

## 4. CUMULATIVE IMPACTS

- 4.1 In addition to the assessment of the Component and Stand Alone Schemes, the SEA also considered the predicted cumulative environmental impacts that would result from implementing the rail network expansion plans. These are discussed below.

### Cumulative Air Quality Implications

- 4.2 The implementation of the rail network expansion plans is predicted to result in a reduction in road based vehicle journeys. Using transport forecasts for the year 2016 (generated with reference to the major network assumptions used in the CTS-3 medium scenario) and agreed emission factors, the potential associated air quality "benefits" from the reductions in vehicle kilometres were calculated in terms of reductions in NO<sub>x</sub>, RSP and CO<sub>2</sub>.
- 4.3 The assessment concluded that the expanded networks (i.e. the Component Schemes plus the NOL and West Island Line) could result in potential emissions savings ranging from 565 to 669 tonnes/annum for NO<sub>x</sub>, 50 and 61 tonnes/annum for RSP, and 152,000 and 181,000 tonnes/annum for CO<sub>2</sub>.
- 4.4 Whilst reductions in NO<sub>x</sub> and RSP can be considered as having a "local" beneficial impact at street level, CO<sub>2</sub> is a greenhouse gas and its emission due to the generation of electricity to power the new railways should be considered as having a more "global" perspective. The amount of rail related CO<sub>2</sub> emissions will be dependant upon the future energy requirements of the railway sector. However, there are difficulties accurately determining the potential electricity requirements that may be needed to power the new railways in 2016, and there are also many uncertainties related to the potential future combinations of power stations that may be used. Consequently, an accurate prediction of the future rail related CO<sub>2</sub> emissions could not be undertaken.
- 4.5 However, it was concluded that any CO<sub>2</sub> benefits resulting from implementing the railways developments could be maximised through the introduction, by the energy sector, of more 'environmentally friendly' fuel sources and plant types, and by advances in power generation technology. Similarly, developments in the rail industry (such as more energy efficient rolling stock and stations, and the use of platform edge doors) could also help reduce the future electricity requirements of the new railways thereby leading to lower emissions of CO<sub>2</sub>.

### Cumulative Ecology Impacts

- 4.6 As the great majority of the rail development options are to be constructed underground within an urban environment, the potential for ecological impacts is generally low. However, losses to sensitive ecological habitats or resources, may occur from the implementation of above ground schemes such as the NOL.
- 4.7 Assuming a landtake corridor of 40 m width along the alignment (and 100 m at stations) will be required by the above ground schemes, the alignments were assessed to identify the extent of any ecological impacts.

- 4.8 Following the re-alignment of the NOL freight connection to avoid Long Valley, the assessment determined that, of most significance, the currently proposed above ground alignments would affect 4.42 ha of natural woodland (equating to 0.042% of Hong Kong's overall resource), 2.7 ha of other wetlands (including marsh areas) (or 0.81%) and 21.3 ha of inland water (including fishponds) (or 0.42%)
- 4.9 In line with best practice, steps should be taken during the rail development process to avoid or minimise the impacts to the identified ecological resources. However, if ecological impacts to certain important habitats (including natural woodland, wetlands, and fishponds) cannot be avoided, the affected habitats will need to be compensated in line with the established mitigation practice in Hong Kong; with the extent and location of such compensatory areas being commensurate with the significance and exact area of the affected habitats.

### **Cumulative Cultural and Heritage Impacts**

- 4.10 As the majority of the alignments are proposed to be constructed underground, the potential for cultural and heritage impacts is generally considered to be low.
- 4.11 Each of the assumed schemes were assessed to determine their proximity to cultural and heritage resources. It was found that 10 deemed and declared monuments are within 50 m of the currently assumed alignments. Concerns have been expressed by the Antiquities and Monuments Office (AMO) regarding the proximity of the alignments to heritage resources including the tunnel networks located below the Former Marine Police Headquarters.
- 4.12 Because of the importance and fragility of the identified resources, detailed consideration should be given to historic and cultural issues during the further developing the proposed rail alignments and construction methodologies so that potential impacts can be avoided.

### **Cumulative Landtake Impacts**

- 4.13 To provide an indication of the potential cumulative landtake implications, reference was made to the total lengths of track that are proposed to be constructed above ground.
- 4.14 Five schemes were found to include potential sections of above ground track. Taking a 'worst-case' approach it was determined that the maximum length of new above ground railways track would be 19.8 km; whereas the total length of new (above ground and below ground) track that is proposed under the rail network expansion plan would be 75.9 km.

### **Cumulative Hazard Impacts**

- 4.15 To provide an indication of the potential cumulative hazard implications, an assessment was undertaken to determine the length of track, and number of stations, within the Consultation Zones (CZs) of Potentially Hazardous Installations (PHIs).

- 4.16 With the currently assumed alignments, it was found that five of the proposed schemes may enter the CZs of PHIs. The cumulative hazard implications were determined by assessing the sum total of above ground rail track that runs within the CZs. Assuming a worst case approach, the total length of above ground track within the CZs was found to comprise 5,420 m . In addition one above ground station was also found to be within a CZ.
- 4.17 In comparison to the total length of proposed new railway (i.e. 75.9 km) the potential length of above ground track within the CZs is relatively small. It is also noted that 3,000 m of the track is within the CZs of two PHIs which currently have approximately 2,900 m of above ground railway within their CZs.
- 4.18 Whilst the estimated lengths of proposed new track within the CZs are not anticipated to present any insurmountable impacts, as is standard practice, hazard assessments will be required to assess the actual hazard implications, and, where applicable, to develop and specify suitable mitigation measures.

### **Cumulative Noise Impacts**

- 4.19 With the majority of the proposed schemes proposed to be located underground, the potential for operational noise impacts is low.
- 4.20 The Noise Control Ordinance (NCO) defines absolute performance limits for controlling operational railway noise. Therefore, for any above ground schemes where impacts are envisaged, direct (at source) mitigation measures must be developed to meet the required noise standard.
- 4.21 As a consequence of the statutory requirements and the underground construction of the majority of the schemes, the implementation of the proposed rail network expansion plans should not result in any properties being exposed to railway noise in excess of the require noise criteria.

### **Summary**

- 4.22 The assessments of the cumulative impacts provides a strategic bench-mark for the sum of potential impacts from the rail expansion schemes; the information contained within the SEA should be used in the further development of the rail proposals and the actual impacts from each scheme assessed in more detail at the EIA stage once the alignments are finalised, with the aim of meeting, and preferably falling below this benchmark.