the East Coast and the West Coast. This is expected to encourage mode shift from private vehicle to

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public transport resulting in reduction of trips generated/attracted between urban centres.

155. During operations, localised traffic congestion may occur at certain stations due to their locations. Therefore, it is important to have proper station access plans. Proper access plans are beneficial to ensure smooth flow of traffic and minimise traffic congestion around the stations. It would also ensure proper integration of the ECRL services in the multi-modal transportation context. In addition, other facilities for pedestrians and vulnerable road users to access the stations are also important.

### Public safety

156. Public safety during the operations of the ECRL is an important matter. The ECRL will mostly carry iron ore, coal, cement, steel, rubber, polyethylene and palm biomass - which are generally not dangerous. Adequate safeguards have been built into the Project to minimise any risks to people and property. Additional risk assessments will be carried out and emergency response plans prepared in the event that dangerous cargo will be carried in the future.
157. The ECRL will be designed and operated in conformance with the relevant Health and Safety regulations such as the Occupational Safety and Health Act 1994, Factories and Machineries Act 1967 and by-laws of the relevant local authorities. Safety and hazard control management during the operations include safety management at stations and electric trains. Safety measures for fires, especially in tunnels will be instituted.
158. Emergency response plans will be formulated to handle accidents or emergency situations that occur such as fires at stations, in tunnels on trains or from peat, derailment of trains, spillage of cargo, equipment failure and failure of the ATP system. The emergency response plan shall contain the following:
  - Fire Fighting and evacuation strategy for passengers from trains, stations and tunnels.
  - Fire fighting and spill response for freight train accidents.
  - Steps and actions taken before evacuation.
  - Emergency training programs and security.
  - Roles and responsibilities of all staff levels shall be clearly defined for security and emergency management.
  - Lines of communication and reporting in the event of emergencies.
  - Public security and emergency awareness program for public.
  - Provision of first aid team during emergency.
  - Conduct functional drills to the possible events that might occur during operation.

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- Reporting process for any suspicious activity to facilitate in investigations .
- Physical security inspections.
- Security program audits.

### Socio-economic

159. A potential concern is the division of communities and villages by the ECRL line (**Table ES-35**). Once operational, the railway line will be fenced and forms a barrier. This could affect access to farms, schools, shops and community facilities. The community division could also potentially affect community cohesion, increase the cost of local travel and in extreme cases, change lifestyles. Communities view the railway as a permanent barrier in their neighbourhood, preventing them from moving about freely. This issue has been voiced out by participants from from FELDA Chemomoi and Sime Darby Plantation.
160. The alignment cutting through agricultural areas could disrupt existing agricultural activity and cause farms to be fragmented, breaking them into small uneconomical parcels of land. Participants from FELDA Chemomoi and Sime Darby Plantation raised the issue of fragmentation of the oil palm estates and also believed that the logistics of harvested fresh fruit bunch could also be impacted as the access could become restricted. Farm fragmentation due to the railway would have a larger impact on smallholders and rural families who rely on agriculture as their main source of income. Thus in the event that the land acquisition results in farms being broken into small parcels, it would be more beneficial for farmers to be compensated for their entire lot than to be left with small remnants of land

**Table ES-35 : Potential areas - community fragmentation**

| <b>Location</b>                      | <b>State</b>    |
|--------------------------------------|-----------------|
| FELDA Mengkarak                      | Pahang          |
| FELDA Mengkarak 2                    |                 |
| FELDA Chemomoi                       |                 |
| Kg. Gagu                             | Negeri Sembilan |
| Ladang RISDA Abdullah Kadir          |                 |
| Kg. Sg. Jarom                        | Selangor        |
| Kg. OA Bukit Jenuk                   |                 |
| Kg. Jalan Enam Kaki                  |                 |
| Sime Darby Plantation in Pulau Carey |                 |

161. To minimise community division, the Project design has incorporated vehicular box culverts that enable people to cross freely under the railway tracks and hence minimise the “barrier” effect. At various locations, including at stations, overpasses will also be provided. Existing road connectivity will be maintained by providing bridges and underpasses.

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162. Once operational, the ECRL is expected to bring a host of benefits both at regional and local levels. Besides enabling people to commute efficiently, the ECRL will boost freight capacity, enhance economic growth and boost the competitiveness of businesses along the alignment corridor. The ECRL will provide a more reliable and safe mode of transport and help increase productivity due to travel time saving. A key social benefit of the proposed ECRL is the reduction of traffic congestion between Klang Valley and the East Coast region during festive periods and school holidays.
163. The ECRL is built to spearhead freight transportation which underpins industrialization. Growth in productivity is anticipated due to improved journey time, enabling more intense economic interactions between the East Coast businesses and those in the Klang Valley. This would affect productivity growth as it is faster now with the ECRL to conduct businesses and transport goods and services.
164. During the ECRL operations, there will be job and business opportunities, particularly at the stations. There will be opportunities for retail shops and provision of a variety of services. Where possible, the local population will be provided with opportunities to participate in these activities. Similarly, MRL, together with the respective state government, will identify job opportunities for the local populations.
165. Apart from the creation of direct jobs, the operations of the ECRL are likely to spill over into the creation of indirect and induced jobs that are linked to its operations. Supplies firms in all kinds of goods and services have to be outsourced to meet the operational needs of the ECRL. These businesses, in turn, require manpower and hence, another round of job creation would have to take place. The anticipated economic growth and job creation from ECRL operations would have a positive impact on income growth.
166. The stakeholders' engagement programme initiated during the construction phase will be extended during operations, at least in the first year of operations. It would allow people living in the corridor and close to the alignment or stations to provide feedback on impacts on them. It also serves as a feedback channel for MRL to monitor potential implications on residents when the railway is operational.
167. Safety and security stands out as a key concern even when the railway is operational. During operations, there should be safety procedures in place to prevent untoward accidents and incidents. At stations, small police base can be set up and manned by auxiliary police. With the help of local authorities, residents' associations and the communities, safety and security measures can be put in place.

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168. Additionally, there are concerns over proximity to the railway alignment, with an added fear that adults, school children and even livestock may wander onto tracks. Fencing would be in place to prevent this from happening but some are worried that people may not be able to cross over and could abuse the erected barriers. Where appropriate, crossings should be erected but where there are potential dangers, warning signboards including punitive measures have to be set up. The advice of local police and local authorities should be sought on these matters.
169. For many communities that are close to the alignment and stations, the major concerns are noise and vibration from the trains. Given this, it is therefore important that adequate noise and vibration mitigation measures be incorporated into the detailed design stage to reduce the impacts to the acceptable limits. It is expected that through proper noise barriers, such concerns over noise can be overcome and noise levels from operations can be maintained below the stipulated limits.

### Geotechnical and Geology

170. To avoid uneven settlement of peat during the operation is to properly carry out the construction method in the peat area utilizing proven methods that will strengthen the peat soil. Settlement marker should be installed.
171. Comprehensive peat fire management should be drawn up to ensure the fires could be controlled. More groundwater wells should be considered to enable groundwater to be withdrawn in raising of the water level in the peat and used to douse the fire.

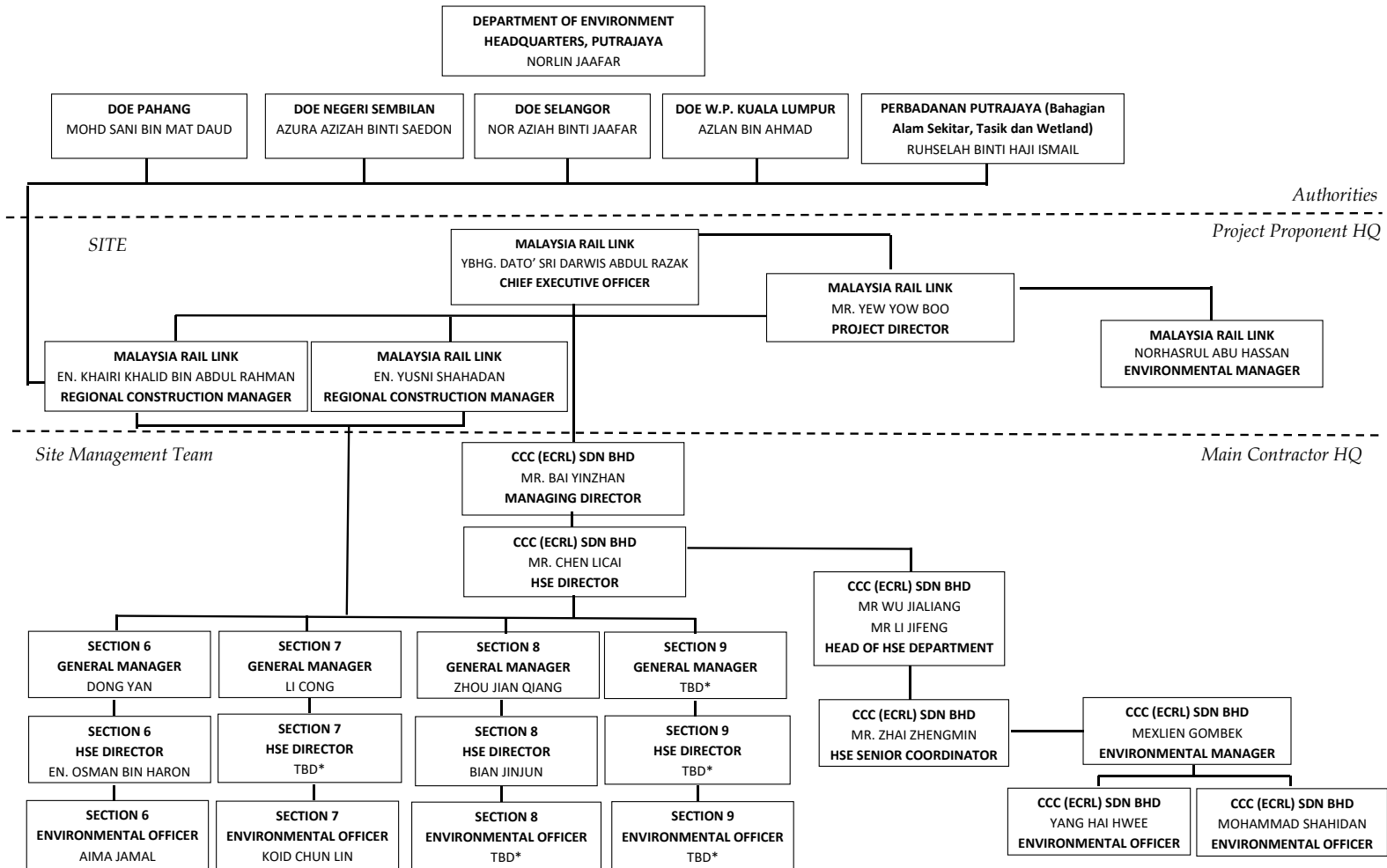
## ENVIRONMENTAL MANAGEMENT PLAN

172. MRL will ultimately be responsible for the environmental performance and compliance of the ECRL Project. The other parties with responsibilities for environmental management and compliance include the EPCC contractor, sub-package contractors, environmental consultants and environmental officers (**Chart ES-2, Table ES-36**).
173. MRL will establish its Health, Safety and Environment Department to ensure compliance to all relevant environmental requirements. Its main responsibilities will include the formulation of environmental policy, supervise the contractors to ensure compliance to environmental requirements, chair the Environmental Performance Monitoring Committee and engage with relevant authorities on environmental related matters.
174. The EPCC Contractor will establish an Environmental Management Team to ensure environmental compliance during the construction stage. Environmental consultants and environmental officers will also be

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appointed for each package to ensure environmental aspects are taken into consideration and P2M2 are implemented effectively.

Chart ES-2 : Environmental Management Organisational Structure



Source: MRL

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**Table ES-36 : Roles and Responsibilities during Project Construction**

| <b>Roles</b>  | <b>Responsibilities</b>  |
|---|--|
| Project Proponent:<br><b>Malaysia Rail Link<br/>Sdn Bhd (MRL)</b>                       | <ul style="list-style-type: none"> <li>• To comply with EIA approval conditions and environmental requirements</li> <li>• To monitor environmental compliance by contractors</li> <li>• To ensure that relevant actions are taken to address any complaints</li> <li>• To submit the required environmental reports to DOE</li> </ul>  |
| EPCC Contractor:<br><b>China<br/>Communications<br/>Construction (ECRL)<br/>Sdn Bhd</b> | <ul style="list-style-type: none"> <li>• To comply with EIA approval conditions and environmental requirements</li> <li>• To inform sub-contractors and consultants about environmental requirements</li> <li>• To ensure implementation of P2M2</li> <li>• To prepare and submit relevant environmental reports to MRL</li> <li>• To ensure that relevant actions are taken to address any complaints</li> </ul>  |
| Sub-Contractor  | <ul style="list-style-type: none"> <li>• To implement P2M2</li> <li>• To ensure compliance to all environmental requirements</li> </ul>  |
| Environmental<br>Consultant:  | <ul style="list-style-type: none"> <li>• Provide technical expertise in the formulation of the EMP, P2M2 and Environmental Performance Monitoring Document</li> <li>• Advise MRL and CCCC on P2M2 and compliance requirements</li> </ul>   |
| Environmental Officer   | <ul style="list-style-type: none"> <li>• Implement the EMP and monitor the P2M2</li> <li>• Prepare Environmental Performance Monitoring Document describing compliance and performance of the P2M2</li> <li>• Supervise Performance Monitoring programme</li> <li>• Prepare Performance Monitoring Report which will evaluate the overall performance of the P2M2</li> <li>• Communicate the status of compliance to MRL and CCCC.</li> <li>• Maintain records of incidences and all other relevant documents</li> </ul> |

175. Environmental management will be carried out based on sub-packages and the EMPs for the alignment and stations will be prepared and submitted to the respective State DOE offices for approval. Construction works for alignment and stations at each package will commence only after EMP approval is obtained. Each package will have a detailed LD-P2M2 document as part of the EMP.

### Reporting

176. Various types of environmental reports will be prepared during Project implementation. The main objective is to document environmental status/progress, compliance to environmental requirements including EIA Conditions of Approval, and the effectiveness of the P2M2 (**Table ES-37**).

**Table ES-37 : Reports to be Submitted to DOE**

| <b>Types of Report</b>  |
|---|
| <b>Environmental Management Plan</b>  |
| <ul style="list-style-type: none"> <li>- to be prepared for each construction package</li> <li>- to submit to DOE for approval prior to commencement of construction</li> </ul> |
| <b>Quarterly Compliance and Monitoring Report</b>   |
| <ul style="list-style-type: none"> <li>- to be prepared and submitted to DOE during the construction stage</li> <li>- include form EIA 1-08 and EIA 2-08</li> </ul>             |
| <b>Monthly Online Erosion and Sediment Control Inspection</b>   |

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- 
- to be submitted to DOE during the construction stage
- 

### **Quarterly Environmental Audit Report (Third-Party)**

- to be submitted to DOE during the construction stage
  - Frequency of audit will be quarterly.
- 

177. Internal reports will be prepared during the construction stage, including the Environmental Performance Monitoring Document and Performance Monitoring Report. In addition to these, other documents that will be prepared and maintained include the Checklist of P2M2s List Sheet, Installation Sheet, Maintenance Sheet, Site and P2M2 Inspection Sheet, Photograph Folder Sheet, Corrective Action Sheet and Performance Monitoring Sheet.

### Communications

178. Effective communication with relevant stakeholders is crucial. Systematic and prompt response to any queries, feedback and complaints is important. The ECRL Project will maintain various communication channels for stakeholders. Stakeholder engagements will also be carried out before commencement of construction at various sites to inform stakeholders about the construction works that will be carried out. The engagement will be continuous in order to address different issues at different Project stages. MRL will also undertake engagement with the media to ensure that appropriate and correct information is disseminated to all stakeholders.

### Monitoring Programme

179. A comprehensive environmental monitoring programme will be implemented during the construction to ensure that MRL is able to monitor the effectiveness of the P2M2 and compliance to the environmental requirements. The monitoring of these components will be categorised into **Performance Monitoring, Compliance Monitoring, and Impact Monitoring**. The environmental monitoring programme will include water quality monitoring, silt trap discharge monitoring, air quality monitoring, noise and vibration monitoring and wildlife monitoring.

### Environmental Auditing

180. Third-party environmental audits will be carried out every quarter during the construction stage. The main objectives of the audit are to determine non-compliances to the environmental requirements as well as to ensure that all the P2M2 are properly implemented, functioning as per designed and adequately maintained to ensure its performance.

### Environmental Mainstreaming and Guided Self- Regulation

181. The Project Proponent is committed to mainstreaming environmental protection into the Project and towards self-regulation to ensure the quality of environment is protected during the construction and operation of the ECRL. This will include the seven elements, namely Environmental Policy (EP), Environmental Budgeting (EB), Environmental Monitoring Committee

(EMC), Environmental Facility (EF), Environmental Competency (EC), Environmental Reporting and Communication (ERC) and Environmental Transparency (ET).

## CONCLUSION

182. The East Coast Rail Link (ECRL) is a vital **national infrastructure** that is expected to stimulate growth and help **bridge the economic gap between the East and West Coasts** of Peninsular Malaysia. The ECRL will **strengthen connectivity** of State capitals, major urban centres and industrial clusters, sea and inland ports, airports and tourism zones; and enhance transport accessibility of the people. The ECRL will **increase freight transport capacity** between the East Coast and West Coast; and within the East Coast, facilitate increased trade and more efficient logistics.
183. Land and property acquisition is the main concern faced during the pre-construction stage. The Government of Malaysia is expected to compensate the affected parties in a fair manner. To minimise the impacts of acquisition, MRL will provide early and sufficient information to the affected parties to ensure that they are well-informed about acquisition process.
184. Main potential impacts during the construction stage include soil erosion and sedimentation from earthworks, hill cutting and tunneling. Calculations have shown that these impacts will be severe if pollution prevention and mitigation measures (P2M2) are not implemented. Degradation of water quality in the receiving rivers, especially those with water intakes downstream of the alignment could potentially disrupt the WTP operation as the system can only operate within certain level of TSS and turbidity. In addition, site clearing, tunneling and, hill cutting and demolition are expected to generate large quantities of soil material and biomass which need to be reused or disposed off responsibly. There is potential risk of aggravating flooding due to the construction of the ECRL, especially in low-lying areas. Construction of embankments sections, temporary structures across rivers as well as construction of access roads could potentially restrict water flow and aggravate flooding. Construction on peatland could also pose a risk as due to the movement and settlement of peat as well as the potential of peat fires during dry season.
185. In terms of ecology, care has been taken to skirt around or tunnel under the forest reserves with minimum loss of forest reserves. Nevertheless, some clearing is required at tunnel portals (less than 30 ha for entire Section C). MRL is committed to carry out reforestation at Forest Reserve areas which are disturbed during construction. In addition, MRL has developed a comprehensive Wildlife Management Plan to be implemented during the construction phase.

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186. Noise and vibration are a concern during the ECRL operations. Although the trains are electrical and designed to emit low noise levels, noise modeling has predicted that noise level will exceed the limits in some locations where noise barriers are needed. In addition to noise barriers, the adoption of continuous welded tracks and acoustic absorption on track sides will further reduce noise levels.
187. The ECRL is expected to contribute towards alleviating road traffic congestion and improving air quality. The cumulative net CO<sub>2e</sub> emission avoided by the implementation of the ECRL for year 2027 is 343,566 CO<sub>2e</sub>/yr respectively. Similarly, air pollution related to vehicular emission, i.e. particulate matters (PM<sub>10</sub> and PM<sub>2.5</sub>) and gaseous (NO<sub>x</sub>, SO<sub>2</sub>, CO<sub>x</sub>) pollutants will also be reduced accordingly.
188. When operational, the ECRL is expected to bring a host of benefits at both regional and local levels. Besides enabling people to commute efficiently, the ECRL will boost freight capacity, enhance economic growth and boost the competitiveness of businesses in the East Coast. The ECRL will provide a more reliable and safe mode of transport and help increase productivity due to travel time saving. A key social benefit of the proposed ECRL is the reduction of traffic congestion between Klang Valley and the East Coast region during festive periods and school holidays.
189. The ECRL will also generate new jobs. Apart from the creation of direct jobs, the operations of the ECRL are likely to spill over into the creation of indirect and induced jobs that are linked to its operations. Supplies firms in all kinds of goods and services have to be outsourced to meet the operational needs of the ECRL. These businesses, in turn, require manpower and hence, another round of job creation would have to take place. The anticipated economic growth and job creation from ECRL operations would have a positive impact on income growth.
190. In order to maximise the benefits of the Project and to minimise its economic and environmental costs, it is crucial that all the P2M2 identified in this report are implemented effectively and the construction process be monitored diligently. The governance mechanism (monitoring, reporting, auditing, etc) have been formulated and the MRL will implement them comprehensively.
191. MRL is committed to mainstreaming environmental protection into the Project and towards self-regulation to ensure that the quality of the environment is protected during the construction and operation of the ECRL. MRL will ensure organisational commitment to environmental regulatory compliance by all personnel at all levels of the organization, including its consultants, contractors, suppliers and all other parties

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involved in the Project implementation. MRL is also committed to continuous communication and engagement with all stakeholders throughout the life of the Project.

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Table ES-38 : Summary of Potential Impacts, their Magnitude and Proposed Pollution Prevention and Mitigation Measures

| No.                             | Significant Potential Impacts due to Project Activities  | Magnitude of Significant Potential Impacts   | Pollution Prevention & Mitigation Measures (P2M2)  | Reference Page |
|---------------------------------|--|--|--|----------------|
| <b>A Pre-Construction Stage</b> |  |  |  |                |
| 1                               | <b>Land and property acquisition</b> issues:<br><ul style="list-style-type: none"> <li>• Relocation/displacement</li> <li>• Potential delay in compensation</li> </ul>   | 10,295 ha within 300m corridor of alignment have been frozen under Section 4 of the LA Act. The actual area to be acquired will be much smaller.   | <ul style="list-style-type: none"> <li>• Continuous stakeholder engagement and communication with affected parties to address issues arising</li> <li>• Fair valuation of land and property that will be acquired</li> <li>• Provide due notice and information to affected parties</li> </ul>   | 7-4<br>8-2     |
| 2                               | <b>Utilities relocation</b><br><ul style="list-style-type: none"> <li>• Traffic congestion</li> <li>• Risk to public safety</li> <li>• Soil erosion</li> </ul>   | Total number of utilities affected to be listed at the detailed design stage.  | <ul style="list-style-type: none"> <li>• Implementation of effective traffic management plan and safety management plan</li> <li>• Utility relocation by appropriate methods in consultation with utility companies</li> </ul>   | 7-18<br>8-5    |
| <b>B Construction Stage</b>     |  |  |  |                |
| 1                               | <b>Soil erosion and sedimentation</b> impacts potentially affect river water quality, disrupt water supply, increased flood risks and affect downstream beneficial users, due to:<br><ul style="list-style-type: none"> <li>• Site clearing and removal of vegetation for alignment, stations, yards and other facilities</li> <li>• Earthworks for embankments, railway formation, stations, yards and other facilities</li> <li>• Slope cutting for alignment in hilly terrain</li> <li>• Tunnelling works in hilly terrain</li> </ul> | Very high erosion risk areas:<br>Pahang:<br><ul style="list-style-type: none"> <li>• Kg. Chemomoi, Bentong</li> </ul> Negeri Sembilan:<br><ul style="list-style-type: none"> <li>• Triang FR</li> <li>• Kenaboi FR</li> <li>• Gapau FR</li> <li>• Lenggeng FR</li> <li>• Plantation area near</li> </ul> | <ul style="list-style-type: none"> <li>• Optimisation of alignment to avoid hilly terrain</li> <li>• Provision of 15 tunnels in the alignment design to minimise slope cutting in steep hilly terrain</li> <li>• Implementation of LDP2M2 for each earthworks site, including phasing of site clearing and earthworks, erosion control, surface runoff control, sedimentation control and maintenance of LDP2M2.</li> <li>• Active Treatment System (ATS) provided at construction area crossing rivers which has water intake downstream.</li> <li>• ATS may also be considered if silt traps not able to treat TSS to 50mg/l, or analysis shows more than</li> </ul> | 7-19<br>8-5    |

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| No. | Significant Potential Impacts due to Project Activities   | Magnitude of Significant Potential Impacts   | Pollution Prevention & Mitigation Measures (P2M2)   | Reference Page |
|-----|---|--|---|----------------|
|     |   | Emville Golf Resort, Nilai<br><br>Selangor and Putrajaya:<br>• Bukit Tunggul, Sepang   | 10% of dispersible material (fine clay) in soil   |                |
| 2   | <b>Water pollution</b> affecting river water quality and beneficial users downstream, due to: <ul style="list-style-type: none"> <li>• Discharge of sewage and sullage from workers camps and site offices</li> <li>• Runoff/ effluent from batching plant and tunnelling works</li> <li>• Spillage from fuel storage tanks and wastes</li> </ul> | Total of 48 crossings including main rivers and tributaries. Water intakes located downstream are:<br><br>Pahang:<br>• Triang WTP<br>• Kg. Jawi-jawi WTP<br><br>Negeri Sembilan:<br>• Petaseh water intake<br><br>Selangor:<br>• Semenyih @ Jenderam Hilir water intake<br>• Bukit Tampo WTP<br>• Labohan Dagang ORS | <ul style="list-style-type: none"> <li>• Installation and maintenance of toilets and sewage treatment for workers camps and site offices</li> <li>• Implementation of effective treatment for batching plant and tunnelling slurry, e.g. silt ponds</li> <li>• Installation of containment bunds for storage areas</li> <li>• Storage of scheduled wastes as per Scheduled Wastes Regulations 2005</li> </ul> | 7-31<br>8-31   |



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| No. | Significant Potential Impacts due to Project Activities  | Magnitude of Significant Potential Impacts   | Pollution Prevention & Mitigation Measures (P2M2)   | Reference Page |
|-----|--|--|---|----------------|
|     |  | <ul style="list-style-type: none"> <li>• Kolam ABASS A, B &amp; C</li> </ul>   |   |                |
| 3   | <p><b>Flooding</b> affecting communities due to:</p> <ul style="list-style-type: none"> <li>• obstruction and/or diversion of floodwaters due to presence of embankments;</li> <li>• blockage of drains or streams during construction (rubbish);</li> <li>• blockage in temporary culverts during construction;</li> <li>• construction works on peat soil that can subside below river or sea levels</li> <li>• Possible conflicts between the ECRL and the existing/on-going flood mitigation works.</li> </ul> | <p>Flood areas at embankment sections</p> <p>Flood areas at elevated sections</p>  | <ul style="list-style-type: none"> <li>• Temporary drains – temporary drainage system will be constructed to accommodate the change in surface runoff.</li> <li>• Stream crossings – install culverts at stream crossings to allow effective stream. The culvert will be designed to handle peak runoff.</li> <li>• Provision of cross culverts and balancing culverts, maintenance of culvert to prevent sediment choke up, best management practices, maintenance and inspection of the BMPs, good housekeeping.</li> <li>• Flood Contingency Plan &amp; Action Plan</li> </ul> | 7-49<br>8-42   |
| 4   | <p><b>Waste</b> generation due to:</p> <ul style="list-style-type: none"> <li>• Construction and demolition waste</li> <li>• Excess/ spoil material from slope cutting and tunnelling</li> <li>• Biomass from site clearing of forests, oil palm plantation, scrubland, paddy fields</li> <li>• Solid waste from workers camps and site offices</li> <li>• Scheduled waste from maintenance yards</li> </ul>   | 12 million m <sup>3</sup> of excavated material, 542,168 tonnes of construction and demolition waste, 13,091 tonnes of biomass and 7,547 tonnes of solid waste | <ul style="list-style-type: none"> <li>• Reuse of suitable excavated material for construction application</li> <li>• Reuse and recycling of construction and demolition waste</li> <li>• Reuse of biomass as mulching for erosion control and landscaping</li> <li>• Disposal of residual waste only at approved disposal sites/landfills</li> <li>• Management of scheduled wastes as per Scheduled Wastes Regulations 2005</li> <li>• Open burning shall be prohibited</li> </ul>  | 7-134<br>8-76  |
| 5   | <p>Noise &amp; Vibration affecting receptors near construction sites (alignment, stations, yards, depot), due to:</p> <ul style="list-style-type: none"> <li>• Noise from construction activities</li> </ul>   | Noise emitted from construction equipment to adjacent receivers may range  | <ul style="list-style-type: none"> <li>• Traffic diversion plan to avoid local roads (where possible) and movement of construction vehicles during off-peak hours</li> </ul>  | 7-73<br>8-59   |

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|     | <ul style="list-style-type: none"> <li>• <b>Noise</b> from earth-moving equipment (bulldozers, tractors), heavy vehicles (lorries), diesel generator sets</li> <li>• Noise and vibration from piling works for piers</li> <li>• Noise and vibration from blasting works</li> </ul>   | from L <sub>10</sub> of 65 to 80 dBA.   | <ul style="list-style-type: none"> <li>• Temporary noise barriers/ hoardings</li> <li>• Equipment shielding and enclosures</li> <li>• Use of low noise piling methods, i.e. bored piling</li> <li>• Flexible noise shroud for piling machines</li> <li>• Restrict piling activities to day time only</li> </ul>   |                |
| 6   | <p><b>Air pollution</b> affecting sensitive receptors near construction sites, particularly stations, which involve large work areas near existing communities:</p> <ul style="list-style-type: none"> <li>• Emissions from construction vehicles</li> <li>• Dust generation from earthworks and construction vehicle traffic</li> </ul> | Air sensitive receptors (residents) located surrounding the stations and tunnel portals are expected to experience negligible to low fugitive dust risk impact attributed by their far distance to the Project site and its low population density. The ambient air during construction will meet the MAAQS 2013 limit. | <ul style="list-style-type: none"> <li>• Phasing of construction instead of total site clearing</li> <li>• Spraying of exposed surfaces, haul roads and stockpiles, especially during dry weather</li> <li>• Washing of vehicle wheels before construction vehicles travel on public roads</li> <li>• Speed limits and control of construction vehicle movements on site</li> <li>• Covering loose loads with tarpaulin to prevent spillage or entrainment of fine materials</li> <li>• Vehicle maintenance to minimise exhaust pollution</li> <li>• Any spillover of soil to public road to be cleaned up immediately.</li> <li>• Increase irrigation of turf during dry season</li> </ul> | 7-121<br>8-72  |
| 7   | <p><b>Geotechnical &amp; geological</b> risks due to:</p> <ul style="list-style-type: none"> <li>• Construction in peat areas and geologically weak areas</li> <li>• Construction of large-span bridges</li> <li>• Construction in Quaternary alluvium</li> <li>• Excavation, trenching and construction of retaining wall</li> </ul>    | <ul style="list-style-type: none"> <li>• 15 tunnels along Section C with total of 20.5 km</li> <li>• 13 km of alignment on peat areas</li> </ul>  | <ul style="list-style-type: none"> <li>• Comprehensive soil investigation will be carried out throughout the Project alignment to fully understand the geotechnical and geological profiles for detailed design</li> <li>• Selection of suitable construction techniques for tunnelling, excavation, foundation and retaining structures</li> </ul>   | 7-156<br>8-98  |

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|     | <ul style="list-style-type: none"> <li>• Tunnelling in granite and layered rocks</li> <li>• Peat fires</li> </ul>   |  | <ul style="list-style-type: none"> <li>• Treatment of peat soil prior to or during construction</li> <li>• Treatment of soft caly within the alluvial deposits prior to or during construction</li> <li>• Control of groundwater seepage into excavations</li> </ul>   |                        |
| 8   | <p><b>Ecological impacts:</b></p> <ul style="list-style-type: none"> <li>• Loss and disturbance of habitats due to alignment passing through forested areas</li> <li>• Fragmentation of forests and ecological linkages/wildlife corridors</li> <li>• Increase in human-wildlife conflicts due to displacement of wildlife</li> </ul>                             | <p>Areas of concern include state Permanent Forest Reserves in Kenaboi, Triang, Gapau, Lenggeng and Kuala Langat North</p> | <ul style="list-style-type: none"> <li>• Revisions and redesign of alignment to avoid cutting through forest reserves.</li> <li>• Provision of tunnels to avoid fragmentation in certain forest reserves that the alignment passes through, and in other hilly forested areas</li> <li>• Provision of wildlife crossings to enable wildlife movement across the railway – viaducts, overpasses and underpasses (e.g. box culverts)</li> <li>• Phasing of site clearing and vegetation removal to enable wildlife to escape into adjacent forests</li> <li>• Preparation of a Wildlife Management Plan to address matters pertaining to wildlife along the alignment</li> </ul> | <p>7-142<br/>8-82</p>  |
| 9   | <p><b>Social impacts:</b><br/>Main concerns include</p> <ul style="list-style-type: none"> <li>• Dust and air pollution</li> <li>• Cracks to house structures from vibration</li> <li>• Traffic congestion</li> <li>• Risk of flooding/flash flood</li> <li>• Presence of foreign workers</li> <li>• Job employment</li> <li>• Community fragmentation</li> </ul> | <p>Land acquisition and risk of flooding was raised the most during stakeholder engagement sessions.</p>                   | <ul style="list-style-type: none"> <li>• Consultation and engagements with affected communities to minimise impacts</li> <li>• Provision of employment opportunities to locals where possible</li> <li>• Provision of centralised workers accommodation to enable closer monitoring of workers’ activities</li> <li>• Maintaining good hygiene levels at workers’ accommodation to prevent outbreak of diseases</li> </ul>   | <p>7-167<br/>8-125</p> |
| 10  | <p><b>Traffic congestion</b> affecting local road users, due to:</p>  | <p>3 roads will operate at LOS E (LOS F is the</p>   | <ul style="list-style-type: none"> <li>• Preparation of detailed Traffic Management Plans for each construction site</li> </ul>  | <p>7-179<br/>8-131</p> |

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|          | <ul style="list-style-type: none"> <li>• Temporary diversion or closure of roads, e.g. to accommodate working space and machinery</li> <li>• Reduction in number and/or width of road lanes</li> <li>• Reduced road capacity during construction</li> <li>• Slow-moving construction vehicles on public roads causing slow traffic</li> </ul>                             | worst operating level) during the construction stage.   | <ul style="list-style-type: none"> <li>• Proper traffic management with adequate warning signs and flagmen</li> <li>• Maintain the number of lanes of major roads as much as possible (avoid lane reduction)</li> <li>• Minimum lane width should be maintained for roads which involve reduction in lane width</li> <li>• Dump trucks to operate at off-peak traffic hours</li> </ul>   |                |
| 11       | <p><b>Public Safety</b></p> <ul style="list-style-type: none"> <li>• Blasting hazards to workers and the public</li> <li>• Hazards to the public living near construction sites</li> <li>• Traffic hazards public road users passing by construction sites</li> </ul>   | HIRARC result: 4 construction activities with risk ranking high and 13 construction activities with risk ranking medium | <ul style="list-style-type: none"> <li>• Precise timing delays and proper explosive charge to avoid blast damage or over-break during blasting</li> <li>• Notifying residential and sensitive receptors near blasting sites of the blasting time prior to blasting</li> <li>• Proper ventilation of tunnels</li> <li>• Restriction of public access to construction sites</li> </ul>   | 7-187<br>8-137 |
| <b>C</b> | <b>Operation Stage</b>  |   |  |                |
| 1        | <p><b>Water pollution</b> affecting river water quality and beneficial users downstream, due to:</p> <ul style="list-style-type: none"> <li>• Sewage and sullage effluent from train stations</li> <li>• Effluent from yards and maintenance bases (mainly effluent from washing of trains)</li> <li>• Accidental spillage or leakage of cargo along alignment</li> </ul> | All stations will comply with Standard A of Environmental Quality (Sewage) Regulations 2009                             | <ul style="list-style-type: none"> <li>• ECRL trains are fully electric powered, thus potential of spills and leakages of fuel will be minimal</li> <li>• Proper operation and maintenance of sewage treatment systems with sufficient capacity for existing and future expansion</li> <li>• Provision of oil &amp; grease traps for sullage at kitchens</li> <li>• Provision of oil interceptors at depot, yards and maintenance bases</li> <li>• Installation of bunded storage area for fuel and</li> </ul> | 7-197<br>8-144 |

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|     |  |   | chemicals at depot and maintenance bases <ul style="list-style-type: none"> <li>• Toilets on-board trains will be equipped with wastewater holding tanks that will be emptied at depot or maintenance bases</li> <li>• Storage of scheduled wastes as per Scheduled Wastes Regulations 2005</li> <li>• Disposal of sewage sludge shall be monitored and tracked with Chain of Custody (COC) documentation</li> </ul>   |                |
| 2   | <b>Waste generation</b> <ul style="list-style-type: none"> <li>• Solid waste and scheduled waste generated from operation of stations, yards and maintenance bases</li> </ul>  | Estimated total solid waste generated is 825 kg/day.  | <ul style="list-style-type: none"> <li>• Disposal of solid wastes at approved landfills</li> <li>• Management of scheduled wastes as per Scheduled Wastes Regulations 2005</li> <li>• Implement centralized scheduled waste storage facilities</li> </ul>  | 7-293<br>8-180 |
| 3   | <b>Flooding</b> due to <ul style="list-style-type: none"> <li>• Increase in impervious area: Reduce the infiltration to the ground. As a result, this will lead to increased water flow on the surface of the land, and much more rapid flow into nearby waterways and subsequently increase the likelihood of flooding</li> <li>• Possible Presence of Piers in the River : could significantly affect the hydraulic characteristics of the rivers and may impose greater backwater effects with increased channel obstruction. Ultimately, backwater effects can increase flood risk at the upstream floodplains.</li> </ul> | Sufficient measures will be determined during the detailed design stage to ensure the operation of ECRL will not aggravate flood risks. | <ul style="list-style-type: none"> <li>• Fill embankment on low lying flood prone / flash flood area and peat soil.                             <ul style="list-style-type: none"> <li>➤ Size of balancing culvert min 1.5 m x 1.5m</li> <li>➤ Spacing of balancing culvert to be specified during detailed design stage</li> </ul> </li> <li>• Elevated structure on low lying flood prone                             <ul style="list-style-type: none"> <li>➤ Bridge soffit shall be minimum 1m above from 100 years ARI flood level</li> <li>➤ Pier location shall be away from main waterway</li> </ul> </li> <li>• Design of the drainage system that will take into account of Climate Change Factor (CCF) and land use change of 20% of the overall catchment. Minor drainage network will be designed for 10 years ARI while major drainage system will be designed for 50-100 years ARI</li> </ul> | 7-206<br>8-150 |

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|     | <ul style="list-style-type: none"> <li>• Presence of embankment: Act as a dam and cause upstream flood</li> <li>• Interference with surrounding drainage system: May experience flash flood if inadequate drainage system is provided along the ECRL section C as this will overload the capacity of the existing drainage network</li> <li>• Interference with tidal effect: Effect of tidal during heavy rainfall event that may cause water to rise and backflow to the drainage system</li> </ul> |   |   |                |
| 3   | <p><b>Noise &amp; Vibration</b></p> <ul style="list-style-type: none"> <li>• Increase in <math>L_{eq}</math> is generally not significant due to short-term nature of train passby, except in residential areas close to the railway (typically within 75 m)</li> <li>• Increases in <math>L_{eq}</math> are more significant in quieter rural areas with low ambient noise levels</li> <li>• Potential vibration impacts in buildings within 25 m from railway track</li> </ul>                      | At 25 m, the assumed noise emission level for a 160 km/hr passenger train is 83 dBA and for a 80 km/hr freight train is 85 dBA. | <ul style="list-style-type: none"> <li>• Installation of noise barriers (at railway boundary or at receptor boundary) at locations where sensitive receptors may receive increased noise levels from trains, in particular sensitive receptors within 50 m from alignment and with direct line of sight</li> <li>• Use of continuous welded tracks to reduce noise</li> <li>• Installation of vibration isolation between tracks and supporting structure, such as under-sleeper pads or low vibration trackform fasteners to reduce vibration</li> </ul> | 7-227<br>8-165 |
| 4   | <p><b>Air Pollution &amp; Greenhouse Gas Emission</b></p> <ul style="list-style-type: none"> <li>• Reduced greenhouse gas emissions (positive impact) with transport modal shift from road and air to rail, due to higher efficiency of rail transport</li> <li>• Reduced vehicular emissions due to shift</li> </ul>   | Net CO <sub>2e</sub> emission avoided for year 2027 is 343,566 MT CO <sub>2e</sub> /yr  | <ul style="list-style-type: none"> <li>• Mitigation is not necessary for positive impacts</li> </ul>  | 7-289<br>8-180 |

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|     | from private transport to rail (zero emissions from electric trains)   |  |   |                |
| 5   | <b>Geotechnical &amp; Geological Risks</b> <ul style="list-style-type: none"> <li>• Impact to settlement of soft clay and peat</li> <li>• Fire risk in peat soil areas in certain locations along the alignment</li> </ul>   | The alignment passes through peat area in Selangor, namely Hutan Simpan Kuala Langat Utara, and soft clay in Port Klang area | <ul style="list-style-type: none"> <li>• Regular monitoring of groundwater levels</li> <li>• Fire prevention in peat areas</li> <li>• Monitoring of settlement in peat and soft clay areas</li> </ul>   | 7-301<br>8-190 |
| 6   | <b>Ecology</b> <ul style="list-style-type: none"> <li>• Restricted wildlife movements due to habitat fragmentation and obstruction of roaming grounds and migratory routes, especially for larger mammals (tiger, elephants and tapirs) and primates (e.g. gibbon, monkeys)</li> <li>• Encroachment of wildlife into railway tracks</li> <li>• Collisions between trains and wildlife, causing wildlife injury and/or mortality</li> </ul> | Fringes of permanent forest reserves will traversed but not fragmented.  | <ul style="list-style-type: none"> <li>• Provision of wildlife crossings to enable wildlife movement across the railway – viaducts and underpasses</li> <li>• Barriers (precast concrete walls with fencing) to prevent wildlife encroachment onto railway tracks and tunnels – Higher precast walls in known elephant hotspot areas</li> <li>• Barriers around tunnel entrances to prevent wildlife encroaching into tunnels</li> <li>• Habitat enrichment in forested areas disturbed during construction</li> <li>• Preparation of a Wildlife Management Plan</li> <li>• Monitoring of wildlife</li> </ul> | 7-296<br>8-184 |
| 7   | Socio-Economy<br>Positive Impacts: <ul style="list-style-type: none"> <li>• Improved transport connectivity between West Coast and East Coast.</li> <li>• Reduced journey time for passenger travel between East Coast and Greater Klang Valley</li> </ul>   | Up to 9 million passenger journeys expected by 2047.   | <ul style="list-style-type: none"> <li>• Mitigation is not necessary for positive impacts</li> </ul>  | 7-304<br>8-192 |

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|     | <ul style="list-style-type: none"> <li>• Increased accessibility and capacity, and reduced cost of freight transport to East Coast ports</li> <li>• Stimulation of economic growth</li> <li>• Economic spinoff and multiplier effects in local area surrounding stations</li> <li>• Increased competitiveness of business</li> <li>• Employment and business opportunities at stations and yards</li> <li>• Demand for provision of support services for the ECRL operations</li> </ul> <p>Negative Impacts:</p> <ul style="list-style-type: none"> <li>• Fragmentation/division of communities, causing loss of social cohesion, reduced accessibility and increased cost of travel in local areas</li> <li>• Safety and security of schoolchildren and livestock</li> </ul> |   | <ul style="list-style-type: none"> <li>• Provision of vehicular box culverts to enable people to cross under railway tracks and minimise the “barrier” effect</li> <li>• Provision of overpasses</li> <li>• Stakeholder engagement programme during construction stage to be extended during operation</li> </ul> |                        |
| 8   | <p><b>Traffic</b></p> <p>Positive Impacts:</p> <ul style="list-style-type: none"> <li>• Improvement in public transport</li> <li>• Improved rail connectivity between East Coast and West Coast, and within East Coast</li> <li>• Reduction in road traffic due to modal shift from private vehicle to public transport</li> <li>• Reduction in heavy vehicle traffic on</li> </ul>   | <p>2 station access roads with LOS E and F (LOS F is the worst operating level) will be affected out of a total of 9 roads assessed</p> | <ul style="list-style-type: none"> <li>• Mitigation is not necessary for positive impacts</li> </ul>  | <p>7-311<br/>8-197</p> |



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|     | highways due to freight transport shift from road to rail<br><br>Negative Impacts: <ul style="list-style-type: none"> <li>• Localised traffic congestion at train stations</li> </ul>  |  | <ul style="list-style-type: none"> <li>• Proper design of station access and traffic circulation</li> <li>• Proper multi-modal integration of ECRL with other transport modes</li> <li>• Station access facilities for pedestrians and vulnerable road users</li> </ul>  |                |
| 9   | <b>Public Safety</b> <ul style="list-style-type: none"> <li>• Hazards due to train operations</li> <li>• Fire/incidents in tunnels</li> <li>• Fire/incidents on trains</li> <li>• Fire from peat areas</li> <li>• Cargo expected to be carried on the ECRL is generally not dangerous</li> </ul> | ECRL currently does not involve dangerous cargo. Train operations will have safety features. | <ul style="list-style-type: none"> <li>• ECRL will be designed and operated in conformance with relevant health and safety regulations</li> <li>• Implementation of safety measures for station and electric train operations</li> <li>• Implementation of safety measures for fires and accidents, especially in tunnels</li> <li>• Duplicate and back-up facilities for critical operation and communication systems</li> <li>• Emergency evacuation facilities for all tunnels</li> <li>• Emergency response plans will be formulated to handle emergency situations such as fires at stations, in tunnels or on trains, derailment of trains, spillage of cargo, equipment failure and failure of train control system</li> <li>• Peat fire management measures</li> </ul> | 7-315<br>8-200 |

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