Chapter 7 ECOLOGY

7.1 Introduction

7.1.1 This section presents a qualitative ecological assessment of the CTS-3 recommended new strategic highway projects up to 2016 as presented in Figures 7.3a - 7.3k to supplement the understanding of the environmental implications. It should be noted that this assessment does not include highway projects that are either not recommended by CTS-3 Study, completely underground, or currently being examined or have been previously examined by individual project specific studies.

7.1.2 As discussed in Section 2.3, recommendations of ecological constraints in Section 3.3.8 have been taken into consideration in the development of the recommended strategic highway projects to avoid as far as practicable the ecologically important areas identified.

7.1.3 The scope of CTS-3 with regard to rail projects is mainly to identify broad railway corridor travel demand (see Figure 7.3l). The present assessment therefore only provides a brief appraisal based on the information available. More detailed alignment identification and evaluation is the subject of the on-going Second Railway Development Study (RDS-2) which also has a strategic environmental assessment that addresses ecological issues in more detail.

7.2 Methodology

7.2.1 The key ecological issues related to the recommended strategic highways would be the potential impact on areas designated for conservation purposes as well as sensitive ecological habitats or resources known to have potential for supporting rare, protected or endemic species, such as native woodland, unpolluted stream, wetland and egretry. The primary potential impact includes direct loss of habitat as a result of landtaking or slope-cutting process.

7.2.2 The present assessment addresses the importance of the habitats affected as well as the landtake of natural habitat areas, taking into account the following:

- direct physical impact on recognised conservation areas identified in *Section 3.3.8*, if any;
- direct physical impact on areas of ecological interest identified in *Section 3.3.8*, if any; and
- total landtake of natural habitat areas.

7.2.3 Indications of the total landtake areas have taken reference from the World Wide Fund for Nature (WWF) - Hong Kong SAR wide vegetation map.

7.2.4 For rail projects, since no exact alignment is available in CTS-3, a broad brush assessment has been undertaken to identify potential constraints based on the rail corridors identified to be assessed in more details in RDS-2.

7.3 Results

Highway Projects

7.3.1 Preliminary assessment of impact from the preferred strategic highway projects on the loss of ecological habitats are presented below, subjected to further detailed assessment at the Environmental Impact Assessment (EIA) stage of the projects in future to ensure no unacceptable ecological impact. Detailed information of habitat loss estimation is given in Annex D. It should be noted that the assessment does not include highway projects that are either not recommended by CTS-3 Study, completely underground, or currently being examined or have been previously examined by individual project specific studies.

Fourth Harbour Crossing

7.3.2 The immersed tunnel of the preferred alignment (Figure 7.3a) would affect approximately 23.4 ha of marine habitat in Victoria Harbour (0.01% of total marine habitat in Hong Kong), and no terrestrial ecological resources would be affected. Given the small proportion of generally degraded harbour marine habitat affected as well as no recognised conservation areas nor areas of ecological interest would be affected, the potential ecological impact is expected to be low.

Island Western Corridor

7.3.3 The viaduct section of the preferred alignment option (Figure 7.3b) would affect approximately 7.3 ha of the marine habitat in Victoria Habour along the northern coast of Hong Kong Island (<0.01% of total marine habitat in Hong Kong). No terrestrial ecological resources would be affected as the alignment would pass through urbanised areas. The ecological impact from this alignment is not expected to be high as no recognised conservation areas nor areas of ecological interest would be affected.

Tai Mo Shan Link

7.3.4 Most of the alignment is put into underground tunnel, to avoid impact to the Shing Mun and Kam Shan Country Parks, the SSSIs (Shing Mun Fung Shui Woodland, Tai Mo Shan, Tai Mo Shan Montane Scrub Forest and Ng Tung Chai), and Special Areas (Shing Mun Fung Shui Woodland and Tai Mo Shan Montane Scrub Forest), including the Shing Mun Tai Wai fung shui woodland. The open section of the Tai Mo Shan Link (Figure 7.3c) would affect approximately 0.6ha of natural woodland (0.006 % of total natural woodland area in Hong Kong), 0.1 ha of tall shrub (<0.001% of total tall shrub habitat in Hong Kong), 1.1 ha of low shrub with grass

(0.008% of total low shrub and grass habitat in Hong Kong), 0.9ha of low shrub (0.012% of total low shrub habitat in Hong Kong) , 2.1 ha of cultivation (0.15% of total cultivation area in Hong Kong) and 1 ha of abandoned cultivation (0.031% of total abandoned cultivation area in Hong Kong). The potential ecological impact from this alignment is expected to be low to moderate, subject to further refinement of the alignment at the EIA stage to avoid the more important habitats such as the natural woodland.

Tuen Mun to Chek Lap Kok Link

7.3.5 Ecological habitats that would be affected by the open section of this alignment (Figure 7.3d) include 1.3 ha of tall shrub with grass (0.014% of total area of tall shrub with grass in Hong Kong), 0.02 ha of low shrub with grass (<0.001% of total area of low shrub with grass in Hong Kong), while the immersed tunnel section would affect 53.6 ha of marine habitat (0.032% of total marine habitat in Hong Kong).

7.3.6 The waters off North Lantau appear to be the preferred habitat for the Indo-Pacific Hump-backed Dolphin, Sousa chinensis, in Hong Kong waters. Although only few sightings have been recorded near the tunnel entrance, the alignment of the Tuen Mun to Chek Lap Kok Link passes through marine waters that are known to be heavily utilised by Sousa chinensis.

7.3.7 Construction mitigation measures that were successfully used previously in Hong Kong will be required to reduce noise disturbance, perturbations to water quality or increases in marine traffic, ensuring no unacceptable impact on the dolphin population in the area. Examples of these measures include scheduling controlled underwater blasting in spring and summer seasons when dolphin density in the area is low, air-bubble curtain and dolphin surveillance.

7.3.8 Overall, the ecological impact due to this alignment is not considered high as neither recognised terrestrial/marine conservation areas nor areas of ecological interest would be affected, and only small areas of low quality terrestrial habitat types which are of secondary nature would be affected. However, the presence of Sousa chinensis in the vicinity of the alignment will require detailed assessment in the EIA stage to develop more specific mitigation measures to ensure no significant impact.

Tuen Mun Western Bypass

7.3.9 The open section of this alignment (Figure 7.3e) would affect ecological habitats including 2.3 ha of natural woodland (0.023% of total natural woodland area in Hong Kong), 6.9 ha of tall shrub with grass (0.077% of total area of tall shrub with grass in Hong Kong), 8.3 ha of plantation woodland (0.174%), 20.6 ha of low shrub with grass (0.159% of total area of low shrub with grass in Hong Kong), 1ha of grassland (0.006% of total grass habitat in Hong Kong), 4.1 ha of cultivation (0.293% of total cultivation area in Hong Kong), as well as 0.03 ha of inland water (<0.001% of total inland water area in Hong Kong). The open section to the southern portal area may

affect two SSSIs including the Castle Peak and Tsing Shan Tsuen which are close to the alignment, while no impact on ecological resources is expected for the tunnel section. The alignment would mostly affect small areas of habitat types which are secondary in nature, and the ecological impact is considered low to moderate subject to further refinement of the alignment at the EIA stage to avoid the more important habitats such as the natural woodland and the two SSSIs.

Kowloon Northern Bypass and Extension

7.3.10 This alignment (Figure 7.3f) is mainly in underground tunnel to avoid the Tai Lam, Kam Shan and Lion Rock Country Parks, the Beacon Hill SSSI, as well as the Kwun Yam Shan fung shui wood. Only 0.2 ha of marine habitat (<0.001% of total marine habitat in Hong Kong) would be affected. Hence ecological impact for this alignment is considered low owing to the small area loss of marine habitat. Future EIA for the project should refine the western portal location to ensure no significant indirect impact to the Tai Lam Country Park.

Hong Kong North Shore Bypass

7.3.11 The alignment proposed for this project id shown in Figure 7.3g. It is assumed that approximately 29.1 ha of marine habitat (0.018% of total marine habitat in Hong Kong) would be affected and no terrestrial ecological habitats would be affected since the alignment would be mainly off-shore. As no recognised conservation areas nor areas of ecological interest would be affected, the ecological impact from this alignment is not expected to be high.

Sha Tin Northern Bypass

7.3.12 The open section of the alignment (Figure 7.3h) would affect 2.5 ha of natural woodland (0.025% of total natural woodland area in Hong Kong), 9.2 ha of tall shrub with grass (0.103% of the total area of tall shrub with grass in Hong Kong), 10.4 ha of tall shrub (0.093% of total tall shrub area in Hong Kong), 1 ha of low shrub (0.015% of total low shrub area in Hong Kong), 0.05 ha of grassland (<0.0015 of total grassland area in Hong Kong), 1.2 ha of abandoned cultivation (0.037% of total abandoned cultivation area in Hong Kong), as well as 0.3 ha of inland water (0.006% of total inland water area in Hong Kong). There would be no ecological impact for the remaining tunnel sections of the alignment. As no recognised conservation areas nor areas of ecological interest would be affected, the ecological impact from this alignment is considered low to moderate, subject to further refinement of the alignment at the EIA stage to avoid the more important habitats such as the natural woodland.

Eastern Highway

7.3.13 The alignment has been put into underground tunnels to avoid the Ma On Shan Country Park, SSSIs including Ho Chung, Mau Ping, She Shan Fung Shui Woodland, Tai Po Kau Nature Reserve Special Area, Tai Po Egretry and Pat Sin

Leng Country Park. Ecological habitat types that would be affected by the preferred alignment option (Figure 7.3i) include approximately 46 ha of natural woodland area (0.45% of total natural woodland area in Hong Kong), 10 ha of tall shrub with grass area (0.11% of total area of tall shrub with grass in Hong Kong), 14.8 ha of tall shrub area (0.13% of total tall shrub area in Hong Kong), 1.8 ha of plantation woodland area (0.04% of total plantation woodland area in Hong Kong), 15.9 ha of low shrub with grass area (0.12% of total area of low shrub with grass in Hong Kong), 7.5 ha of low shrub area (0.11% of total low shrub area in Hong Kong), 18.4 ha of grassland area (0.10% of total grassland area in Hong Kong), 4.9 ha of cultivation (0.35% of total cultivation area in Hong Kong), 14.2 ha of abandoned cultivation area (0.45% of total abandoned cultivation area in Hong Kong), 1.5 ha of inland water (0.03% of total inland water area in Hong Kong), and 21.2 ha of marine habitat (0.01% of total marine habitat in Hong Kong).

7.3.14 The potential ecological impact on marine habitat is expected low given the small proportion of generally degraded harbour marine habitat affected. However, given the significant encroachment into natural woodland and shrubland habitats, the terrestrial ecological impact from this alignment is considered moderate to high. Careful considerations should be given at the EIA stage to refine the alignment to avoid the more important habitats such as natural woodlands.

New Territories East-West Link

7.3.15 The preferred alignment (Figure 7.3k) would affect ecological habitats including approximately 14.8 ha of natural woodland (0.15% of total natural woodland area in Hong Kong), 1.5 ha of tall shrub with grass (0.02% of total area of tall shrub with grass in Hong Kong), 1.5 ha of tall shrub (0.01% of total tall shrub area in Hong Kong), 2.7 ha of plantation woodland (0.06% of total plantation woodland area in Hong Kong), 6.6 ha of low shrub with grass (0.05% of total area of low shrub with grass in Hong Kong), 0.3 ha of low shrub (<0.01% of total low shrub area in Hong Kong), 10.2 ha of grassland (0.06% of total grassland area in Hong Kong), 8.7 ha of cultivation (0.62% of total cultivation area in Hong Kong), 7.2 ha of abandoned cultivation (0.23% of total abandoned cultivation area in Hong Kong), and 0.4 ha of inland water (0.01% of total inland water area in Hong Kong).

7.3.16 The section passing through Lam Tsuen Country Park is in underground tunnel to avoid ecological impact on the habitats within the Country Park. However, due to the significant encroachment into natural woodland, the ecological impact from this alignment is considered moderate to high, and a sympathetic alignment refinement and design should be undertaken at the EIA stage to avoid the more important habitats such as natural woodlands.

Route 81

7.3.17 Ecological habitat types that would be affected by the alignment (Figure 7.3m) include approximately 20.2 ha of natural woodland (0.2% of total natural woodland area in Hong Kong), 1.6 ha of tall shrub with grass (0.02% of total area of tall shrub

with grass in Hong Kong), 14.6 ha of tall shrub (0.13% of total tall shrub area in Hong Kong), 1.2 ha of low shrub with grass (0.01% of total area of low shrub with grass in Hong Kong), 1.9 ha of low shrub (0.03% of total low shrub area in Hong Kong), 1.1 ha of grassland (0.01% of total grassland area in Hong Kong), and 1.3 ha of inland water (0.03% of inland water area in Hong Kong).

7.3.18 This alignment may affect two Country Parks including Tai Tam and Shek O, as well as Tai Tam Harbour (Inner Bay) SSSI which are in close proximity. Moreover, given the significant encroachment into natural woodland, the ecological impact from this alignment is considered high, and a better alignment should be developed at the EIA stage to ensure avoidance of the Country Parks and SSSI, as well as other natural habitats found to be ecologically important.

Rail Projects

7.3.19 Preliminary appraisal to highlight constraints based on the rail corridors identified for the possible new rail projects (see Figure 7.3n) is presented below, excluding rail projects that have been committed and subjected to detailed studies already or are completely underground.

South Hong Kong Island Line

7.3.20 This rail corridor passes through areas with mainly natural woodland and some tall shrub habitats. However the rail would be mainly in tunnel and emerge in the vicinity of Aberdeen, and therefore avoids encroachment into the Aberdeen Country Park and the nearby Pok Fu Lam Reservoir Catchment Area SSSI. The ecological impact due to this rail project is expected to be low.

Link to Western District

7.3.21 The Hong Kong Island Section is mainly in urbanised areas and no ecological impact is expected. The section connecting Hong Kong Island and Green Island affects mainly marine habitat. The landing point on Green Island would affect only reclaimed land. Since the corridor would affect habitat types which are secondary in nature, and no recognised conservation areas nor areas of ecological interest would be affected, the ecological impact due to this rail project is expected to be low.

Kowloon Southern Loop

7.3.22 The whole rail passes through only urbanised areas and therefore no ecological impact is expected.

Kowloon East-West Rail

7.3.23 The whole rail passes through only urbanised areas and therefore no ecological impact is expected.

Second Rail Link from Tai Wai to Kowloon (Diamond Hill)

7.3.24 Ecological habitats within the corridor include mainly low shrub with grass area and some natural woodland area. This rail would encroach into the Lion Rock Country Park. Further development and design of the alignment should avoid natural woodland areas as far as possible and adopt tunnel option for the section passing through the Country Park.

Second Rail Link from Tai Wai to Kowloon (Yen Chow Street)

7.3.25 This corridor would pass through low shrub habitat and plantation woodland mainly within Kam Shan Country Park. Tunnel option should be adopted to avoid Kam Shan Country Park.

Outer Western Corridor Railway

7.3.26 This rail would mostly affect grassland, tall shrub with grass and low shrub with grass areas. Other habitat types which would also be affected include plantation woodland and probably some natural woodland. The rail may encroach into the Tai Lam Country Park. Encroachment into Country Park should be avoided and impact on natural woodland area should be avoided as far as possible.

7.4 Discussion

7.4.1 The CTS-3 recommended new strategic highway projects have avoided the recognised conservation areas as well as areas of ecological interest identified as ecological constraints in *Section 3.3.8* during the alignment development and evaluation stage, either through careful routing or entering into underground tunnels.

7.4.2 An indication of the cumulative total areas of habitat loss, if all the recommended new strategic highway projects examined in the SEA are in place, is shown in Table 7.4a.

Table7.4a
Total Area Loss of Ecological Habitat Types Due to the Recommended Strategic Highways

Ecological Habitat	Total Area Loss (ha)	Percentage Loss (%)
Abandoned Cultivation	23.6	0.74
Cultivation	19.9	1.41
Grassland	30.8	0.17
Low Shrub	11.6	0.17
Low Shrub with Grass	45.3	0.35
Plantation Woodland	12.7	0.27
Tall Shrub	41.4	0.37
Tall Shrub with Grass	30.5	0.34
Natural Woodland	86.4	0.85
Inland Water	3.5	0.07
Marine	145.4	0.09
TOTAL	**451.1**	**0.2** [1]

Note: 1 – Percent loss from sum of all ecological habitat areas shown in the table.

7.4.3 It is estimated that there would be approximately 450 ha of cumulative terrestrial and marine habitat loss as a result of the development of the recommended strategic highway projects, about 0.2 % of the total areas of such habitats in Hong Kong SAR. Overall most of the habitats types (eg. grassland, shrubland) affected by these strategic highways are mainly secondary in nature with low ecological significance, and therefore the potential ecological impact is considered to be generally low. However three alignments would encroach into more important habitats such as natural woodland, including Eastern Highway, New Territories East-West Link, and Route 81, and the potential ecological impact is considered moderate to high. Refinement of the alignments should be undertaken to avoid or minimise the potential impacts to acceptable levels. Potential construction impact on the Chinese White Dolphins utilising the North Lantau waters will require appropriate mitigation measures to ensure no adverse impacts.

7.4.4 All these strategic highway schemes should be assessed in detail in the EIA stage, in accordance with the EIA Ordinance requirements, to investigate the ecological conditions of the affected areas, avoid ecological important habitats or species, and ensure no unacceptable ecological impacts in relation to the implementation of the schemes.

7.4.5 Based on the broad new rail corridors, the overall potential ecological impact is expected to be low given that most of the alignment will pass through either urbanised areas or habitat types which are secondary in nature (eg. grassland, shrubland), and assuming that tunnel option will be adopted to avoid the recognised conservation areas. More detailed rail alignment assessments will be undertaken in the on-going RDS-2 study. It is recommended that the RDS-2 study should take on

the habitat loss findings of the CTS-3 ecological appraisal for cumulative assessment of habitat loss due to planned highway and railway projects.