8 ECOLOGY (TERRESTRIAL)

8.1 Introduction

8.1.1 This chapter presents an assessment of potential impacts on ecological resources within the assessment area, and the results of assessment of the potential ecological impacts resulting from the construction and operation of the proposed improvement of Lion Rock Tunnel (LRT). According to the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM), the baseline conditions for the ecological components of the terrestrial environment were evaluated based on information from available literature and field surveys conducted for the purposes of this EIA. The potential impacts on any ecologically sensitive receivers within the assessment area were assessed. Measures required to mitigate any identified adverse impacts were recommended, where appropriate, and residual impacts were assessed.

8.2 Environmental Legislation, Standards and Criteria

8.2.1 This assessment makes reference to the following Hong Kong Special Administrative Region (HKSAR) Government ordinances, regulations, standards, guidelines, and documents when identifying ecological importance of habitats and species, evaluating and assessing potential impacts of the Project on the ecological resources:

- *Environmental Impact Assessment Ordinance (Cap. 499)*, and its subsidiary legislation, which provides guidelines on the environmental impact assessment process;
- *Technical Memorandum on Environmental Impact Assessment Process* (*EIAO-TM*) *Annex 8*, which recommends the criteria to be used for evaluating habitat and ecological impact;
- *EIAO-TM Annex 16*, which sets out the general approach and methodology for assessment of ecological impacts arising from a project or proposal, to allow a complete *and objective identification, prediction and evaluation of the potential ecological impacts;*
- *EIAO Guidance Note No. 3/2010 Flexibility and Enforceability of Mitigation Measures. Proposed in an Environmental Impact Assessment Report*, which provides guiding principles on the approach to assess the recommended environmental mitigation measures in EIA reports.
- *EIAO Guidance Note No. 7/2010 Ecological Baseline Survey for Ecological Assessment*, which provides general guidelines for conducting ecological baseline surveys in order to fulfil requirements stipulated in the *EIAO-TM*.
- *EIAO Guidance Note No. 10/2010 Methodologies for Terrestrial and Freshwater Ecological Baseline Surveys*, which introduces some methodologies in conducting terrestrial and freshwater ecological baseline surveys in order to fulfil requirements stipulated in the *EIAO-TM*;
- *Country Parks Ordinance (Cap. 208)*, which provides for the designation and management of country parks and special areas. Country Parks are designated for the purpose of nature conservation, countryside recreation and outdoor education. Special areas are created mainly for the purpose of nature conservation.
- *Forests and Countryside Ordinance (Cap. 96)*, which prohibits felling, cutting, burning or destroying of trees and growing plants in forests and plantations on Government land. Related subsidiary regulations prohibit the selling or possession of listed, restricted and protected plant species.
- *Wild Animals Protection Ordinance (Cap. 170)*, under which the designated wild animals are protected from being hunted, whilst their nests and eggs are protected from injury, destruction and removal. All birds and most mammals, including marine cetaceans, are protected under this Ordinance.
- *Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)*, which gives effect to the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (*CITES*) in Hong Kong. It restricts the import and export of species listed in

CITES Appendices so as to protect wildlife from overexploitation or extinction. The Ordinance is primarily related to controlling trade in threatened and endangered species and restricting the local possession of them.

- *Town Planning Ordinance (Cap. 131)*, which provides for the designation of Coastal Protection Areas, Sites of Special Scientific Interest, Conservation Area, Country Park, Green Belt or other specified uses that promote conservation or protection of the environment.
- Chapter 10 of the *Hong Kong Planning Standard and Guidelines (HKPSG)*, which covers planning considerations relevant to conservation. This chapter details the principles of conservation, the conservation of natural landscape and habitats, historic buildings, archaeological sites and other antiquities. It also describes enforcement issues. The appendices list the legislation and administrative controls for conservation, other conservation related measures in Hong Kong and Government departments involved in conservation.
- *Development Bureau (DEVB) TC(W) No. 4/2020 Tree Preservation* – sets out the policy on tree preservation, and the procedures for control of tree felling, transplanting and pruning in Government projects.
- *Drainage Services Department Practice Note No. 1/2015 Guidelines on Environmental and Ecological Considerations for River Channel Design* – presents the environmental considerations that should be taken into account and incorporated whenever practicable in design of river channels.
- *Environment, Transport and Works Bureau (ETWB) Technical Circular (Works) No. 5/2005 Protection of Natural Streams/rivers from Adverse Impacts Arising from Construction Works* – provide guidelines for the planning and execution of construction works and for the vetting of public and private development proposals that affect natural rivers and streams, i.e. including those not classified as environmentally sensitive.

8.2.2 This section also makes reference to the following international conventions and national legislation:

- The *International Union for Conservation of Nature (IUCN) Red List of Threatened Species*, which provides taxonomic, conservation status and distribution information on taxa that have been evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the *IUCN Red List* is to catalogue and highlight those taxa that are facing a higher risk of global extinction. The *IUCN Red List* also includes information on taxa that are either close to meeting the threatened thresholds or that would be threatened were it not for an ongoing taxon-specific conservation programme.
- The List of Wild Plants and Wild Animals Under Special State Protection – lists detailed Class I and Class II key protected animals and plant species under the Law of the People's Republic of China on the Protection of Wildlife. The list was last updated in February 2020.
- The *Convention on Biological Diversity* (the *CBD*), which opened for signature at the Rio Earth Summit in 1992 with three main objectives: to conserve biodiversity, to ensure sustainable use of the components of biodiversity, and to share the benefits arising from the use of genetic resources in a fair and equitable manner. There are currently over 190 Parties to the Convention, including China. In May 2011, the CBD was formally extended to Hong Kong. The Environment Bureau and the Agriculture, Fisheries and Conservation Department have embarked on an exercise to develop a city-level Biodiversity Strategy and Action Plan (BSAP) under the CBD.

8.3 Assessment Methodology

Assessment Area

8.3.1 In accordance with the EIA Study Brief No. ESB-323/2019, the assessment area for the purpose of the terrestrial ecology includes areas within 500 m distance from the Project boundary and

areas likely to be impacted by the Project and associated works (refer to **60604728/R42b/Figure 8.1**). The proposed Project footprint (i.e. permanently and temporarily affected areas) are presented in **60604728/R42b/Figure 8.4.1** to **60604728/R42b/Figure 8.4.5**).

Literature Review

8.3.2 The ecological characteristics of the assessment area were identified through a comprehensive review of the available literature, as shown in **Table 8.1** below.

Table 8.1 Baseline Information of Ecological Resources in the Assessment Area

Relevant Literature	Terrestrial Ecology						
	Habitat and Vegetation	Avifauna	Butterfly	Odonate	Herpetofauna	Mammal	Freshwater Communities
(1) Revised Trunk Road T4 in Sha Tin (CEDD, 2021)	✓	✓	✓	✓	✓	✓	✓
(2) In-situ Reprovisioning of Sha Tin Water Treatment Works - South Works (WSD, 2014)	✓	✓	✓	✓	✓	✓	✓
(3) Shatin to Central Link - Tai Wai to Hung Hom Section (MTRC, 2011)	✓	✓	✓	✓	✓	✓	✓
(4) Trunk Road T4 in Sha Tin (CEDD, 2004)	✓	✓	✓	✓	✓	✓	✓
(5) Hong Kong Biodiversity Agriculture, Fisheries and Conservation Department Newsletter (AFCD, 2006a)					✓	✓	
(6) Data extracted from 2002 – 2019 Territory-wide long-term monitoring survey on major taxon groups (AFCD, 2020a (unpublished data))			✓	✓	✓	✓	✓

Ecological Survey Methodology

Six-month Ecological Field Survey Conducted in 2020

8.3.3 Based on the review of the findings of relevant studies and available information, ecological surveys were carried out to fill information gaps identified, verify the information collected, and to fulfil the requirements of the EIA Study according to the EIA Study Brief No. ESB-323/2019. A six-month ecological field survey (covering both dry and wet seasons) was undertaken from February 2020 to July 2020.

Additional Field Surveys Conducted between 2020 and 2022

8.3.4 Given the changes of the proposed layout of the improvement works for Lion Rock Tunnel, additional field surveys were conducted in between May 2020 and January 2022 to collect and verify the ecological baseline information of the additional Project footprint that would be potentially affected under the Project (e.g. woodland near LRT toll plaza, LRT portals at Sha Tin and Kowloon, woodlands and engineered slopes along Lion Rock Tunnel Road (LRTR) and natural terrain hazard mitigation measures (NTHMM) near LRTR within LRCP).

8.3.5 **Table 8.2** summarizes the survey programme of six-month ecological field surveys and additional field surveys conducted from 2020 to 2022. Reference were made to the EIAO Guidance Note No. 7/2010 and EIAO Guidance Note No.10/2010 and the methodologies adopted for the above surveys are described below.

Table 8.2 Survey Programme of Six-month Ecological Field Surveys and Additional Field Surveys

Survey	Dry Season		Wet Season				Dry Season		Wet Season	Dry Season
	Feb 2020	Mar 2020	Apr 2020 *	May 2020	Jun 2020	Jul 2020	Jan 2021	Mar 2021	Apr 2021*	Jan 2022
Six-month Ecological Field Surveys										
Habitat and Vegetation	✓				✓					
Avifauna (Day)	✓	✓	✓	✓	✓	✓				
Avifauna (Night)	✓		✓	✓	✓					
Ardeid Night Roost and Pre-Roost Survey	✓		✓		✓					
Butterfly and Odonate		✓		✓	✓	✓				
Herpetofauna (Day and Night)		✓		✓	✓	✓				
Mammal (Day and Night)	✓			✓	✓					
Freshwater Communities		✓		✓	✓	✓				
Additional Field Surveys										
Habitat and Vegetation				✓	✓	✓	✓	✓	✓	✓
Avifauna (Day and Night)				✓	✓	✓	✓	✓	✓	✓
Butterfly and Odonate				✓	✓	✓	✓	✓	✓	✓
Herpetofauna (Day and Night)				✓	✓	✓	✓	✓	✓	✓
Mammal (Day and Night)				✓	✓	✓	✓	✓	✓	✓
Freshwater Communities				✓	✓	✓	✓	✓	✓	✓

Note:
The ticks (✓) denote the timing of the surveys for the faunal or floral groups assessed under the Project
* Transitional months

Habitat Mapping and Vegetation Survey

8.3.6 Based on the review of aerial photographs, the latest countryside series maps and previous literature, terrestrial habitats within the assessment area were preliminary identified, sized and mapped. A habitat map of suitable scale (1:5000) showing the types and locations of terrestrial habitats within the assessment area was prepared accordingly. Ground truthing exercise of the assessment area was undertaken in accessible areas and paths of different habitat types (as per the walk transects presented in **60604728/R42b/Figure 8.1.1** to **60604728/R42b/Figure 8.1.3**) to check and verify each identified habitat, with particular attention on the Project site. During habitat surveys, ecological characteristics of each habitat type, including size, vegetation type, species presence, dominant species found, species diversity and abundance, community structure, ecological value and inter-dependence of the habitats and species, and presence of any features of ecological importance were defined and characterized. Binoculars and aerial photographs were used to observe ecological structure of inaccessible areas. Representative photographs of the habitat types and/or any important ecological features identified were taken.

8.3.7 Potential watercourses within the assessment area were identified from maps published by the Survey and Mapping Office of Lands Department and checked and mapped out during ground truthing, with particular attention to potential seasonal patterns as evidenced by presence of surface flowing water.

8.3.8 Vegetation surveys were conducted by direct observation to record diversity and dominance of plant species present in different habitat types. The location of any plant species of

conservation importance was recorded. Identification of flora species and status in Hong Kong was made with reference to Corlett *et al*. (2000), Hu *et al*. (2003), Hong Kong Herbarium (2012), and Hong Kong Herbarium and South China Botanical Garden (2007; 2008; 2009; 2011).

Avifauna Survey

8.3.9 The presence and abundance of avifauna species at various habitats were recorded visually and aurally. Avifauna within the assessment area was surveyed during daytime (between early mornings and late evenings) and night-time (after dusk) quantitatively using transect count method (refer to **60604728/R42b/Figure 8.1.1** to **60604728/R42b/Figure 8.1.3**). The location of any avifauna species of conservation importance encountered was recorded, along with notable behaviour (e.g. breeding behaviour such as nesting and presence of recently fledged juveniles, roosting, and feeding activities). Night-time avifauna surveys were also undertaken to survey nocturnal avifauna species. Ornithological nomenclature in this report followed Carey *et al*. (2001), Viney *et al*. (2005) and the most recently updated list from the Hong Kong Bird Watching Society.

Ardeid Night Roost and Pre-Roost Survey

8.3.10 The trees at banks along Shing Mun River Channel (SMRC), which is located approximately 630 m from the nearest Project boundary, are known to support night roosts for ardeids (**60604728/R42b/Figure 8.1.3** refers). Ardeid night roost and pre-roost survey at the vantage point was conducted to confirm the status and location of existing and potential night roost and pre-roost sites of ardeid along SMRC. The survey started from approximately an hour before sunset and last until nightfall, which is the peak period of ardeid activities at the night roost and pre-roost sites. The exact time of sunset on the date of survey referred to the Hong Kong Observatory.

Butterfly and Odonate Survey

8.3.11 Butterflies and odonates (dragonflies and damselflies) within the assessment area were surveyed using transect count method (refer to **60604728/R42b/Figure 8.1.1** to **60604728/R42b/Figure 8.1.3** for survey transects). Larvae and pupae of butterflies were actively searched. For odonates, special attention was given to their potential habitats such as watercourses and ponds. The surveys were conducted at suitable weather condition to avoid overcast weather when the butterfly and odonate were less active. Most species observed were identified to species level. Relative abundance of butterfly, dragonfly and damselfly were recorded. Nomenclature of butterfly followed Lo and Hui (2010) and nomenclature of dragonfly and damselfly follows Reels (2019) and Tam *et al*. (2011).

Herpetofauna Survey

8.3.12 Herpetofauna (i.e. amphibians and reptiles) within the assessment area were surveyed during daytime and night-time along walk transects (refer to **60604728/R42b/Figure 8.1.1** to **60604728/R42b/Figure 8.1.3**). Potential microhabitats (e.g. leaf litter, underneath of rotten logs) were searched. All reptiles and amphibians sighted or heard were recorded. Amphibian survey were conducted whenever possible on evenings following or during periods of rainfall, focusing on areas suitable for amphibians (e.g. woodlands, shrublands, grasslands, streams, if any). Records of calling amphibians formed the bulk of the data were collected, but this was also supplemented when possible by visual observation of eggs, tadpoles and adults.

8.3.13 During reptile surveys, careful searches of appropriate microhabitats and refugia (e.g. stones, pond bunds, crevices, leaf litter/debris, rotten logs) were undertaken. All reptiles observed were identified as far as practicable. Night-time surveys were also conducted to survey nocturnal reptiles. In addition to active searching, observation of exposed, basking or foraging reptiles were recorded.

8.3.14 Nomenclature of amphibian and reptile followed Chan *et al.* (2005) and Karsen *et al.* (1998), respectively.

Terrestrial Mammal Survey

8.3.15 Surveys were conducted on areas which might potentially be utilized by terrestrial mammals. The surveys focused on searching for field signs such as droppings, footprints, diggings or burrows left by larger terrestrial mammals along walk transects (refer to **60604728/R42b/Figure 8.1.1** to **60604728/R42b/Figure 8.1.3**). Mammal identification were made as accurate as possible from the field signs encountered. In addition, mammal directly observed were identified as far as practicable. Nomenclature of mammal follows Shek (2006a). Flying mammals (e.g. bat species) were also taken into account during the mammal survey.

8.3.16 Bat surveys were undertaken by an experienced surveyor equipped with an ultrasonic bat detector, with calls recorded for later analysis with computer software. The bat species were also located by direct sighting, and field observation (e.g. their behaviour, such as flying pattern and height, size of bat species, nearby habitats, etc.) were recorded to aid in the identification of the bat species as far as practicable.

Freshwater Communities Survey

8.3.17 Freshwater communities were surveyed via active searching, direct observation, hand netting and kick sampling at permanently-flowing streams within assessment area. Representative sampling locations (refer to **60604728/R42b/Figure 8.1.1** to **60604728/R42b/Figure 8.1.3**) were selected for surveys, with emphasis placed on the watercourses with continual flow and located at and in close proximity to the project footprint which are susceptible to potential impacts arising from the Project. Active searching, direct observation and hand netting would be used to survey freshwater fish. During the freshwater communities surveys, rock within the streams, if any, were turned over to locate any aquatic animals beneath where necessary. Hand netting and kick sampling were used to survey benthic macroinvertebrates in shallow fast-flowing streams. Organisms encountered were recorded and identified to the lowest possible taxon level. Boulders were returned to their original location and orientation. All organisms collected were released to the point of collection after identification. No unnecessary stress was exerted on the stream organisms during the survey. The aforementioned survey methodology is indicative in nature and were subject to change due to site condition and accessibility upon the exercise of professional judgement during the course of ecological survey. Nomenclature of freshwater fish and invertebrate communities followed Lee *et al*. (2004) and Dudgeon (2003), respectively.

8.4 Evaluation of Conservation Importance/Value and Impact Significance

Conservation Importance/Value

8.4.1 Impact significance is a product of the magnitude and scale of an impact, and the conservation importance/value of the species or habitat(s) likely to be affected. Evaluation of ecological importance of the species and habitat(s) associated with the assessment area was based on the criteria outlined in Tables 2 and 3 of the EIAO-TM Annex 8.

8.4.2 Table 2 of Annex 8 (EIAO-TM) specifies criteria for evaluating the importance of a site/habitat. This includes: Naturalness; Size; Diversity; Rarity; Re-creatability; Fragmentation; Ecological Linkage; Potential Value; Nursery/Breeding Ground; Age; and Abundance/Richness of Wildlife. These criteria have been considered when evaluating the importance of habitats recorded within the assessment area.

8.4.3 Table 3 of Annex 8 (EIAO-TM) specifies three criteria by which species conservation importance may be measured:

- Protection status (local – Hong Kong; Chinese; or international), making special reference to legally protected species and/or those under international conventions for conservation;
- Geographical distribution, with higher conservation value afforded to species with more restricted geographical ranges (locally or regionally). More weight shall be given to species which are endemic to Hong Kong or South China; and

- Rarity, with higher conservation value afforded to species which are internationally "rare" than to species which are only regionally or locally "rare".

8.4.4 For the purpose of this ecological assessment, species protection status is based on local, PRC and international legislation, standards and guidelines, outlined in **Section 8.2** above.

8.4.5 The assessment of faunal restrictedness and rarity has been based on the assessment by Fellowes *et al*. (2002), PRC and international legislation and publications (e.g. IUCN Red List of Threatened Species). Fellowes *et al*. (2002) examines the local (Hong Kong), regional (South China) and global restrictedness of native fauna species occurring in a wild state in Hong Kong, combined with an assessment of the vulnerability of populations, using the most reliable and up to date information available at the time of writing, and assigns a rating to each species accordingly. The following ratings are assessed: Local Concern (LC), Regional Concern (RC) and Global Concern (GC).

8.4.6 Some species are considered to be relatively secure in Hong Kong at present, but since the Hong Kong population is of regional or global importance, all Hong Kong localities are of potential regional and global importance, respectively. These species were therefore assigned as either Potential Regional Concern (PRC) or Potential Global Concern (PGC).

8.4.7 The Fellowes *et al*. (2002) assessment also considers restrictedness in nesting and/or roosting sites of a species. For the purpose of this ecological impact assessment would be assessed as of having conservation importance, if they were recorded nesting/roosting within the assessment area during the surveys.

Impact Significance

8.4.8 The potential ecological impacts arising from the Project were assessed following the criteria outlined in Table 1 of the EIAO TM Annex 8. This included:

- Habitat Quality – particular emphasis was given to the evaluation of habitats;
- Species – particular emphasis was given to the evaluation of species importance;
- Size/abundance – impacts of greater significance generally result where a larger habitat area or greater species numbers are affected;
- Duration – short-term and long-term impacts;
- Reversibility – consideration of temporary reversible and permanent irreversible impacts; and
- Magnitude – consideration of the magnitude and scale of the Project footprint.

8.4.9 This also included consideration of direct, indirect, secondary, cumulative, adverse and beneficial impacts of the proposed development on the ecological resources.

8.5 Description of the Environment

Recognized Sites of Conservation Importance

Lion Rock Country Park

8.5.1 Lion Rock Country Park (LRCP) situates in the upland region between North Kowloon and Sha Tin, and east of Kam Shan Country Park. LRCP was designated in 1977 and covers a total area of 557 ha. It comprises a narrow mountain range and the southern slopes are covered with thin vegetation, while the northern slopes are nourished by abundant streams and with rich diversity of flora (AFCD, 2019a). Approximately 198.88 ha of LRCP, including woodland (168.96 ha), mixed woodland (6.67 ha), plantation (1.69 ha), shrubland (14.11 ha), developed area (4.9 ha), natural watercourse (0.69 ha) and modified watercourse (1.86 ha) habitats, falls within the assessment area south to the existing LRT Road (refer to **60604728/R42b/Figure 8.2.1** to **60604728/R42b/Figure 8.2.5**).

8.5.2 According to previous EIA studies, several natural and artificial habitats including woodland, mixed woodland, shrubland, developed area and natural and modified watercourses were recorded within LRCP (CEDD, 2004, 2021; MTRC, 2011; WSD, 2014). LRCP contains various native plant species, including Chinese Red Pine (*Pinus massoniana*), Chinese Hackberry (*Celtis sinensis*), Schima (*Schima superba*), Ivy Tree (*Schefflera heptaphylla*) and various *Melastoma* species. Flora species of conservation importance Incense Tree (*Aquilaria sinensis*), Chinese New Year Flower (*Enkianthus quinqueflorus*), Butulang Canthium (*Canthium dicoccum*), Luofushan Joint-fir (*Gnetum luofuense*), Lamb of Tartary (*Cibotium barometz*), Hong Kong Eagle's Claw (*Artabotrys hongkongensis*), Small Persimmon (*Diospyros vaccinioides*), Hairy-fruited Ormosia (*Ormosia pachycarpa*), *Rhododendron* spp. and Ixonanthes (*Ixonanthes reticulata*) were also recorded. LRCP also supports various fauna species including avifauna Common Tailorbird (*Orthotomus sutorius*), dragonfly Wandering Glider (*Pantala flavescens*), and butterfly Tailed Jay (*Graphium agamemnon agamemnon*). Fauna species of conservation importance occurring in LRCP included avifauna Black Kite (*Milvus migrans*), Collared Scops Owl (*Otus lettia*), reptile Tokay Gecko (*Gekko gecko*), amphibian Lesser Spiny Frog (*Quasipaa exilispinosa*), Hong Kong Newt (*Paramesotriton hongkongensis*), odonate Club-tailed Cruiser (*Macromia urania*) Emerald Cascader (*Zygonyx iris insignis*) and Tawny Hooktail (*Paragomphus capricornis*), mammal Short-nosed Fruit Bat (*Cynopterus sphinx*), Japanese Pipistrelle *(Pipistrellus abramus*) and Rhesus Macaque (*Macaca mulatta*) (AFCD, 2006a; 2019a; CEDD, 2004, 2021; MTRC, 2011; WSD, 2014).

Beacon Hill Site of Special Scientific Interest

8.5.3 The Beacon Hill Site of Special Scientific Interest (SSSI) was designated in 1979 and it is situated in the upland region of Beacon Hill within LRCP. Part of Beacon Hill SSSI (approximately 34 ha) falls within the assessment area but outside the Project boundary at the hillslope southwest to the existing LRTR (refer to **60604728/R42b/Figure 8.1**). According to EPD (2005), the area was designated as a SSSI because of its rich floral diversity and the rare ferns and unusual orchids it contains.

Literature Review

Habitat and Vegetation

8.5.4 The previous study area of the EIA studies for CEDD (2004); MTRC (2011) and WSD (2014), and concurrent EIA studies for CEDD (2021) were partially overlaps with the current assessment area. A total of 12 habitats were previously recorded, namely woodland, mixed woodland, shrubby grassland/shrubland, fung shui woodland, plantation, active and abandoned agricultural land, village/orchard, developed area, pond, natural watercourses and modified watercourses (CEDD, 2004, 2021; MTRC, 2011; WSD, 2014). Habitats adjacent to the Project footprint included woodland, plantation, modified and natural watercourses, and developed area. A total of eleven flora species of conservation importance were recorded (**Table 8.11** and **Appendix 8.1** refer).

8.5.5 Most of the woodland are established on hillslopes within the assessment area, including those near the Sha Tin Water Treatment Works (STWTW), south of Sha Tin Road and within LRCP. These woodlands were dominated by native species Chinese Alangium (*Alangium chinensis*), Ivy Tree, Schima (*Schima superba*) and Lance-leaved Sterculia (*Sterculia lanceolata*). Two patches of mature woodlands were located near Sha Tin Wai. Common tree species were recorded, including *Ficus* spp., Chinese Hackberry and Camphor Tree (*Cinnamomum camphora*). Seven species of conservation importance recorded within woodland south of Sha Tin Road, including Butulang Canthium, Luofushan Joint-fir (*Gnetum luofuense*), Lamb of Tartary (*Cibotium barometz*), Hong Kong Eagle's Claw (*Artabotrys hongkongensis*), Small Persimmon, Hairy-fruited Ormosia (*Ormosia pachycarpa*) and Ixonanthes (*Ixonanthes reticulata*) outside Project footprint (CEDD, 2021). These woodlands are largely mature and supported moderate floral and faunal diversity, the ecological value was considered as moderate for woodland south of Sha Tin Road (CEDD, 2004, 2021), and high for woodlands near the STWTW and within LRCP to the south of LRTR (MTRC, 2011; WSD, 2014).

8.5.6 The mixed woodland to the south of Sha Tin Road within LRCP and south of Tsang Tai Uk was commonly dominated by plantation species and native species are also occasionally recorded regenerated. Mature exotic plantation species Taiwan Acacia (*Acacia confusa*) and Brisbane Box (*Lophostemon confertus*) were commonly recorded. With small tree or shrub species including Pop-gun Seed (*Bridelia tomentosa*) and Lance-leaved Sterculia (*Sterculia lanceolata*) in the understory, and herb species including Bracken Fern (*Pteridium aquilinum* var. *latiusculum*), Wood-fern (*Cyclosorus parasiticus*) and Common Lophantherum (*Lophatherum gracile*) were recorded in the understory. Five flora species of conservation importance including Incense Tree, Butulang Canthium, Small Persimmon, Luofushan Joint-fir and *Rhododendron* spp. were recorded within this mixed woodland outside Project footprint. The ecological value of mixed woodland with LRCP was considered as moderate, while the patch south to Tsang Tai Uk was considered as low (CEDD, 2021).

8.5.7 Two patches of woodlands were previously recorded surrounding the Stewards High Rock Centre (SHRC) and south to Sha Tin Tau Village with a few mature trees having a girth of over 1 m and up to 20 m tall (CEDD, 2004). These woodlands were relatively natural and contained high floral diversity but low faunal diversity. Common tree species including Chinese Banyan, Chinese Hackberry and Camphor Tree were recorded. These woodlands were disturbed by human and the ecological value was considered as low to moderate. These two woodlands were classified as fung shui woodland in previous EIA study (CEDD, 2004). However, these two woodlands were not recognized as fung shui woodlands under the territory-wide Fung Shui Woods survey by Yip *et al*. (2004) and in *Committee Paper NCSC 9/06 Fung Shui Woods in Hong Kong* (AFCD, 2006b). As referenced to AFCD (2006b), fung shui woodland is located behind some traditional villages, usually in crescent shape and with ecological features such as the presence of unique rare plant populations or old and significant specimen trees, land status, disturbance status and existing protection status. Considered the landscape, structural complexity and highly disturbed nature, these two woodlands were not considered as fung shui woodlands in the assessment.

8.5.8 A patch of shrubby grassland/shrubland was recorded on hillslope to the south of Sha Tin Road within LRCP. The ecological value of these habitats was considered as low to moderate (CEDD, 2004, 2021). Other habitats including plantation, active and abandoned agricultural land, village/orchard, developed area and pond within the previous study area only supported low diversity of flora and fauna species. Exotic species such as Taiwan Acacia and Lebbeck Tree (*Albizia lebbeck*) were commonly recorded. These habitats were largely affected by disturbance from road traffic and other human activities. Majority of these habitats were considered as having low ecological value, except the abandoned agricultural land at Sha Tin Tau Village and plantation south to Sha Tin Road within LRCP was considered as having low to moderate ecological value (CEDD, 2004, 2021).

8.5.9 A large number of natural watercourses were recorded within the assessment area, including Kwun Yam Shan Stream, watercourses at Tei Lung Hau, Ka Tin Court and within LRCP. This habitat was relatively natural and supported rich riparian vegetation (CEDD, 2004, 2021; MTRC, 2011; WSD, 2014). Several modified watercourses were recorded within the assessment area, including watercourse near STWTW and the catchwaters within LRCP. These modified watercourses were concreted, and only supported minimal vegetation and low faunal diversity. The ecological value of natural watercourses and modified watercourse were considered as moderate and low respectively.

Fauna

Avifauna

8.5.10 According to the previous studies (CEDD, 2021; MTRC, 2011; WSD, 2014), the majority of avifauna species recorded within the assessment area are common and widespread species, such as Red-whiskered bulbul (*Pycnonotus jocosus*), Japanese White-eye (*Zosterops japonica)* and Eurasian Tree Sparrow (*Passer montanus*). Eight avifauna species of conservation importance were recorded which the majority were recorded at secondary woodland near STWTW or within LRCP outside Project footprint (**Table 8.11** and **Appendix 8.1** refer). An ardeid night roosting site at the bank of Shing Mun River Channel near the Hong

Kong Heritage Museum were known to be active in 2017, 2018 and 2019, but inactive in winter 2019/2020 (AFCD, 2020b).

Butterfly and Odonate

8.5.11 The majority of recorded butterfly species are very common or commonly distributed within Hong Kong, such as Tailed Jay (*Graphium agamemnon Agamemnon*), Common Mormon (*Papilio polytes polytes*) and Red-base Jezebel (*Delias pasithoe pasithoe*). Five butterfly species of conservation importance were recorded at the secondary woodland or plantation near Tei Lung Hau or within LRCP, and also abandoned agricultural land outside Project footprint (CEDD, 2021; MTRC, 2011; WSD, 2014) (**Table 8.11** and **Appendix 8.1** refer).

8.5.12 The majority of odonate species recorded have an abundant or common distribution in Hong Kong, while watercourse habitat supported the highest diversity of odonate. Odonate species of conservation importance, including Emerald Cascader (*Zygonyx iris insignis*), Indochinese Copperwing (*Mnais mneme*) and White-banded Shadow Damsel (*Protosticta taipokauensis*) were recorded at the natural watercourse or plantation at Tei Lung Hau outside Project footprint (CEDD, 2021; MTRC, 2011; WSD, 2014) (**Table 8.11** and **Appendix 8.1** refer). Emerald Cascader was also recorded at modified watercourse within LRCP (i.e. WC1) outside Project footprint (WSD, 2014).

Herpetofauna

8.5.13 The majority of recorded herpetofauna were common or widely distributed species in Hong Kong, such as Asiatic Painted Frog (*Kaloula pulchra pulchra*) and Bowring's Gecko (*Hemidactylus bowringii*). Two amphibian (Lesser Spiny Frog (*Rana exilispinosa*) and Hong Kong Cascade Frog (*Amolops hongkongensis*)), and one reptile (Indo-Chinese Rat Snake (*Ptyas korros*)) species of conservation importance were previously recorded within natural watercourse habitat at Tei Lung Hau outside Project footprint (MTRC, 2011; WSD, 2014). Lesser Spiny Frog was also recorded at modified watercourse within LRCP (i.e. WC1) outside Project footprint (WSD, 2014). Hong Kong Newt was recorded at the natural watercourse at Mau Tsai Shan within LRCP (CEDD, 2020). Another reptile species of conservation importance, *Enhydris* sp. was recorded in abandoned agricultural land outside the project footprint (CEDD, 2021) (**Table 8.11** and **Appendix 8.1** refer).

Mammal

8.5.14 All of the recorded mammal species within assessment area were either abundant or common in Hong Kong. Nine mammal species of conservation importance were recorded in previous and concurrent studies outside Project footprint. Chinese Horseshoe Bat (*Rhinolophus sinicus*), Japanese Pipistrelle (*Pipistrellus abramus*), Rhesus Macaque (*Macaca mulatta*) and Pallas's Squirrel (*Callosciurus erythraeus*) were recorded at the secondary woodland or plantation near Tei Lung Hau and within LRCP. Japanese Pipistrelle was also recorded in other habitats such as developed area and abandoned agricultural land. This species was also recorded at modified watercourse within LRCP (i.e. WC1) outside Project footprint (WSD, 2014). Least Pipistrelle (*Pipistrellus tenuis*) and Chinese Pipistrelle (*Hypsugo pulveratus*) were recorded in plantation near Ka Tin Court. (**Table 8.11** and **Appendix 8.1** refer). An individual of Short-nosed Fruit Bat was recorded in mixed woodland to the south of Sha Tin Road, while an inactive roost of Short-nosed Fruit Bat (*Cynopterus sphinx*) was recorded south of the filter beds of STWTW (WSD, 2014). The roost was made on the fronds of Chinese Fan-palms (*Livistona chinensis*). However, during the verification survey of the same study, no active or inactive roost was recorded within STWTW (WSD, 2014). Quills of East Asian Porcupine (*Hystrix brachyura*) were found at the woodland near Tei Lung Hau (MTRC, 2011).

Freshwater Community

8.5.15 The freshwater fauna recorded were very common or common species in Hong Kong, such as fish Mosquito Fish (*Gambusia affinis*) and shrimp *Caridina cantonensis* (MTRC, 2011; WSD, 2014). One locally common freshwater fish species of conservation importance, Predaceous

Chub (*Parazacco spilurus*) was previously recorded at a natural watercourse near Ka Tin Court and outside the project footprint (WSD, 2014) (**Table 8.11** and **Appendix 8.1** refer).

8.6 Survey Findings

Habitat and Vegetation

8.6.1 A total of 11 habitat types were identified within the 500 m assessment area, namely woodland, mixed woodland, plantation, shrubland, village/orchard, active agricultural land, abandoned agricultural land, developed area, pond, natural watercourse and modified watercourse. Habitat maps and representative photographs of the habitats recorded within the assessment area are shown in **60604728/R42b/Figure 8.2.1** to **60604728/R42b/Figure 8.2.5** and **Appendix 8.2**. The sizes of these habitats within the Project boundary and assessment area are summarized in **Table 8.3**. The flora recorded during the ecological surveys are listed in **Appendix 8.3**. A total of 19 flora species of conservation importance were recorded within the assessment area, which 14 of them were recorded within LRCP (**Table 8.11** refers). The indicative locations and representative photographs of the species of conservation importance are presented in **60604728/R42b/Figure 8.2.1** to **60604728/R42b/Figure 8.2.5** and **Appendix 8.5** respectively.

8.6.2 As detailed in **Section 2.3**, the proposed improvement works of LRT include both aboveground works (e.g. widening works of LRTR and associated works, slope stabilization works, NTHMMs) and underground works (e.g. tunnel improvement works) underneath Lion Rock and Beacon Hill. The aboveground Project footprint (as presented in **60604728/R42b/Figure 8.4.1** to **60604728/R42b/Figure 8.4.5**) will largely follow the existing LRTR (i.e. developed area) with high level of human disturbance. Although a majority of the proposed works are located at developed area and outside LRCP, some aboveground works are unavoidably located within LRCP, including the roadside woodland at the engineered slope west to the Hung Mui Kuk Barbecue Area and south to Kak Tin Village, and plantation and developed area habitats along LRTR (refer to **60604728/R42b/Figure 8.2.3** to **60604728/R42b/Figure 8.2.5**). The proposed underground tunnel improvement works would be mainly located underneath woodland and shrubland habitats within LRCP.

Table 8.3 Area of Habitats Recorded within the Assessment Area

Habitat Type	Within Project Boundary		Within 500 m Assessment Area	
	Total Habitat Area (ha)	Percentage of Area	Total Habitat Area (ha)	Percentage of Area
Woodland	9.41	24.5%	252.23	43.3%
Mixed Woodland	2.44	6.3%	37.02	6.4%
Shrubland	2.7	7%	23.38	4%
Plantation	6.5	16.9%	33.68	5.8%
Village/Orchard	0.15	0.4%	12.89	2.2%
Active Agricultural Land	0	0%	0.57	0.1%
Abandoned Agricultural Land	0	0%	0.47	0.1%
Developed Area	17.13	44.5%	218.18	37.4%
Pond	0	0%	0.06	<0.1%
Natural Watercourse	<0.01 (~0.08 km)	<0.1%	1.39 (~7.0 km)	0.2%
Modified Watercourse	0.13 (~0.07 km)	0.3%	3.12 (~6.9 km)	0.5%
Total	**38.47**	**100.0%**	**582.99**	**100.0%**

Note:
The Project boundary covers both aboveground and underground works. The area of underground works is approximately 8.65 ha, i.e. woodland (5.73 ha), mixed woodland (0.58 ha), shrubland (2.02 ha), plantation (0.25 ha), developed area (0.02 ha) and modified watercourse (0.05 ha).

Woodland

8.6.3 The majority of woodlands straddle the hillside area at the south of LRTR, Sha Tin Road and STWTW, and partially fall within LRCP and Beacon Hill SSSI. These woodlands are mainly located outside the Project boundary, except the woodland margin immediate adjacent to LRTR. These woodlands comprised closed and continuous canopy of about 12-20 m tall, which dominated by native tree species Short-flowered Machilus (*Machilus breviflora*), Ivy Tree, China-berry (*Melia azedarach*) and Schima (*Schima superba*). Other plants included small trees or shrubs such as Hong Kong Hawthorn (*Rhaphiolepis indica*), Shining Eurya (*Eurya nitida*) and Wild Coffee (*Psychotria asiatica*) at the middle layer; and herbs Walking Maidenhair (*Adiantum caudatum*), Common Lophatherum (*Lophatherum gracile*) and Oriental Blechnum (*Blechnum orientale*) at the understorey. One flora species of conservation importance (Butulang Canthium) was recorded in close proximity to the Project footprint of NTHMMs (i.e. flexible barrier) at the slope fringe west to Sha Tin Tau New Village outside LRCP.

8.6.4 The woodland located between Lion Rock and Beacon Hill are mature with canopy of about 10-20 m tall. Part of this woodland is located above the Project footprint of underground works (i.e. tunnel improvement works). The majority of this woodland fall within LRCP and the western portion fall within Beacon Hill SSSI. It was dominated by native species including Ivy Tree, Lingnan Garcinia, Short-flowered Machilus and Schima. Small trees or shrubs such as Wild Coffee, Shining Eurya and Rough-leaved Holly were commonly recorded in the middle layer, while herbs and shrubs including Oriental Blechnum, Common Lophatherum, Composite Oplismenus (*Oplismenus compositus*) were recorded at the understorey. Three flora species of conservation importance including Butulang Canthium, Luofushan Joint-fir and Hong Kong Pavetta were recorded within LRCP within the Project footprint of underground works (i.e. tunnel improvement works).

8.6.5 Woodland to the west of Hung Mui Kuk Barbecue Area along LRTR within LRCP falls within the Project footprint. This woodland canopy was semi-closed, tree species including *Eucalyptus* spp., Brisbane Box (*Lophostemon confertus*), Yellow Cinnamomum (*Cinnamomum parthenoxylon*), Longan and Chinese Alangium were commonly recorded. Small trees and shrubs Chinese Privet (*Ligustrum sinense*), Wild Coffee and herbs *Wedelia trilobata*, Lantana (*Lantana camara*) and Guinea Grass were recorded at the understorey. Two flora species of conservation importance (one seedling of Incense Tree and seven young individuals of Butulang Canthium) were recorded in this woodland within the Project footprint. While individuals of other flora species of conservation importance, including three clumps of Luofushan Joint-fir, one seedling of Incense Tree and four individuals of Ailanthus, were recorded in this woodland but outside the Project boundary along LRTR. Among which, three clumps of Luofushan Joint-fir, one seedling of Incense Tree and one individuals of Ailanthus were recorded in close proximity to the proposed Project footprint of NTHMMs (i.e. rigid barrier) within LRCP.

8.6.6 A small patch of woodland within LRCP was recorded at the south of the existing LRT toll plaza outside Project footprint. This woodland comprised a closed canopy of about 10-20 m tall, dominated by native tree species Short-flowered Machilus, Common Red-stem Fig (*Ficus variegata*), Chinese Alangium and Turn-in-the-wind (*Mallotus paniculatus*). The understorey included small trees or shrubs such as Asiatic Ardisia (*Ardisia quinquegona*), Aporosa (*Aporusa dioica*) and Wild Coffee recorded at the middle layer; and herbs Panic Grass (*Panicum brevifolium*), Common Lophantherum and Oriental Blechnum. Two flora species of conservation importance, Incense Tree and Lamb of Tartary, were recorded in this woodland outside the Project boundary.

8.6.7 Another patch of woodland south to LRT portals at Sha Tin falls within the Project footprint of proposed slope stabilization works. This woodland comprised a semi-closed canopy and is about 8-15 m tall. The commonly recorded tree species included Turn-in-the-wind, Ivy tree, Lance-leaved Sterculia and *Machilus* spp. The understorey was relatively sparse with common shrubs Wild coffee, Shining Eurya and Aporosa recorded.

8.6.8 A small area of woodland at the west of the Lion Rock Tunnel Office (Transports Department), (between Shatin Portal and tunnel toll plaza, hereinafter refer to as “the LRT Office”) is located

within the Project footprint. This woodland has a semi-closed canopy and comprised common Elephant's Ear (*Macaranga tanarius* var. *tomentosa*), Lance-leaved Sterculia, Common Red-stem Fig and Ivy tree, Giant Alocasia (*Alocasia macrorrhizos*), Guinea Grass (*Panicum maximum*) and *Bidens alba*.

8.6.9 Woodlands located at the valley southwest to Lion Rock, south of Beacon Hill SSSI and near the Kowloon portal were less mature with canopy of about 5-9 m tall. The majority of these woodlands is located outside the Project boundary. It was dominated by native species including Ivy Tree, Lingnan Garcinia (*Garcinia oblongifolia*) and Turn-in-the-wind. Small trees or shrubs such as Rough-leaved Holly (*Ilex asprella*), Desmos and Hairy Fig (*Ficus hirta*) were commonly recorded in the middle layer, while herbs and shrubs including Dianella (*Dianella ensifolia*), Composite Oplismenus (*Oplismenus compositus*) and Wild Coffee were recorded at the understorey.

8.6.10 The woodland at Hung Mui Kuk Village was relatively isolated by surrounding developed area, but it was mature with rich flora structural complexity. The canopy was 10-15 m tall, with commonly recorded tree Wood-oil Tree (*Vernicia montana*), Lychee (*Litchi chinensis*), Rose Apple (*Syzygium jambos*) and Turn-in-the-wind. The middle and understorey layers were sparely covered with Desmos (*Desmos chinensis*), Common Lophatherum and Simple Pronephrium (*Pronephrium simplex*).

8.6.11 Woodland located behind Sheung Keng Hau Village was subjected to disturbance from nearby residential areas (e.g. glare and noise). It was mature and heavily shaded with native trees including Microcos (*Microcos nervosa*), Lance-leaved Sterculia and Longan (*Dimocarpus longan*) of about 8-14 m in height. Shrub species such as Chinese Alangium, Wild Coffee and Chinese Privet were commonly recorded in the middle layer, while herb species such as Giant Alocasia and Wood-fern (*Cyclosorus parasiticus*) were recorded in the sparse understorey.

8.6.12 The isolated woodland surrounding the SHRC and south to Sha Tin Tau Village were small in size and highly disturbed (e.g. by regular slope stabilization works, anthropogenic activities from nearby villages, etc.). The tree species in these woodlands were relatively mature and the canopy was semi-closed. Several recorded tree Small-leaved Aphananthe (*Aphananthe cuspidata*) and Yellow Cinnamomum (*Cinnamomum parthenoxylon*) were up to 20 m height. In the middle layer, shrub or subshrub Sarcandra and Shining Eurya were recorded.

8.6.13 Within the Project boundary, the woodland margin adjacent to LRTR (partially within LRCP) and Sha Tin Road, woodland south to LRT portals at Sha Tin and woodland at the west of LRT Office experienced continuous disturbance (e.g. traffic noise and emission from LRTR and Sha Tin Road, regular vegetation maintenance at engineered slope, commemorative activities at burial grounds and recreational activities by country park users or villagers). Outside Project boundary, woodland at Hung Mui Kuk Village, woodland behind Sheung Keng Hau Village, woodland surrounding the SHRC and south to Sha Tin Tau Village experienced continuous disturbance including littering and noise and commemorative activities at burial grounds.

Mixed Woodland

8.6.14 Scattered mixed woodlands within assessment area were mainly developed from plantation through natural succession. Most of them were located adjacent to developed or village areas and subjected to relatively high level of human disturbance (e.g. commemorative activities, traffic noise, construction works nearby). Part of the mixed woodland near Kak Tin Village along the LRTR falls within the Project footprint. One flora species of conservation importance, Ailanthus (*Ailanthus fordii*), was recorded in this mixed woodland within the Project footprint. The canopy of this habitat ranged between 10-15 m, which was dominated by a mix of exotic and native tree species including Taiwan Acacia, Schima (*Schima superba*), Longan and Chinese Hackberry. The understorey was very sparse and consisted of Oblong-leaved Litsea, Rough-leaved Holly, Wild Coffee and *Wedelia trilobata*.

8.6.15 The mixed woodland east to the Lion Rock High Level No. 2 Primary Service Reservoir fall within the Project footprint. The canopy of this habitat ranged between 6-11 m, with a mix of exotic and native tree species including *Eucalyptus* spp., Ivy Tree and Chinese Alangium.

Commonly recorded plants at the bottom layer included Dichotomy Forked Fern and Oriental Blechnum.

8.6.16 Mixed woodlands on the engineered slopes along LRTR fall within the Project boundary. The canopy was semi-closed and comprised a mixture of exotic plantation and native species. Exotic plantation species including Taiwan Acacia, *Eucalyptus* spp., Brisbane Box (*Lophostemon confertus*) and native tree species Yellow Cinnamomum, Longan, Chinese Alangium and Schima were commonly recorded. Small trees and shrubs Chinese Privet, Wild Coffee and herbs *Wedelia trilobata*, Lantana (*Lantana camara*) and Guinea Grass were recorded at the understorey. Four flora species of conservation importance were recorded within the Project boundary outside LRCP. Ailanthus (*Ailanthus fordii*) and Luofushan Joint-fir were recorded at the mixed woodland east to Hung Mui Kuk Barbecue Area. Butulang Canthium and Hong Kong Pavetta (*Pavetta hongkongensis*) were recorded in mixed woodland to the southeast of Kak Tin Village.

8.6.17 Mixed woodland south to Sha Tin Road (i.e. at the slope toe of Mau Tsai Shan) falls within LRCP outside the Project boundary. The canopy was closed, which commonly recorded trees included plantation species Taiwan Acacia, *Eucalyptus* spp. and Brisbane Box, and native species Chinese Hackberry, Yellow Cinnamomum, Lance-leaved Sterculia and Longan. Small tree or shrub species Pop-gun Seed and Shining Eurya, and herbs Wood-fern and Common Lophantherum were recorded in the understorey. These mixed woodlands were subjected to disturbance from traffic emission, noise and regular vegetation management.

8.6.18 Some hillside mixed woodland patches (e.g. south to Sha Tin Tau New Village, near Reunification Pavilion, northeast of Lion Rock Park, south of Beacon Hill SSSI and near the Kowloon portal) were more mature. The mixed woodland south to Sha Tin Tau New Village, and part of mixed woodlands near Reunification Pavilion and south of Beacon Hill SSSI fall within LRCP. The canopy was about 8-15 m and mainly closed and dominated by exotic Taiwan Acacia, *Eucalyptus* spp., native Schima, Ivy Tree and Aporosa (*Aporosa dioica*). Herb species such as Wood-fern and seedling of shrub species such as Oblong-leaved Litsea and Wild Coffee were commonly recorded at the understorey.

8.6.19 Other isolated mixed woodlands near developed area and residential areas were generally dominated by exotic tree species Taiwan Acacia, *Eucalyptus* species, and some native Chinese Banyan and Schima. Shrub and small tree species including Microcos, Wild Coffee, and herb species such as Oriental Blechnum, Chinese Brake (*Pteris multifida*) and Fan-leaved Maidenhair (*Adiantum flabellulatum*) were frequently recorded in the understorey. These mixed woodlands were highly disturbed by human activities nearby and some of which were isolated by surrounding developed areas.

Plantation

8.6.20 Plantation habitats scattered along roadside, on engineered slopes or interspersed among developed areas, while some of this habitat fall within the Project boundary and footprint. These plantations were usually dominated by exotic species such as Taiwan Acacia, Ear-leaved Acacia (*Acacia auriculiformis*), Horsetail Tree (*Casuarina equisetifolia*), but native species such as Chinese Banyan, Lance-leaved Sterculia and Rose Apple were also recorded occasionally. The common flora at understorey included Oblong-leaved Litsea, Oriental Blechnum and *Wedelia trilobata*. Within Project boundary, four flora species of conservation importance were recorded outside LRCP. Rhodoleia were recorded at the plantation near Lung Cheung Road Park. Butulang Canthium were recorded at the plantation southeast to Kak Tin Village and west to Sha Tin Tau New Village. Luofushan Joint-fir was recorded at the engineered slope west to Sha Tin Tau New Village. Ailanthus was recorded at plantation south to Kak Tin Village, near Sun Tin Wai Estate and along LRTR. Some individuals of these species fall within the Project footprint outside LRCP.

8.6.21 Part of the plantation on engineered slope south and north to LRT portals at Sha Tin and Kowloon fall within the Project footprint of slope stabilization works respectively. This plantation comprised simple flora structure, with exotic plantation species Taiwan Acacia and *Eucalyptus* spp. commonly recorded at the canopy. The understorey was sparse and common shrub Wild

coffee, Chinese Privet and herb Dichotomy Forked Fern were recorded. This habitat was subjected to disturbance from nearby traffic (e.g. noise, dust, glare).

8.6.22 Some plantations slopes along the LRTR are located within LRCP and fall within the Project boundary, part of which also located within Project footprint. This habitat was created due to slope formation works at least 20-30 year ago and sparse with simple floral structure. Vegetation recorded included Taiwan Acacia, Brisbane Box and Paper-bark Tree (*Melaleuca cajuputi cumingiana*), and a few native species such as Chinese Banyan (*Ficus microcarpa*) and *Machilus* spp. were also recorded. The understorey only supported limited vegetation, such as *Wedelia trilobata*, Panic Grass (*Panicum repens*) and Dichotomy Forked Fern. Regular slope maintenance works were recorded within this habitat. Two flora species of conservation importance were recorded within Project boundary. Luofushan Joint-fir was recorded at plantation slope near the LRT portals at Sha Tin within LRCP and Butulang Canthium was recorded at the plantation slope east to Hung Mui Kuk Barbecue Area within LRCP outside Project footprint.

Shrubland

8.6.23 Shrubland habitat was located on hillslope at Mau Tsai Shan near Shui Chuen O Estate, south of the Beacon Hill view compass and at southwest to Lion Rock. Majority of shrubland falls within LRCP, except part of the shrubland to the south of the Beacon Hill view compass and southwest to Lion Rock. This habitat has a simple floral structure and the very sparse ground layer consisted of typical shrub or subshrub species such as Common Melastoma (*Melastoma malabathricum*), Blood-red Melastoma (*Melastoma sanguineum*), and herb species Dichotomy Forked Fern and Guinea Grass. Graves were recorded at shrubland at Mau Tsai Shan. Hiking trails were recorded within the shrubland at Mau Tsai Shan, south of the Beacon Hill view compass and southwest to Lion Rock (i.e. including those above the Project footprint of tunnel improvement works and within LRCP). Thus, these shrubland were subjected to human disturbance (e.g. country park users, commemorative activities).

8.6.24 A small patch of shrubland north to LRT portals at Kowloon falls within the Project footprint. The canopy of this habitat was mainly open and the structure was simple. Common shrubland species including Chinese Red Pine, Hong Kong Gordonia (*Polyspora axillaris*) and Rose Myrtle (*Rhodomyrtus tomentosa*) were recorded. Understorey comprised bare ground or sparse ground layer with Dichotomy Forked Fern (*Dicranopteris pedate*).

Active Agricultural Land

8.6.25 Small pieces of active agricultural land were identified in Sha Tin Tau Village and near Sha Tin South Fresh Water Service Reservoir (STSFWSR). Crop species including Sweet Potato (*Ipomoea batatas*), Night-blooming Cereus (*Hylocereus undatus*) and Taro (*Colocasia esculenta*) were planted. Fruit trees such as Common Banana (*Musa* x *paradisiaca*) and Papaya (*Carica papaya*) were also recorded. Herb species such as Hilo Grass (*Paspalum conjugatum*) and Uni-spike Kyllinga (*Kyllinga nemoralis*) grew on the field bunds.

Abandoned Agricultural Land

8.6.26 A plot of abandoned agricultural land was located adjacent to the active agricultural land in Sha Tin Tau Village. Only limited crops or fruit trees were recorded. The land was found to be waterlogged and overgrown with common herb species Blunt Signal-grass (*Brachiaria mutica*), Mile-a-minute (*Mikania micrantha*), Nut-grass Glaingale (*Cyperus rotundus*) and *Wedelia trilobata*.

Village/Orchard

8.6.27 The village/orchard habitat refers to areas with low-rise village housings and interspersed with orchard. They are located near Sha Tin Tau New Village, Hung Mui Kuk Village and Kak Tin Village. This habitat was dominated by fruit trees such as Longan, Lychee, Papaya and

Common Banana. Horticultural plants including Chinese Fan-palm, Brazil Bougainvillea (*Bougainvillea spectabilis*) and Orange-jessamine (*Murraya paniculata*) were also recorded.

Developed Area

8.6.28 The assessment area was dominated by developed areas, comprising roads (e.g. LRTR and Sha Tin Road), urban parks, residential areas, STWTW and other public facilities. Dominant species recorded at roadside or planting areas included tree species Taiwan Acacia, Camel's Foot Tree (*Bauhinia variegata*), Chinese Banyan and Flame Tree (*Delonix regia*). Horticultural species Red Strap Flower (*Loropetalum chinense*), Pink Powder Puff (*Calliandra haematocephala*), and *Wedelia trilobata* were also commonly recorded. This habitat was frequently subjected to human disturbance such as traffic noise, utilities and vegetation maintenance works and other anthropogenic activities.

8.6.29 Along LRTR, some shotcrete slopes fall within the Project boundary and Project footprint including those to be occupied by the NTHMMs. Some of them were also located within LRCP. These engineered slopes supported limited floral species, including Opposite-leaved Fig, White Popinac (*Leucaena leucocephala*), Guinea Grass. Climbers recorded on the highly disturbed slope toes included Diverse-leaved Creeper (*Parthenocissus dalzielii*) and Creeping Fig (*Ficus pumila*). Other engineered slopes within assessment area were located near residential areas, with common trees Taiwan Acacia, Chinese Banyan, Tree Cotton (*Bombax ceiba*); shrubs Pop-gun Seed (*Bridelia tomentosa*), Oblong-leaved Litsea and Golden Dewdrops (*Duranta erecta*) recorded. Two flora species of conservation importance (Butulang Canthium and Ailanthus) were recorded within Project boundary outside LRCP. Ailanthus were recorded outside LRCP at engineered slope along LRTR south to Fung Shing Court, north to Hung Mui Kuk Barbecue Area, south to Kak Tin Village and south of Sun Tin Wai Estate within Project footprint. Ailanthus and Butulang Canthium were also recorded in close proximity to the Project footprint of NTHMMs (i.e. flexible barrier) at the slope fringe west to Sha Tin Tau New Village outside LRCP.

Pond

8.6.30 A few small inactive ponds are located near the village housing at Sha Tin Tau New Village. This habitat only supported limited vegetation at the concrete pond bund, including horticultural species Iron Plant (*Cordyline fruticosa*), Brazil Bougainvillea and some fruit trees such as Papaya and Common Banana. No flora species of conservation importance were recorded.

Natural Watercourse

8.6.31 The natural watercourses within the assessment area largely originate from uphill areas of Lion Rock and Beacon Hill. A total of eight permanent-flowing natural watercourses were identified within the assessment area, namely S1-S8 (as shown in **60604728/R42b/Figure 8.2.1** to **60604728/R42b/Figure 8.2.5**). The above natural watercourses have moderate to fast flow rate and mainly comprised of natural sandy and/or rocky substratum. The lower sections of these natural watercourses are mostly modified, either being channelized or discharged into underground culverts (**Section 8.6.38** refers).

S1 and S2

8.6.32 S1 is situated in a woodland at Mau Tsai Shan (partially falls within LRCP) and ranged from 1-3 m wide and 0.5-1 m deep, with moderate flow rate and comprised of natural sandy and rocky substratum. It was covered by a relatively closed canopy comprising of Ivy Tree, Japanese Superb Fig, Chinese Elaeocarpus (*Elaeocarpus chinensis*) and Turn-in-the-wind (*Mallotus paniculatus*). Limited signs of human disturbance (e.g. littering) were observed but the water quality was good in general.

8.6.33 S2 originates from the hillslope area of Lion Rock and gradually runs through the Sha Tin Tau New Village. S2 ranged from 2-5 m in width, 0.2-1 m in depth, and was relatively natural at the upper section within woodland habitat. The banks of S2 running through Sha Tin Tau New Village were modified to concrete wall, nevertheless, natural rocky substratum was retained.

The upper section comprised of semi-closed canopy of native tree species such as Chekiang Machilus (*Machilus chekiangensis*), Ivy Tree and Lance-leaved Sterculia. The canopy became exposed when passing through the village area.

S3, S4 and S5

8.6.34 S3 runs from hillside area (partially falls within LRCP) towards Kak Tin Village and joins another watercourse S4 near Hung Mui Kuk Village. S5, which is largely located within LRCP, joins two tributaries from the hillside region near Hung Mui Kuk Barbecue Area. All these watercourses eventually discharge into modified channel or box culvert. S3, S4 and S5 ranged from 0.5-1.5 m wide and 0.5-1 m deep, with low to moderate flow and comprised of natural sandy and rocky substratum. A short section of S5 falls within the Project boundary at the west of Hung Mui Kuk Barbecue Area, this section of S5 only received fluctuating water flow with 0.1-0.3 m deep and eventually discharge into modified watercourse Culvert 1. In general, these watercourses were semi-shaded and dominated by Chekiang Machilus, Japanese Superb Fig, *Saurauia tristyla* and Fragrant Litsea, and climbers such as Wood Gossip Caesalpinia (*Caesalpinia crista*) and Bentham's Rosewood (*Dalbergia benthamii*) were also commonly recorded at riparian zone. Signs of human disturbance (e.g. channelization, littering) were observed to be more frequent at S3 near Kak Tin Village north of LRTR and S4.

S6, S7 and S8

8.6.35 S6, S7 and S8 originate from the hillslope area from Lion Rock or Beacon Hill and are largely located within LRCP. S7 and S8 also partially fall within Beacon Hill SSSI. S7 eventually flows into a nullah at an engineered slope crest above the LRT Shatin portals, while S6 and S8 are running towards Tei Lung Hau. S6 ranged from 1.5-3 m wide and 0.5-1.5 m deep and comprised of natural rocky substratum, with moderate to fast flow and runs through a mixed woodland to the south of Ka Tin Court. Some tributaries could be found in the upstream of S6 to the southeast of WC1, but no obvious signs of permanently-flowing tributaries were recorded above the Project site of proposed underground tunnel improvement. The condition of tributaries was largely similar to the mainstream of S6. Part of the S6 runs underground through box culvert under LRTR. Anthropogenic disturbance such as littering and noise were recorded at the lower section of S6 near Ka Tin Court north of LRTR. The riparian vegetation was dominated by Chinese Alangium, Opposite-leaved Fig and Japanese Superb Fig.

8.6.36 S7 ranged from 0.5-1 m wide and 0.3-0.5 m deep with moderate flow rate, and comprised of natural sandy and rocky substratum. The small section of S7 near an engineered slope crest above the LRT Shatin portals is located approximately 20 m from the Project footprint and would not be directly affected by construction works. Trees such as Lance-leaved Sterculia, Ivy Tree, Japanese Superb Fig, and herbs such as Oriental Blechnum and Wood-fern were recorded at the relatively dense riparian zone. The upper section of S8 is generally natural and became channelized at the section to east of STSFWSR. It ranged from 0.5-2 m wide and 0.3-1 m deep, comprised of natural sandy and rocky substratum and shaded by trees such as Ivy Tree, Chinese Alangium and Japanese Superb Fig. The lower section of S8 at Tei Lung Hau was exposed to moderate human disturbance (e.g. littering, construction of concrete blocks for water crossing) from nearby Ka Tin Court. Two flora species of conservation importance, Lamb of Tartary and Bottlebrush Orchid (*Goodyera procera*), were recorded in S7 within Project boundary outside LRCP.

Other Natural Watercourses

8.6.37 Other natural watercourses within the assessment area were mainly seasonal watercourses at hillside region, such as SW1, SW2, SW3 and SW4 within LRCP. These seasonal watercourses are predominantly dry and no evident surface flow was observed during dry and wet seasons. The natural sections of SW1 and SW2 are approximately 1 to 2 m in width and with rocky substrate, but SW2 were modified into Culvert 2 at section near LRTR. Flora species recorded in riparian zones included Ivy Tree, Chinese Alangium and Turn-in-the-wind. SW3 was heavily overgrown by small tree/shrub and herbs such as Oblong-leaved Litsea, Wild coffee and Oriental Blechnum at the understorey. No water flow was recorded at this watercourse. SW4 is also overgrown by small tree/shrub and herbs such as Rough-leaved Holly, Oblong-leaved

Litsea, Giant Alocasia and Common Lophatherum at the understorey, and eventually links to a modified watercourse WC8. No water flow was recorded within this watercourse.

Modified Watercourse

8.6.38 Several modified watercourses (WC1 to WC7), including a channelized watercourse near STWTW, STSFWSR and Jade Garden, and some narrow nullahs near Sha Tin Tau Village were recorded. WC1 is a concretized rectangular catchwater located within LRCP of about 2-6 m wide of 2-3 m deep. WC2, which located at the southeast of Ha Keng Hau, is a small concrete step-channel of approximately 2 m wide with very limited water flow.

8.6.39 A small concrete nullah WC3 was recorded south to the LRT toll plaza, which a small section of WC3 would be located within the Project footprint. This nullah was approximately 1-1.5 m wide, with concrete banks and discharges to an underground culvert. No water flow was observed at this modified watercourse. Only limited plant species were recorded at the two sides of watercourse, including *Bidens alba*, Mile-a-minute Weed (*Mikania micrantha*) and Common Lophatherum. Other nullah (WC4) and concrete step-channel (WC5, WC6 an WC7) were recorded within the Project boundary to the west of the Lion Rock Park. These modified watercourses were approximately 1-2 m wide, with concrete banks and connected to an underground culvert. These watercourses received shallow water occasionally and only limited plant species such as *Bidens alba* and Mile-a-minute Weed were recorded at the two sides of watercourse.

8.6.40 The channelized watercourse near STWTW, STSFWSR, Jade Garden ranged from 4-10 m wide and 2-4 m deep, and these watercourses only contained limited water flow. Only few vegetation such as Giant Alocasia and Blunt Signal-grass were occasionally recorded. No flora species of conservation importance was recorded in this habitat.

8.6.41 Some culverts (Culverts 1-3) situate within LRCP along LRTR but all of these culverts would not be directly affected under the Project. As the proposed elevated highway structure will span over the Culvert 1 and no construction works would be encroached into the channel bed of Culvert 1, Culvert 1 within LRCP would not be directly affected. Culvert 1 received fluctuating water flow from natural watercourses (S5), while Culvert 2 and Culvert 3 may only receive water from seasonal watercourse (SW2 and SW3) occasionally. These culverts were concrete banks of approximately 3-4 m wide and 5 m deep and gradually become underground culvert. Only limited vegetation such as Giant Alocasia and Blunt Signal-grass were occasionally recorded. A modified watercourse WC8 linked to SW4 is a dry nullah of 1.5 m wide within LRCP. No vegetation was recorded within this watercourse.

Terrestrial Fauna

8.6.42 The sections below outline the findings of current fauna surveys. Lists of fauna species recorded from the assessment area are provided in **Appendix 8.3**. The habitat in which the species of conservation importance were recorded, their protection status and distribution in Hong Kong are presented in **Table 8.11**. Their indicative locations are presented in **60604728/R42b/Figure 8.2.1** to **60604728/R42b/Figure 8.2.5**.

Avifauna

8.6.43 A total of 70 avifauna species were recorded within the assessment area, during the ardeid night roost and pre-roost survey, 21 of which are species of conservation importance (**Table 8.11** refers). Most of these recorded species are common and widespread in Hong Kong. The highest abundance and diversity of avifauna species were recorded within the woodland habitat. Raptors such as Black Kite (*Milvus migrans*), Bersa (*Accipiter virgatus*) and Eastern Buzzard (*Buteo japonicus*) were recorded at flight above the woodland habitat.

8.6.44 About a half of 21 recorded avifauna species of conservation importance were recorded in woodland habitat within LRCP, while only two species including Little Egret (*Egretta garzetta*) and Orange-bellied Leafbird (*Chloropsis hardwickii*) were recorded within Project boundary and

Project footprint. An individual of Little Egret was recorded foraging at the modified watercourse WC1 within the Project footprint of tunnel improvement work within LRCP. An individual of Orange-bellied Leafbird was recorded roosting at woodland habitat within the Project footprint outside LRCP. Juveniles of Collared Scops Owl and individuals of Orange-bellied Leafbird were recorded in woodland to the north of STSFWSR. Wetland dependent species Little Egret was recorded in village/orchard habitat at Sha Tin Tau New Village and modified watercourse WC1 outside the Project boundary.

Ardeid Night Roost and Pre-Roost

8.6.45 Ardeids were observed utilizing trees along the northern bank of SMRC as night roosting site, which is located approximately 630 m from the nearest Project boundary. A total of 16 Little Egret, 18 Great Egret, two Chinese Pond Heron and two Grey Heron were recorded at section between Hong Kong Heritage Museum and Man Lai Court (**60604728/R42b/Figure 8.3.1** and **Table 8.4** refer). Some individuals of Grey Heron roosted at the rooftop of HKHM. Pre-roosting behavior was observed at the channel bank or at the trees near Man Lai Court outside the assessment area. Majority of the ardeids returned to the night roost approximately within 30 minutes before or after sunset. The ardeids roosted on trees including Chinese Banyan, White Popinac and Taiwan Acacia with height ranged 8-16 m. In addition, no roosting behaviour of Black-crowned Night Heron was recorded during daytime.

Table 8.4 Number and Species of Night Roost Ardeid Recorded during Ardeid Night Roost and Pre-Roost Survey

Date	Species Recorded					Time of Return	Tree Species that Ardeid Night Roost Recorded
	Little Egret	Great Egret	Chinese Pond Heron	Grey Heron	Total		
Along Shing Mun River Channel							
Feb 2020	8	9	2	2	21	17:43-18:40	Chinese Banyan, White Popinac
Apr 2020	7	7	0	0	14	18:25-19:09	Chinese Banyan, White Popinac, Taiwan Acacia
Jun 2020	1	2	0	0	3	19:10-19:23	White Popinac
Sub-total	*16*	*18*	*2*	*2*	*38*		
Hong Kong Heritage Museum Rooftop							
Feb 2020	0	0	0	9	9	17:50-18:27	
Apr 2020	0	0	0	2	2	18:43-18:47	
Jun 2020	0	0	0	0	0		
Sub-total	*0*	*0*	*0*	*11*	*11*		
Total	**16**	**18**	**2**	**13**	**49**		

8.6.46 Flying ardeids with obvious flight path to the night roost along SMRC were observed. A total 11 ardeids were recorded flew from Tai Wai direction to their night roosting trees; and a total 25 ardeids were recorded flew from Tolo Harbour direction to the night roosting trees (**60604728/R42b/Figure 8.3.1** and **Appendix 8.6** refers). Eleven Grey Heron were recorded flew from Tolo Harbour direction towards the night roost site at the HKHM rooftop, while two Grey Heron flew from Tai Wai direction. No obvious ardeid flight movement was observed from/to the direction of proposed Project boundary (i.e. south or southeast).

Butterfly

8.6.47 A total of 64 butterfly species were recorded within the assessment area, seven of which are species of conservation importance (**Table 8.11** refers). Most of these species are either common or very common in Hong Kong, such as Red Helen (*Papilio helenus helenus*), Indian Cabbage White (*Pieris canidia canidia*) and Pale Grass Blue (*Pseudozizeeria maha serica*). Most of the butterfly species of conservation importance were recorded in woodland within LRCP outside the Project boundary and Project footprint, including White-banded Flat (*Gerosis phisara*), Plain Hedge Blue (*Celastrina lavendularis limbata*) and Baron (*Euthalia aconthea aditha*). Small Yellow Sailer (*Neptis miah nolana*) was recorded in the mixed woodland north to Hung Mui Kuk Village, and Metallic Cerulean (*Jamides alecto alocina*) was recorded in abandoned agricultural land in Sha Tin Tau Village. All species were recorded in low abundance.

Odonate

8.6.48 A total of 18 species of odonate were recorded, seven of which are species of conservation importance (**Table 8.11** refers). Two odonate including Chinese Yellowface (*Agriomorpha fusca)* and Small Clubtail (*Stylogomphus chunliuae*) were recorded within the Project boundary but outside Project footprint. Majority of these recorded species are common and widespread in Hong Kong, such as Indigo Dropwing (*Trithemis festiva*), Common Blue Skimmer (*Orthetrum glaucum*) and Common Blue Jewel (*Rhinocypha perforata*). Chinese Yellowface and nymph of Small Clubtail were recorded at natural section of S7 outside Project footprint. Individuals of teneral Tawny Hooktail (*Paragomphus capricornis*) were recorded at WC1 within LRCP outside Project boundary, while the nymph of Small Clubtail were recorded at S5 outside Project boundary and the natural section of S7 outside Project footprint, suggesting they may utilize these watercourses as their breeding ground.

Herpetofauna

8.6.49 A total of nine amphibian and 10 reptile species were recorded within the assessment area (**Table 8.11** refers). Most of the recorded species are common and widely distributed in Hong Kong, such as Common Toad (*Duttaphrynus melanostictus*), Gunther's Frog (*Hylarana guentheri*) and Chinese Gecko (*Gekko chinensis*). Three amphibian and five reptiles are species of conservation importance. All herpetofauna species of conservation importance were recorded in natural watercourse habitat outside Project footprint, including Hong Kong Newt, Short-legged Toad (*Megophrys brachykolos*), Brown Forest Skink (*Sphenomorphus incognitus*) and Chines Water Dragon (*Physignathus cocincinus*). An individual of Indian Forest Skink (*Sphenomorphus indicus*) and Tokay Gecko was recorded in woodland west of Sha Tin Tau New Village and developed area southwest to STSFWSR, respectively, within Project boundary but outside Project footprint. Tadpoles of Lesser Spiny Frog (*Quasipaa exilispinosa*) were recorded at the natural section of S7 near freshwater sampling point SP7 within Project boundary but outside Project footprint, which may suggest this stream section serves as a potential breeding ground of the Lesser Spiny Frog.

Mammal

8.6.50 A total of 12 mammal species were recorded within the assessment area, ten of which are species of conservation importance (**Table 8.11** refers). Most of the recorded species are common or abundant in Hong Kong. A total of seven bat species were recorded, they were mostly found at woodland in LRCP or Sha Tin Tau New Village outside Project footprint, such as Intermediate Horseshoe Bat (*Rhinolophus affinis*), Himalayan Leaf-nosed Bat (*Hipposideros armiger*) and Japanese Pipistrelle (*Pipistrellus abramus*). An individual of Lesser Bamboo Bat (*Tylonycteris pachypus*) known to roost in bamboo stands was recorded by ultrasonic device at woodland near the LRT toll plaza outside the Project footprint. Lesser Bamboo Bat was recorded only once during the survey and no physical sightings of this bat nor its roost were observed within the Project footprint. Groups of Rhesus Macaque (*Macaca mulatt*) were recorded foraging in different habitats including the woodland adjacent to STSFWSR and some plantation area outside Project boundary and Project footprint.

Freshwater Community

8.6.51 A total of 37 aquatic fauna species were recorded within the assessment area, six of which are species of conservation importance recorded outside Project footprint (**Table 8.11** refers). Most of these recorded species are common in Hong Kong. Typical native hillstream fish species such as Flat-headed Loach *(Oreonectes platycephalus*), Broken-band Hillstream Loach (*Liniparhomaloptera disparis*), and invertebrate such as shrimp *Caridina cantonensis* and insect larvae (e.g. mayfly, dragonfly and caddisfly) were mainly recorded in the natural watercourses within LRCP, including sections that are close to the Project boundary (e.g. section of S5 to the west of Hung Mui Kuk Barbecue Area). While exotic fish species such as Guppy (*Poecilia reticulata*) and Swordtail (*Xiphophorus hellerii*) were mainly recorded in modified watercourse, where village houses and human disturbance (e.g. littering, domestic discharge) could be found nearby. Culvert 3 within LRCP was observed to receive water occasionally, however, no freshwater fauna was recorded during the survey.

8.6.52 Freshwater fauna species of conservation importance such as *Caridina serrata*, the endemic Hong Kong Freshwater Crab (*Nanhaipotamon hongkongense*) and nymph of the locally common Small Clubtail were recorded in S5 outside Project boundary and Project footprint. The latter was also recorded in S7 (outside Project footprint) (as stated in **Section 8.6.48**). Individuals of Predaceous Chub were recorded at S5 and S6 outside Project boundary, while *Cryptopotamon anacoluthon* were recorded in S2 outside Project boundary and lower section of S7 outside Project footprint.

8.7 Ecological Value

8.7.1 The ecological importance of recorded habitats was evaluated in accordance with the EIAO-TM Annex 8 criteria and presented in **Table 8.5** to **Table 8.10** below. Species of conservation importance identified from current survey findings and literature review of previous studies (including those in **Table 8.1**) are summarized in **Table 8.11** and representative photographs are presented in **Appendix 8.5**.

Table 8.5 Ecological Evaluation of Woodland within the Assessment Area

Criteria	Woodland
Naturalness	The majority of woodland (including LRCP and Beacon Hill SSSI) is natural.
Size	Very large (252.23 ha)
Diversity	High floral and moderate faunal diversity
Rarity	A fairly common habitat in Hong Kong. Current Surveys 14 flora species of conservation importance (Ailanthus, Incense Tree, Hong Kong Eagle's Claw, Silver-back Artocarpus, Butulang Canthium, Lamb of Tartary, Small Persimmon, Luofushan Joint-fir, Ixonanthes, Hairy-fruited Ormosia, Hong Kong Pavetta, *Aralia chinensis*, Red Azalea and Hairy Chestnut) were recorded. 31 fauna species of conservation importance (Black Kite, Crested Goshawk, Collared Scops Owl, Speckled Piculet, Black-winged Cuckoo-shrike, Grey-chinned Minivet, Ashy Drongo, Mountain Bulbul, Pygmy Wren-babbler, Rufous-capped Babbler, Silver-eared Leiothrix, Orange-bellied Leafbird, White-banded Flat, Orange Punch, *Arhopala* sp., Plain Hedge Blue, Baron, Chinese Yellowface, Yellow-spotted Shadowdamsel, Emerald Cascader, Indian Forest Skink, Intermediate Horseshoe Bat, Himalayan Leaf-nosed Bat, Chinese Noctule, Japanese Pipistrelle, Least Pipistrelle, Chinese Pipistrelle, Lesser Bamboo Bat, Rhesus Macaque, Pallas's Squirrel and Red Muntjac) were recorded. Literature Review Nine flora species of conservation importance (Incense Tree, Lamb of Tartary, Hairy-fruited Ormosia, Hong Kong Pavetta, Hong Kong Eagle's Claw, Butulang Canthium, Small Persimmon, Luofushan Joint-fir, Ixonanthes) were recorded. 19 fauna species of conservation importance (Crested Serpent Eagle, Black Kite, Common Emerald Dove, Collared Scops Owl, Black-capped Kingfisher, Grey-chinned Minivet, Rufous-capped Babbler, Chestnut-collared Yuhina, White-banded Flat, Lesser

Criteria	Woodland
	Band Dart, Golden Birdwing, Common Rose, Metallic Cerulean, Chinese Horseshoe Bat, Japanese Pipistrelle, Rhesus Macaque, Unidentified Bat, East Asian Porcupine and Pallas's Squirrel) were recorded.
Re-creatability	Low to moderate. Re-creatable but maturation of trees and natural succession would take decades.
Fragmentation	Low
Ecological linkage	Woodlands to the south of LRTR and Sha Tin Road mostly fall within LRCP, and part of them also fall within Beacon Hill SSSI. Woodland on hillslope in Kowloon side partially fall within LRCP and also linked with woodland to the south of LRTR. The habitat is physically and functionally connected with natural habitat (e.g. mixed woodland, shurbland, natural watercourse) within LRCP.
Potential value	Moderate to high – for contiguous woodland within LRCP under protection and active management Moderate – for isolated woodland
Nursery/Breeding ground	No nursey/breeding ground was found during the surveys but hillside woodland within LRCP could be potential nursey/breeding ground for varies fauna species (e.g. avifauna, butterfly).
Age	Mature for the majority of hillside woodland. Less mature for those woodland near developed area (e.g. portal, traffic road).
Abundance/ Richness of Wildlife	Moderate to high
Ecological Value	**Moderate to high** – for contiguous woodland within LRCP **Moderate** – for remaining isolated woodland

Table 8.6 Ecological Evaluation of Mixed Woodland and Plantation within the Assessment Area

Criteria	Mixed Woodland	Plantation
Naturalness	The majority of mixed woodland (including those within LRCP) is natural.	The plantation located near developed area and roadside (including those along LRTR and on engineered slopes within LRCP) are artificial and relatively disturbed.
Size	Moderate (37.02 ha)	Moderate (33.68 ha)
Diversity	Moderate floral and low faunal diversity	Low to moderate floral and low faunal diversity
Rarity	Common habitat in Hong Kong <u>Current Surveys</u> Seven flora of conservation importance (Luofushan Joint-fir, Incense Tree, Butulang Canthium, Small Persimmon, Ailanthus, Hong Kong Pavetta and *Rhododendron* spp.) were recorded. Five fauna species of conservation importance (Rufous-capped Babbler, Small Yellow Sailer, Common Rat Snake, Pallas's Squirrel and Rhesus Macaque) were recorded. <u>Literature Review</u> Five flora of conservation importance (Incense Tree, Butulang Canthium, Small Persimmon, Luofushan Joint-fir and *Rhododendron* spp.) were recorded. One fauna of conservation importance (Short-nosed Fruit Bat) was recorded.	A very common habitat in Hong Kong. <u>Current Surveys</u> Four flora species of conservation importance (Luofushan Joint-fir, Rhodoleia, Butulang Canthium and Ailanthus) were recorded. One fauna species of conservation importance (Rhesus Macaque) was recorded. <u>Literature Review</u> Three flora of conservation importance (Ailanthus, Butulang Canthium and Incense Tree) were recorded. Seven fauna species of conservation importance (Grey-chinned Minivet, Golden Birdwing, Emerald Cascader, Least Pipistrelle, Chinese Pipistrelle, Rhesus Macaque and Pallas's Squirrel) were recorded.
Re-creatability	Moderate. Re-creatable if time is allowed	High

Criteria	Mixed Woodland	Plantation
	for maturation and natural succession.	
Fragmentation	Low to Moderate	Moderate
Ecological linkage	Mixed woodlands near the Reunification Pavilion and east to Hung Mui Kuk Barbecue Area fall within LRCP. The mixed woodland patch to the south of Beacon Hill SSSI fall within LRCP. Mixed woodland on hillslope in Kowloon side also linked with surrounding woodland and shrubland.	Some plantations on engineered slopes to the south of LRTR are linked with the woodland within LRCP.
Potential value	Moderate to High – for mixed woodland within LRCP under protection and active management Moderate – for remaining plantation	Low to Moderate – for plantation within LRCP Low – for remaining plantation
Nursery/Breeding ground	None known	None known
Age	Mature, at least 30 years	Relatively mature, about 20-30 years
Abundance/ Richness of Wildlife	Moderate	Low to moderate
Ecological Value	**Moderate** – for mixed woodland within LRCP **Low to Moderate** – for remaining mixed woodland	**Low to moderate** – for plantation within LRCP **Low** – for remaining plantation

Table 8.7 Ecological Evaluation of Shrubland and Active Agricultural Land within the Assessment Area

Criteria	Shrubland	Active Agricultural Land
Naturalness	Low to moderate	Low. An artificial habitat used for cultivation.
Size	Moderate (23.38 ha)	Very small (0.57 ha)
Diversity	Low to moderate floral and low faunal diversity.	Low floral and faunal diversity.
Rarity	A common habitat in Hong Kong. Two flora species of conservation importance (Luofushan Joint-fir and Red Azalea) were recorded. One fauna species of conservation importance (Chinese Hwamei) was recorded.	A common habitat in Hong Kong. No species of conservation importance were recorded.
Re-creatability	Moderate. Re-creatable but time needed for the shrubland to establish.	High
Fragmentation	Moderate	None
Ecological linkage	Hillside at Mau Tsai Shan near Shui Chuen O Estate and part of shrubland at southwest to Lion Rock and south to Beacon Hill View Compass fall within LRCP. The habitat is connected with natural habitat (e.g. woodland, natural watercourse) within LRCP.	Not structurally and functionally linked with habitat of high ecological value.
Potential value	Low to moderate	Low
Nursery/Breeding ground	None known	None known
Age	Mature, at least 40 years	N/A
Abundance/ Richness of Wildlife	Low to moderate	Low
Ecological Value	**Low to moderate**	**Low**

Table 8.8 Ecological Evaluation of Abandoned Agricultural Land and Village/Orchard within the Assessment Area

Criteria	Abandoned Agricultural Land	Village/Orchard
Naturalness	Low. An artificial habitat	Low. An artificial habitat
Size	Very small (0.47 ha)	Small (12.89 ha)
Diversity	Low floral and faunal diversity	Low floral and faunal diversity
Rarity	A common habitat in Hong Kong. Current Surveys No flora species of conservation importance was recorded. One fauna species of conservation importance (Metallic Cerulean) was recorded. Literature Review Three fauna species of conservation importance (Metallic Cerulean, *Enhydris* sp., and Japanese Pipistrelle) were recorded.	A very common man-made habitat in Hong Kong. No flora species of conservation importance was recorded. Four fauna species of conservation importance (Little Egret, Greater Coucal, Japanese Pipistrelle and Chinese Pipistrelle) were recorded.
Re-creatability	High	High
Fragmentation	None	None
Ecological linkage	Not structurally and functionally linked with habitat of high ecological value.	Not structurally and functionally linked with habitat of high ecological value.
Potential value	Low	Low
Nursery/Breeding ground	None known	None known
Age	N/A	N/A
Abundance/ Richness of Wildlife	Low	Low
Ecological Value	**Low**	**Low**

Table 8.9 Ecological Evaluation of Developed Area and Pond within the Assessment Area

Criteria	Developed Area	Pond
Naturalness	Low. An artificial habitat.	Low. An artificial habitat.
Size	Very large (218.18 ha)	Very small (0.06 ha)
Diversity	Moderate to high floral and low faunal diversity, but most flora are introduced or horticultural species.	Low floral and faunal diversity
Rarity	Common habitat in Hong Kong. Current Surveys Five flora species of conservation importance (Butulang Canthium, Ailanthus, Hairy-fruited Ormosia, Small Persimmon and Ixonanthes) were recorded. Four fauna species of conservation importance (Peregrine Falcon, Ashy Drongo, Tokay Gecko and Rhesus Macaque) were recorded. Literature Review Four flora species of conservation importance (Butulang Canthium, Hairy-fruited Ormosia, Small Persimmon and Ixonanthes) were recorded. Seven fauna species of conservation	Common habitat in Hong Kong. No species of conservation importance were recorded.

Criteria	Developed Area	Pond
	importance (Eastern Buzzard, Rufous-capped Babbler, Emerald Cascader, Short-nosed Fruit Bat, Japanese Pipistrelle, Rhesus Macaque and Pallas's Squirrel) were recorded.	
Re-creatability	High	High
Fragmentation	None	None
Ecological linkage	Some engineered slope along LRTR and Sha Tin Road fall within LRCP.	Not structurally and functionally linked with habitat of high ecological value.
Potential value	Low	Low
Nursery/Breeding ground	None known	None known
Age	N/A	N/A
Abundance/ Richness of Wildlife	Low	Low
Ecological Value	**Low**	**Low**

Table 8.10 Ecological Evaluation of Natural Watercourse and Modified Watercourse within the Assessment Area

Criteria	Natural Watercourse	Modified Watercourse
Naturalness	The majority of S1-S8 are natural. Only small sections of S3 and S5 near LRTR are modified into culvert. The section of S6 near Ka Tin Court, section of S7 connected to LRT Shatin portal, sections of S8 east of STSFWSR and sections of S8 near Ka Tin Court are channelized. Seasonal watercourse SW1-SW4 are natural.	WC1 is a catchwater made of concrete. WC2 and WC5 to WC7 are small and narrow concrete step-channels. WC3, WC4, WC8 are small concrete nullahs. Culvert 1-3 within LRCP are concreted culverts.
Size	Large – S1, S2, S5, S6, S8 Moderate – S3, S7 Small – S4, SW1-SW4 (total area 1.39 ha, ~ 7.0 km long)	Large – WC1 Small – WC2-WC8 Small – Culvert 1-3 within LRCP (total area 3.12 ha, ~ 6.9 km long)
Diversity	Moderate floral and low faunal diversity – for S1, S2, S3, S5, S6, S7, S8 Low to moderate floral and low faunal diversity – for S4, SW1, SW2, SW3 and SW4	Low floral and faunal diversity
Rarity	Common habitat in Hong Kong. <u>Current Surveys</u> Eight flora species of conservation importance (Hong Kong Eagle's Claw, Luofushan Joint-fir, Lamb of Tartary, Small Persimmon, Ailanthus, Bottlebrush Orchid, Hainan Hypolutrum and Siamense Selenodesmium) were recorded. 13 fauna species of conservation importance (Indochinese Copperwing, Chinese Yellowface, White-banded Shadowdamsel, Small Clubtail (nymph), Hong Kong Newt, Short-legged Toad, Lesser Spiny Frog (adult and tadpole), Brown Forest Skink, Chinese Water Dragon, *Cryptopotamon anacoluthon*, *Caridina serrata,* Hong Kong Freshwater Crab and Predaceous Chub) were recorded.	A very common habitat in Hong Kong. <u>Current Surveys</u> No flora species of conservation importance were recorded. Nine fauna species of conservation importance (Little Egret, Mountain Bulbul, Plain Hedge Blue, Tawny Hooktail, Hong Kong Newt, Brown Forest Skink, Chinese Water Dragon, Predaceous Chub and Rhesus Macaque) were recorded. <u>Literature Review</u> Three fauna species of conservation importance (Emerald Cascader, Lesser Spiny Frog and Japanese Pipistrelle) were recorded.

Criteria	Natural Watercourse	Modified Watercourse
	Literature Review Nine fauna species of conservation importance (Common Emerald Dove, Indochinese Copperwing, White-banded Shadow Damsel, Emerald Cascader, Lesser Spiny Frog, Hong Kong Cascade Frog, Hong Kong Newt, Indo-Chinese Rat Snake and Predaceous Chub) were recorded.	
Re-creatability	Low	High
Fragmentation	Low	Low. Some modified watercourses WC1, WC8 and culverts 1-3 within LRCP are ecologically linked to other natural habitats (e.g. natural watercourse)
Ecological linkage	S1, S3, S5 and S6 partially fall within LRCP, and S7 and S8 partially fall within both LRCP and Beacon Hill SSSI. SW1 to SW4 fall within LRCP. This habitat is physically and functionally connected with natural habitat (e.g. woodland, shrubland) within LRCP.	WC1, WC3, WC8 and Culvert 1-3 fall within LRCP. The habitat is connected with natural habitat (e.g. woodland, natural watercourse) within LRCP.
Potential value	Moderate	Low
Nursery/Breeding ground	Small Clubtail (nymph) were recorded at S5 and S7 outside Project footprint, and Lesser Spiny Frog (tadpoles) were recorded at S7 outside Project footprint, which may suggest these watercourses could be the breeding ground of these species.	Individuals of teneral Tawny Hooktail were observed at WC1 but this channel would unlikely serve as an important breeding ground.
Age	Mature	Mature – at least 30 years for WC1-WC8 channelized watercourse near STWTW, STSFWSR and Jade Garden Not known for remaining small modified watercourses and culverts
Abundance/ Richness of Wildlife	Moderate – for S1, S2, S3, S5, S6, S7, S8 Low to moderate – for S4, SW1, SW2 SW3, and SW4	Low
Ecological Value	**Moderate to high** – for S1, S2, S3, S5, S6, S7, S8 **Low to moderate** – for S4, SW1, SW2, SW3 and SW4	**Low**

Table 8.11 Species of Conservation Importance Recorded within the Assessment Area during Current Surveys and Previous Studies

Common Name (Scientific Name)	Recorded Location / Habitat		Distribution in Hong Kong [1]	Rarity [1]	Protection Status
	Literature Review [16]	Current Survey			
Flora					
Ailanthus *(Ailanthus fordii)*	Plantation	Woodland(*)(+); Mixed woodland(*)(+); Plantation(*); Developed area(*); Natural watercourse	Can be found in forest.	Rare; also widely cultivated as roadside trees and ornamental trees [3]	Cap. 96 [2]
Incense Tree (*Aquilaria sinensis*)	Secondary woodland; Mixed woodland; Plantation	Woodland(*)(+); Mixed woodland	Can be found in lowland forests and fung shui woods.	Common	Cap. 586 [2]; Vulnerable [2]; Status in China: Near Threatened [3]; Category II [4]; Vulnerable [5]; Near Threatened [6]; Recorded in Illustration of Rare and Endangered Plants in Guangdong Province [7]; Vulnerable [8]
Hong Kong Eagle's Claw (*Artabotrys hongkongensis*)	Secondary woodland(+)	Woodland(+); Natural watercourse	Can be found in dense forests or on wet places of ravines.	Restricted	Least Concern [4]
Silver-back Artocarpus (*Artocarpus hypargyreus*)	-	Woodland(+)	Can be found in lowland forest.	Common	Vulnerable [2]; Status in China: Near Threatened [3]
Butulang Canthium (*Canthium dicoccum*)	Secondary woodland(+); Mixed woodland(+); Plantation; Developed area	Woodland(*)(+); Mixed woodland; Plantation(*)(+); Developed area(*)	Can be found in ravines, forests and thickets.	Common	Vulnerable [2]
Lamb of Tartary (*Cibotium barometz*)	Secondary woodland(+)	Woodland(*)(+); Natural watercourse(*)	Can be found in forest and shrubland.	Very Common	Cap. 586 [2]; Status in China: Vulnerable [3]; Category II [4]
Small Persimmon (*Diospyros vaccinioides*)	Secondary woodland(+); Mixed Woodland(+); Developed area	Woodland(+); Mixed woodland; Developed area; Natural watercourse(+)	Can be found in thin forests and thickets in ravines or on hillslopes.	Very Common	Critically Endangered [2]; Endangered [8]
Luofushan Joint-fir	Secondary	Woodland (+); Mixed	Can be found in forest and shrubland.	Very	Near Threatened [2]

Common Name (Scientific Name)	Recorded Location / Habitat		Distribution in Hong Kong [1]	Rarity [1]	Protection Status
	Literature Review [16]	Current Survey			
(*Gnetum luofuense*)	woodland(+); Mixed Woodland(+)	Woodland(*)(+); Shrubland(+); Plantation(*)(+); Natural Watercourse(+)		Common	
Ixonanthes (I*xonanthes reticulata*)	Secondary woodland(+); Developed Area	Woodland(+); Developed area	Can be found in thickets or thin forests.	Common	Vulnerable [2][5]
Hairy-fruited Ormosia (*Ormosia pachycarpa*)	Secondary woodland(+); Developed area	Woodland(+); Developed area	Can be found in forests.	Restricted	Status in China: Endangered [3]; Vulnerable [8]
Hong Kong Pavetta (*Pavetta hongkongensis*)	Secondary woodland	Woodland(*)(+); Mixed Woodland (*);	Can be found in thickets and forests.	Common	Cap. 96 [2]
Aralia chinensis	-	Woodland	Can be found in sunny hillslope.	Common	Vulnerable [8]
Red Azalea (*Rhododendron simsii*)	-	Woodland(+); Shrubland(+)	Can be found in shrubland.	Very Common	Cap. 96 [2]
Rhododendron spp.	Mixed Woodland(+)	Mixed Woodland(+)	Can be found in forest and/or shrubland	-	Cap. 96 [2]
Hairy Chestnut (*Castanopsis concinna*)	-	Woodland(+)	-	Restricted	Status in China: Vulnerable [3]; Category II [4]; Endangered [5]; Vulnerable [8]
Rhodoleia (*Rhodoleia championii*)	-	Plantation(*)	Can be found in forest and also widely planted.	Very Rare; but also widely planted	Cap. 96 [2]; Vulnerable [3]
Bottlebrush Orchid (*Goodyera procera*)	-	Natural watercourse(*)	On rocks beside and in streams from sea level up to montane forest.	Very Common	Cap. 96 [2], Cap. 586 [2]
Siamense Selenodesmium (*Selenodesmium siamense*)	-	Natural watercourse	Tai Mo Shan, Sham Chung, Cloudy Hill and Tai Po Kau	Rare	Status in China: Vulnerable [3]
Hainan Hypolutrum (*Hypolytrum hainanense*)	-	Natural watercourse	Forest and shrubland	Restricted	-
Fauna					
Avifauna					
Little Egret [15] (*Egretta garzetta*)	-	Village/orchard; Modified	Widely distributed in coastal area throughout Hong Kong.	Common	Cap.170 [2]; PRC (RC) [2]

Common Name (Scientific Name)	Recorded Location / Habitat		Distribution in Hong Kong [1]	Rarity [1]	Protection Status
	Literature Review [16]	Current Survey			
		watercourse[(*)(+)]; In flight			
Crested Serpent Eagle (*Spilornis cheela*)	Secondary woodland	-	Uncommon resident. Widely distributed in shrublands on hillsides throughout Hong Kong.	Uncommon	Cap.170 [2]; (RC) [2]; Class II [9]; Vulnerable [10]
Black Kite [15] (*Milvus migrans*)	Secondary woodland	Woodland; In flight	Widely distributed in Hong Kong.	Common	Cap.170 [2]; Cap.586 [2]; (RC) [2]; Class II [9]
Crested Goshawk (*Accipiter trivirgatus*)	-	Woodland[(+)]	Widely distributed in woodlands and shrublands throughout Hong Kong.	Uncommon	Cap.170 [2]; Cap.586 [2]; Class II [9]; Rare [10]; Near Threaten [11]
Besra (*Accipiter virgatus*)	-	In flight	Found in Tai Po Kau, Deep Bay area, Chek Lap Kok, Cheung Chau, Soko Islands.	Scarce	Cap.170 [2]; Cap.586 [2]; Class II [9]
Eastern Buzzard (*Buteo japonicus*)	Developed area	In flight	Common winter visitor. Widely distributed in Hong Kong.	Common	Cap.170 [2]; Cap.586 [2]; Class II [9]
Peregrine Falcon (*Falco peregrinus*)	-	Developed area	Scarce resident and winter visitor. Widely distributed in Hong Kong.	Scarce	Cap.170 [2]; (LC) [2]; Cap.586 [2]; Class II [9]; Near Threaten [11]
Common Emerald Dove (*Chalcophaps indica*)	Secondary woodland; Natural watercourse	-	Widely distributed in woodland throughout Hong Kong.	Scarce	Cap.170 [2]; Vulnerable [10]
Greater Coucal (*Centropus sinensis*)	-	Village/orchard	Widely distributed in Hong Kong.	Common	Cap.170 [2]; Class II [9]; Vulnerable [10]
Collared Scops Owl (*Otus lettia*)	Secondary woodland[(+)]	Woodland[(+)]	Widely distributed in shrubland throughout Hong Kong.	Common	Cap.170 [2]; Cap.586 [2]; Class II [4]
Black-capped Kingfisher (*Halcyon pileata*)	Secondary woodland	-	Common passage migrant and winter visitor. Widely distributed in coastal areas throughout Hong Kong.	Common	Cap.170 [2]; (LC) [2]
Speckled Piculet (*Picumnus innominatus*)	-	Woodland[(+)]	Found in Wong Chuk Yeung, Tai Po Kau.	Occasional	Cap.170 [2]; LC [2]
Black-winged Cuckoo-shrike (*Coracina melaschistos*)	-	Woodland[(+)]	Scarce passage migrant and winter visitor. Widely distributed in woodland throughout Hong Kong.	Scarce	Cap.170 [2]
Grey-chinned Minivet (*Pericrocotus solaris*)	Secondary woodland; Plantation	Woodland[(+)]	Common in winter, scarce in summer. Found in Tai Po Kau, Shing Mun, Ho Chung, Kadoorie Farm and Botanic Garden, Tung Ping Chau.	Common	Cap.170 [2]; LC [2]
Ashy Drongo (*Dicrurus leucophaeus*)	-	Woodland[(+)]; Developed area	Scarce winter visitor. Found in Shing Mun, Tai Po Kau.	Scarce	Cap.170 [2]; LC [2]
Mountain Bulbul (*Hypsipetes mcclellandii*)	-	Woodland[(+)]; Modified watercourse	Rare resident. Found in Tai Po Kau, Ng Tung Chai.	Rare	Cap.170 [2]

Common Name (Scientific Name)	Recorded Location / Habitat		Distribution in Hong Kong [1]	Rarity [1]	Protection Status
	Literature Review [16]	Current Survey			
Pygmy Wren-babbler (*Pnoepyga pusilla*)	-	Woodland(+)	Found in Tai Po Kau, Ng Tung Chai.	Rare	Cap.170 [2]; LC [2]
Rufous-capped Babbler (*Stachyris ruficeps*)	Secondary woodland; Developed area	Woodland(+); Mixed woodland	Common resident. Found mainly in shrublands and woodlands of New Territories.	Uncommon	Cap.170 [2]; LC [2]
Chinese Hwamei (*Garrulax canorus*)	-	Shrubland	Widely distributed in hillside shrubland throughout Hong Kong.	Common	Cap.170 [2]; Cap 586 [2]
Silver-eared Leiothrix (*Leiothrix argentauris*)	-	Woodland(+)	Widely distributed in woodland throughout Hong Kong.	Common	Cap.170 [2]; Near Threatened [11]
Chestnut-collared Yuhina (*Yuhina castaniceps*)	Secondary woodland	-	Rare winter visitor. Widely distributed in Hong Kong.	Rare	Cap.170 [2]; (LC) [2]
Orange-bellied Leafbird (*Chloropsis hardwickii*)	-	Woodland(+)	Uncommon resident and winter visitor. Widely distributed in woodland throughout Hong Kong.	Uncommon	Cap.170 [2]; LC [2]
Butterfly					
White-banded Flat (*Gerosis phisara*)	Secondary woodland	Woodland(+)	Widely distributed in woodland throughout Hong Kong.	Rare	-
Lesser Band Dart (*Potanthus trachala trachala*)	Secondary woodland	-	Widely distributed in grassland throughout Hong Kong	Rare	-
Golden Birdwing (*Troides aeacus aeacus*)	Secondary woodland; Plantation	-	Widely distributed throughout Hong Kong.	Rare	LC [2]
Common Rose (*Pachliopta aristolochiae goniopeltis*)	Secondary woodland	-	Widely distributed throughout Hong Kong.	Rare	-
Orange Punch (*Dodona egeon egeon*)	-	Woodland(+)	Found in Tai Po Kau, Shing Mun Reservoir, Ngau Ngak Shan, Kwun Yam Shan, Sam A Chung, Cheung Sheung, Tai Lam, Tai Mo Shan.	Rare	RC [2]
Arhopala sp. [17]	-	Woodland(+)	-	-	-
Metallic Cerulean (*Jamides alecto alocina*)	Woodland; Abandoned agricultural land	Abandoned agricultural land	Found in Victoria Peak, Fung Yuen, Chuen Lung, Mui Wo.	Very Rare	-
Plain Hedge Blue (*Celastrina lavendularis limbata*)	-	Woodland(+); Modified watercourse	Found in Tai Po Kau, Tai Lam Country Park, Kadoorie Farm and Botanic Garden, Ngau Ngak Shan.	Very Rare	LC [2]
Small Yellow Sailer (*Neptis miah nolana*)	-	Mixed woodland	Found in Tai Mo Shan Country Park.	Very Rare	LC [2]

Common Name (Scientific Name)	Recorded Location / Habitat		Distribution in Hong Kong [1]	Rarity [1]	Protection Status
	Literature Review [16]	Current Survey			
Baron (*Euthalia aconthea aditha*)	-	Woodland(+)	Widely distributed in woodland throughout Hong Kong.	Uncommon	LC [2]
Odonate					
Indochinese Copperwing (*Mnais mneme*)	Natural watercourse	Natural watercourse(+)	Widely distribute in woodland streams throughout the New Territories.	Common	LC [2]
Chinese Yellowface (*Agriomorpha fusca*)	-	Woodland; Natural watercourse(*)	Widely distribute in forest seepages and small woodland streams throughout Hong Kong.	Abundant	LC [2]
White-banded Shadow Damsel (*Protosticta taipokauensis*)	Natural watercourse	Natural watercourse	Widely distributed in mature forest with permanent streams throughout Hong Kong.	Common	GC [2]
Yellow-spotted Shadowdamsel (*Sinosticta ogatai*)	-	Woodland(+)	Uncommon; Found in Keung Shan, Ng Tung Chai, Shing Mun Country Park, Sunset Peak, Tai Mo Shan and Tai Tam Country Park.	Uncommon	GC [2]
Tawny Hooktail (*Paragomphus capricornis*)	-	Modified watercourse(+)	Scattered; Found in Lion Rock Country Park, Tai Lam Chung Country Park, Tai Tong and Yeung Ka Tsuen.	Uncommon	RC [2]
Emerald Cascader (*Zygonyx iris insignis*)	Plantation; Developed area; Natural Watercourse; Modified watercourse(+);	Woodland	Widely distribute in moderately clean, rapidly flowing forested streams throughout Hong Kong.	Abundant	PGC [2]
Small Clubtail (nymph) (*Stylogomphus chunliuae*)	-	Natural watercourse(*)	Found in Bride's Pool, Keung Shan, Lam Tsuen Valley, Ng Tung Chai, Tai Mo Shan, Tai Po Kau, Tung Chung, Yeung Ka Tsuen and Yuen Tun Ha.	Common	LC [2]
Amphibian					
Hong Kong Newt (*Paramesotriton hongkongensis*)	Natural watercourse(+)	Natural watercourse(+); Modified watercourse(+)	Widely distributed in mountain streams.	Common	PGC [2]; Near Threatened [2]; Near Threatened [11]
Short-legged Toad (*Megophrys brachykolos*)	-	Natural watercourse(+)	Widely distributed in upland forest streams throughout Hong Kong.	Common	PGC [2]; Endangered [2]; Vulnerable [11]
Lesser Spiny Frog (*Quasipaa exilispinosa*)	Natural watercourse (+); Modified watercourse (+)	Natural watercourse(*)(+)	Occurs throughout territory.	-	PGC [2]; Vulnerable [2]; Vulnerable [11]
Hong Kong Cascade Frog (*Amolops hongkongensis*)	Natural watercourse	-	Widely distributed in mountain streams.	-	Cap. 170 [2]; PGC [2]; Endangered [2]; Vulnerable [11]
Reptile					

Common Name (Scientific Name)	Recorded Location / Habitat		Distribution in Hong Kong [1]	Rarity [1]	Protection Status
	Literature Review [16]	Current Survey			
Common Rat Snake (*Ptyas mucosus*)	-	Mixed woodland	Widely distributed.	Common	PGC [2]; Endangered [11]; Endangered [12]
Indo-Chinese Rat Snake (*Ptyas korros*)	Natural watercourse	-	Widely distributed.	Common	PGC [2]
Tokay Gecko (*Gekko gecko*)	-	Developed area[*]	Distributed in rocky areas in Tung Chung and Sham Wat on Lantau Island, Lion Rock Country Park.	-	RC [2] Class II [4]; Critically Endangered [11]; Endangered [12]
Indian Forest Skink (*Sphenomorphus indicus*)	-	Woodland[*][+]	Commonly distributed in woodlands in the eastern and central New Territories.	-	LC [2]
Brown Forest Skink (*Sphenomorphus incognitus*)	-	Natural watercourse[+]; Modified watercourse[+]	Distributed in streams in central and eastern New Territories.	Common	Near Threatened [11]
Chinese Water Dragon (*Physignathus cocincinus*)	-	Natural watercourse; Modified watercourse[+]	-	-	Vulnerable [2]
Enhydris sp.	Abandoned agricultural land	-	-	-	-
Mammal [2]					
Intermediate Horseshoe Bat (*Rhinolophus affinis*)	-	Woodland	Widely distributed in countryside areas throughout Hong Kong.	Uncommon	Cap.170 [2]; (LC) [2]
Himalayan Leaf-nosed Bat (*Hipposideros armiger*)	-	Woodland[+]	Widely distributed in countryside areas throughout Hong Kong.	Abundant	Cap.170 [2]; (LC) [2]
Chinese Horseshoe Bat (*Rhinolophus sinicus*)	Secondary woodland	-	Widely distributed in countryside areas throughout Hong Kong.	Abundant	Cap.170 [2]
Short-nosed Fruit Bat (*Cynopterus sphinx*)	Mixed woodland[+]; Developed area	-	Very widely distributed in urban and countryside areas throughout Hong Kong.	Abundant	Cap.170 [2]; Near Threatened [11]
Chinese Noctule (*Nyctalus plancyi*)	-	Woodland[+]	Fairly widely distributed in countryside areas throughout Hong Kong.	Common	Cap.170 [2]; PRC [2]
Japanese Pipistrelle (*Pipistrellus abramus*)	Secondary woodland[+]; Abandoned agricultural land; Developed	Woodland[+]; Village/orchard	Widely distributed throughout Hong Kong.	Very Common	Cap.170 [2]

Common Name (Scientific Name)	Recorded Location / Habitat		Distribution in Hong Kong [1]	Rarity [1]	Protection Status
	Literature Review [16]	Current Survey			
	area; Modified watercourse(+)				
Least Pipistrelle (*Pipistrellus tenuis*)	Plantation	Woodland(+)	Recorded in Nam Chung, Sheung Wo Hang, Lin Ma Hang, Plover Cove Country Park, Yuen Long, Shek Pik, Deep Water Bay, Ho Pui and Ho Chung.	Uncommon	Cap.170 [2]; Near Threatened [11]
Chinese Pipistrelle (*Hypsugo pulveratus*)	Plantation	Woodland(+); Village/orchard	Recorded in the countryside areas at Ting Kau, Ma On Shan and Lin Ma Hang, and several records of stray individuals inside buildings.	Rare	Cap.170 [2]; (LC) [2]; Near Threatened [11]
Lesser Bamboo Bat (*Tylonycteris pachypus*)	-	Woodland(*)(+)	Fairly widely distributed in countryside areas throughout Hong Kong.	Abundant	Cap.170 [2]; (LC) [2]; Rare [13]
Unidentified Bat	Secondary Woodland	-	-	Abundant	Cap.170 [2]
Rhesus Macaque (*Macaca mulatta*)	Secondary woodland(+); Plantation; Developed area	Woodland(*)(+); Mixed Woodland; Plantation(*); Developed area(+); Modified watercourse(+)	Mainly distributed in Kam Shan, Shing Mun and Tai Po Kau; also found in Ma On Shan, Sai Kung, Tai Lam Country Parks and the North District.	Common	Cap.170 [2]; Cap.586 [2]; Class II [9]; Vulnerable [13]
Pallas's Squirrel (*Callosciurus erythraeus*)	Secondary woodland; Plantation; Developed area	Woodland(+); Mixed Woodland	Fairly widely distributed, with the styani subspecies found in the New Territories (e.g. Tai Lam, Shing Mun and Tai Po Kau), and the thai subspecies found on the Hong Kong Island (e.g. Tai Tam and Pok Fu Lam).	Common	Cap.170 [2]
Red Muntjac (*Muntiacus muntjak*)	-	Woodland(+)	Very widely distributed in countryside areas throughout Hong Kong.	Abundant	PRC [2]; Near Threatened [11]
East Asian Porcupine (*Hystrix brachyura*)	Secondary woodland	-	Very widely distributed in countryside areas throughout Hong Kong, except for Lantau Island	Very common	Cap. 170 [2]; PGC [2];
Freshwater Community					
Small Clubtail (nymph) (*Stylogomphus chunliuae*)	-	Natural watercourse(*)(+)	Found in clean woodland streams dominated by boulder and cobble substrates.	Common	LC [2]
Cryptopotamon anacoluthon	-	Natural watercourse(*)(+)	-	Common; Endemic	Vulnerable [2]
Caridina serrata	-	Natural watercourse(+)	-	-	Near Threatened [2]
Hong Kong Freshwater Crab (*Nanhaipotamon hongkongense*)	-	Natural watercourse(+)	-	Common; Endemic	PGC [2]
Lesser Spiny Frog (Tadpole) (*Quasipaa exilispinosa*)	-	Natural watercourse	Occurs throughout territory.	-	PGC [2]; Vulnerable [2]; Vulnerable [11]

Common Name (Scientific Name)	Recorded Location / Habitat		Distribution in Hong Kong [1]	Rarity [1]	Protection Status
	Literature Review [16]	Current Survey			
Predaceous Chub (*Parazacco spilurus*)	Natural watercourse	Natural watercourse[+]; Modified watercourse[+]	A widespread species occurring in most unpolluted hill streams in both upper and lower courses.	Common	Vulnerable [14]

Notes:

(1) Distribution in Hong Kong and Rarity follows:
Flora: Wu and Lee (2000); Xing and Chau (2000); Siu (2000).
Fauna: AFCD (2019b); Karsen *et al*. (1998); Shek (2006a); Reels (2019).
(2) Fellowes *et al*. (2002): GC=Global Concern; LC=Local Concern; RC=Regional Concern; PRC=Potential Regional Concern; PGC: Potential Global Concern.
Letters in parentheses indicate that the assessment is on the basis of restrictedness in nesting and/or roosting sites rather than in general occurrence.
Cap. 96: Forests and Countryside Ordinance (Cap. 96).
Cap. 170: Protected under Wild Animals Protection Ordinance (Cap. 170).
Cap. 586: Protection of Endangered Species of Animals and Plants Ordinance (Cap.586).
IUCN (2021).
(3) Hong Kong Herbarium (2021).
(4) List of Wild Plants Under State Protection.
(5) Fu and Chin (1992).
(6) Feng *et al*. (2002).
(7) Wu and Hu (1988).
(8) Qin *et al*. (2017).
(9) The List of Endangered and Protected Species of China.
(10) Zheng and Wang (1998).
(11) Jiang *et al.* (2016).
(12) Zhao and Wang. (1998).
(13) Wang (1998).
(14) Yue and Chen (1998).
(15) Wetland-dependent species (including wetland-dependent species and waterbirds).
(16) CEDD (2004); MTRC (2011); WSD (2014); CEDD (2021)
(17) All *Arhopala* sp. in Hong Kong are considered as species of conservation importance (either considered as “Rare” or “Very Rare” and/or listed as “Local Concern” in Fellowes *et al.* (2002))
[*] Record within Project boundary.
[+] Record within LRCP.

8.8 Identification of Ecological Impact

8.8.1 As mentioned in **Section 2**, the LRT is a trunk road linking traffic between Shatin and Kowloon. At the Shatin side, the LRTR will be widened to dual three-lane from tunnel toll plaza to Fung Shing Court. New administration building, car depot and vehicular cross-over bridge will be constructed at the tunnel toll plaza. At the Kowloon side, the LRTR will be widened to dual three-lane from slip road of Lung Cheung Road interchange to LRT Kowloon portal and an additional one-lane vehicular bridge crossing over Lung Cheung Road will be constructed. The above road widening works will largely be conducted along the existing roads. To create an extra lane, some works will be inevitably conducted between the slopes and the carriageway along LRTR. Construction of new portal structures, ventilation buildings, noise barriers and reprovisioning of Footbridge NF74 near Fung Shing Court and associated slope stabilisation works will also be carried out at both LRT Shatin and Kowloon portals. The proposed three-lane road tunnel will be wholly constructed by tunnelling method avoiding loss of natural habitats of conservation importance. NTHMMs (including rigid barriers and flexible barriers) would also be constructed at locations identified with potential risk of natural terrain hazards along LRTR.

8.8.2 It is anticipated that the major sources of ecological impact would be associated with areas where the aboveground works (e.g. road widening, slope stabilisation works, tunnel portal structures, administration building, ventilation buildings, and NTHMMs, etc.) are required. Potential ecological impacts that may arise during the construction and operation phases are outlined below.

- Direct impact in relation to the loss of habitats and associated wildlife; and
- Indirect, secondary and cumulative impact to habitat, groundwater and wildlife, such as disturbance impact, loss of feeding, breeding and roosting habitat, loss or reduction of ecological linkages and functions as well as habitat fragmentation.

Potential Direct Impact

Construction Phase

8.8.3 The proposed improvement of LRT would affect habitats within the Project footprint proposed under the current study. The major impacts on ecological resources in construction phase would be direct habitat loss:

- Permanent direct habitat, vegetation loss, and fragmentation resulting from land take for the construction activities in the aboveground Project footprint, such as road widening, slope stabilisation works, tunnel portal structures, vehicular bridge, footbridge, administration building, ventilation buildings, lay-by, noise barriers, reprovisioning of Footbridge NF74 near Fung Shing Court and NTHMMs, etc.; and
- Temporary direct habitat and vegetation loss resulting from land take for temporary structures such as construction shaft, temporary storage areas, construction access, temporarily affected areas, etc.

Operation Phase

8.8.4 The potential direct impact resulting from the operation of the Project are likely to be:

- Permanent net loss in habitat; and
- Mortality of wildlife (e.g. avifauna) from roadkill and collision with noise barrier / enclosures.

Potential Indirect Impact

Construction Phase

8.8.5 The proposed Project would result in indirect impact to the surrounding / off-site habitats and associated fauna:

- Associated potential indirect impact to wildlife, such as restriction of wildlife utilization, degradation of habitat quality, as a result of temporary and permanent loss, isolation and fragmentation of ecological habitats;
- Potential indirect impact to the surrounding and off-site habitats and associated wildlife due to physical disturbance of habitat such as noise, dust deposition, sedimentation, and increased human activities;
- Potential hydrological disruptions such as drawdown of water table and consequential impact on vegetation and watercourses resulting from tunnelling works.

Operation Phase

8.8.6 The potential indirect impacts resulting from the operation of the Project are likely to be:

- Disturbance from operation of road and associated facilities;
- Hydrological disruption;
- Pollution from the road operation such as leakage of oil, lubricants, toxic chemical; and
- Habitat fragmentation.

Discussion on Identified Ecological Impact

Construction Phase

8.8.7 As discussed in **Section 2**, the proposed improvement works of LRT include both aboveground and underground works. The aboveground works include widening works of LRTR and associated works, slope stabilization works, while the underground works include tunnel improvement works underneath Lion Rock and Beacon Hill. Direct and indirect impacts arising during construction phase are discussed in the below sections.

Direct Impact

Unavoidable Habitat Loss

8.8.8 Permanent habitat loss would be resulted from the following key aboveground works at both Shatin and Kowloon side:

Shatin Side

- Widening of LRT Road at Shatin side to dual three-lane between the existing tunnel portal to Fung Shing Court (except a section of the northbound carriageway between the slip roads to and from Hung Mui Kuk Road which would remain two lanes), and associated slope stabilization works;
- Demolish the existing toll plaza together and provision of equipment and facilities for free-flow tolling;
- Re-provision of tunnel buildings including tunnel administration building (ADB), ventilation buildings (VBs) etc., and construction/reprovisioning of vehicular crossover bridge, footbridges and any other tunnel support facilities;
- construction of new tunnel portal structure and a ventilation building, provision of a surge tank (underground structure) as well as associated slope formation works at the tunnel portal;
- construction of noise barriers and reprovisioning of Footbridge NF74 near Fung Shing Court;
- construction of NTHMMs along LRTR (including two rigid barriers and four flexible barriers);

Kowloon Side

- Widening of LRT Road at Kowloon side to dual three-lane from the slip roads of Lung Cheung Road interchange to LRT Kowloon portal and construct a single lane vehicular bridge crossing over Lung Cheung Road for the Shatin bound direction;
- Widening of the slip road from LRTR (S/B) to Lung Cheung Road (E/B) to two lanes, and realigning the slip road from Lung Cheung Road (E/B) to Lion Rock Tunnel Road (N/B), and
- construction of new tunnel portal structure and ventilation building, and slope formation works at the LRT Kowloon portals.

8.8.9 Temporary habitat loss would occur at areas that would be affected by temporary works such as setting up of site hoardings, temporary material and equipment storage and stockpiling, construction access, etc. These temporarily affected habitats will be reinstated by woodland mix plantings after the completion of the construction works.

8.8.10 Details of the above proposed works is discussed in **Section 2.3** and illustrated in **60604728/R42b/Figure 2.2** to **60604728/R42b/Figure 2.5**. Based on the latest design developed under the current study, the Project footprint (i.e. potential permanently and temporarily affected areas) within the Project footprint are shown in **60604728/R42b/Figure 8.4.1** to**60604728/R42b/Figure 8.4.5**. Areas within the Project boundary but outside the Project footprint would not be occupied or directly affected under the Project, thus, loss of habitats there is not anticipated.

8.8.11 Given the underground tunnel improvement works would be undertaken underneath the Lion Rock and Beacon Hill, it is not anticipated to result in any permanent direct loss to aboveground habitats. For the aboveground works, direct permanent loss (about 14.8 ha) and temporary loss (about 2.75 ha) on both natural and man-made habitats are anticipated, about 1.14 ha of permanently loss and 0.59 ha of temporary loss of which are located in the LRCP. As no construction works would be encroached into Beacon Hill SSSI, no habitat loss would be anticipated at Beacon Hill SSSI. Direct habitat loss to natural watercourses within the assessment area are also avoided. The estimated habitat loss is tabulated in **Table 8.12**.

Table 8.12 Area of Habitat Loss Arising from the Proposed Works

Habitat Type	Area of Permanent Habitat Loss (ha)		Area of Temporary Habitat Loss (ha)	
	Within LRCP	Within Project Footprint	Within LRCP	Within Project Footprint
Woodland	0.16	0.24	0.09	0.13
Mixed Woodland	0	0.62	0	0.33
Plantation	0.17	3.40	0.16	0.98
Shrubland	0	0.29	0	0.04
Developed Area	0.81	10.24	0.33	1.26
Modified Watercourse	<0.01	<0.01	0	0
Total (2)	**1.14**	**14.80**	**0.59**	**2.75**

Note:
(1) No permanent or temporary loss of natural watercourses would be anticipated.
(2) Habitat loss "within Project footprint" covers areas within and outside LRCP.

8.8.12 The proposed LRT improvement works (e.g. road widening, reprovision of tunnel buildings, etc.) would be largely carried out along the existing LRT alignment and other developed areas, it is anticipated that about 10.24 ha (69% of permanent loss) occur within developed area, of which 0.81 ha is located within LRCP. This affected habitat (i.e. developed area) is highly urbanized and most recorded vegetation were roadside trees or horticultural species, as stated in **Sections 8.6.28** to **8.6.29**. This habitat is of low ecological value and subjected to continuous roadside disturbance impacts including dust, noise and glare. Thus, the impact on developed area is

considered as minor. Details of other habitats (i.e. woodland, mixed woodland, plantation, shrubland and modified watercourse) which would be directly impacted by the aboveground works were discussed in **Sections 8.8.13** to **8.8.28** below. Direct encroachment on semi-natural/natural habitats (including woodland, mixed woodland, plantation) would be unavoidable. For LRCP, apart from the developed area, about 0.34 ha vegetated area (i.e. 0.16 ha woodland and 0.17 ha plantation) and less than 0.01 ha modified watercourse would be lost permanently due to the proposed works. No potential diversion or modification of natural watercourse is anticipated. The loss of habitats can lead to reduction of habitat size, food, water and other ecological resources and hence lead to reduction of overall ecological carrying capacity within the assessment area. However, the concerned habitats were mainly situated along the LRTR and already subjected to constant disturbance, hence these habitats were unlikely to be significant for wildlife. Moreover, the permanent loss of natural habitats (woodland, mixed woodland and shrubland) within the Project footprint is relatively small (total 1.15 ha), and the abundance and diversity of flora and fauna species in artificial habitats including plantation, developed area and modified watercourse were relatively low. The impact on reduction of ecological carrying capacity hence is considered as minor.

Road Widening and Associated Slope Works at Shatin Side

8.8.13 The majority of road widening and associated slope stabilization works (e.g. retaining wall and slope formation) are proposed along the LRTR section between Sha Tin Tau Village and the Tunnel Toll Plaza (approximately 2.07 km), including the roundabout at Hung Mui Kuk (refer to **60604728/R42b/Figure 8.4.3** to **60604728/R42b/Figure 8.4.5** for the project footprint and **60604728/R42b/Figure 2.1** to **60604728/R42b/Figure 2.4** for the works layout). To avoid encroachment upon the LRCP to the maximum practicable extent, a downhill option is selected and the proposed works are located mainly to the south of the LRTR away from the LRCP.

8.8.14 However, given there is currently limited buffer space between the uphill slopes and the carriageway of LRTR at the southbound traffic lane, part of the proposed works would inevitably affect some plantation (0.06 ha), woodland (0.15 ha), and culvert / modified watercourse located adjacent to the LRTR (refer to **60604728/R42b/Figure 8.4.4**). The above permanent habitat loss within LRCP included 0.15 ha of woodland and 0.05 ha of plantation near Hung Mui Kuk Barbecue Area, and small area of woodland (<0.01 ha) to the south of Kak Tin Village (details refer to **Sections 8.8.33** to **8.8.39**). Direct impact to the uphill natural watercourses (i.e. S2, S3, S5, and S6) and other seasonal watercourses (i.e. SW1, SW2, SW3, SW4) within LRCP are all avoided.

8.8.15 The proposed downhill works at northbound lane outside LRCP would take up about 2.02 ha of plantation and mixed woodlands (~0.47 ha in total) near Kak Tin Village, Hung Mui Kuk Village and Sheung Keng Hau. These habitats would be affected by the road widening works and associated fill slope works. The affected mixed woodlands and plantations were only support low floral diversity and abundance as they were isolated by developed area and subject to disturbance. The flora species recorded in these habitats were common and widespread species including Taiwan Acacia, Lance-leaved Sterculia and Wild Coffee. Those natural and modified watercourses (i.e. S3, S4, S6 and WC2) situated in downhill area of this works section would not be directly affected.

8.8.16 Two flora species of conservation importance (i.e. 19 individuals of the widely planted Ailanthus and two individuals of the locally common Butulang Canthium) identified within developed area, wooded area and watercourse along both sides of the LRTR between Sun Tin Wai Estate and Shatin Tunnel Portal. Butulang Canthium and Incense Tree were recorded in woodland to the west of Hung Mui Kuk Barbecue Area within Project footprint. Some of them would potentially be impacted due to the road widening and associated slope stabilisation works. Impact evaluation on these flora species of conservation importance is further discussed in **Sections 8.8.40** to **8.8.42** below.

8.8.17 It is challenging to construct extra lanes along an operating carriageway with busy traffic, some temporarily affected areas along the LRTR would be required for material storage, operation of equipment and machinery, construction assess, workspace for labours, and large hoardings to prevent falling objects onto LRT Road during the uphill site formation works, etc. As an

avoidance approach, developed areas and bare ground near the LRTR will be considered as a first priority. Due to the shortage of suitable land, some plantation, mixed woodland, and woodland near Hung Mui Kuk and Kak Tin Village would unavoidably be temporary occupied. Part of these affected habitats are located within the LRCP, which are further discussed in **Sections 8.8.34** to **8.8.39**. Vegetation clearance and tree felling at the temporarily affected areas would be avoided/ minimised as far as possible.

8.8.18 The affected habitats were located next to the LRTR and subjected to continuous disturbance from heavy traffic road, hence these habitats are unlikely to support high diversity and abundance of wildlife. The potentially affected area in these habitats is also relatively small. All temporarily affected area will be reinstated after the completion of the construction. Therefore, the impact of permanent and temporary habitat loss caused by road widening and associated works along the LRTR at Shatin side is considered to be minor on plantation habitat, and minor to moderate on mixed woodland and woodland habitat due the higher ecological value and diversity of flora species they supported. As some plant species of conservation importance and some areas of the LRCP would unavoidably be directly impacted, mitigation measures would be required.

Construction Works at Tunnel Toll Plaza

8.8.19 Several construction works including construction of new footbridge, administration building, car parking space and car depot, vehicular cross-over bridge, and reprovision of bus stops would be conducted at the existing Tunnel Toll Plaza (refer to **60604728/R42b/Figure 8.4.3** for the affected area and **60604728/R42b/Figure 2.4** for the works layout). Most part of the road works in this section would be carried out along the existing LRTR, while the construction of car parking space and car depot and vehicular cross-over bridge adjacent to the southbound lanes would affect a man-made slope covered by plantation (0.1 ha) and a modified watercourse WC3 within the LRCP. Direct impact to the natural woodland within LRCP and the fauna species of conservation importance recorded at the woodland (i.e. the locally common Lesser Bamboo Bat) are avoided through revising the Project footprint and relocating the proposed car park and part of the crossover bridge to southwest of the reprovisioned ADB. The direct habitat loss within LRCP and impact on species of conservation importance are further discussed in **Sections 8.8.9** to **8.8.42**. The natural watercourse S6 at the east side of the LRT toll plaza would not be directly impacted.

8.8.20 The construction of new footbridge and vehicular cross-over bridge at the northbound lane would take place at a man-made slope covered by plantation. Considered the potentially affected areas were relatively small and already subjected to continuous disturbance from heavy traffic, the impact of permanent loss of this plantation (0.25 ha) is considered as minor if unmitigated.

8.8.21 Only limited temporarily affected areas are required in toll plaza area which occur mainly at the periphery of the permanent affected areas. It would temporarily affect some plantation at man-made slopes. Part of these temporary works near southbound lane are located within the LRCP (0.05 ha of plantation), which are further discussed in **Sections 8.8.33** to **8.8.42**. These temporary works would only result in limited disturbance and vegetation clearance and tree felling would be avoided/ minimised as far as possible. Considered that potentially affected area in these habitats is relatively small and they will be reinstated after the completion of the construction, the impact on these habitats is anticipated to be minor. The reinstatement of temporarily affected area by woodland mix planting would be carried out.

Construction at Shatin Tunnel Portal

8.8.22 Construction works in the Shatin tunnel portal area include road widening works, reprovision of an underground surge tank, construction of new tunnel portal structure, ventilation building and slope formation works (refer to **60604728/R42b/Figure 8.4.3** for the affected area and **60604728/R42b/Figure 2.4** for the works layout). Most part of the road works in this section would be carried out along the existing LRTR. The construction of new tunnel portal structure and ventilation building would be conducted at a plantation area (0.24 ha), while associated slope formation works would be required at woodland (<0.01 ha within LRCP and 0.03 ha outside LRCP) and plantation (0.02 ha within LRCP) located at the immediate north of the

existing tunnel portal. The reprovision of the underground surge tank would affect 0.03 ha of woodland habitat located at the east of the STSFWSR outside LRCP. No direct impact is anticipated on the natural watercourses S7 and S8 near the tunnel portal. Considered the potentially affected areas were relatively small and already subjected to continuous disturbance from heavy traffic road, the impact of permanent loss of plantation is considered as minor, and minor to moderate for the loss of woodland, if unmitigated.

8.8.23 Temporary habitat loss in this works section would occur at woodland, plantation and developed area. These temporary works would only result in limited disturbance given vegetation clearance and tree felling would be avoided/ minimized as far as possible. Considered that potentially affected area in these habitats is relatively small and they will be reinstated after the completion of the construction, the impact on these habitats is anticipated to be minor. The reinstatement of temporarily affected area by woodland mix planting would be carried out.

Construction at Kowloon Tunnel Portal

8.8.24 Construction works at Kowloon side include construction of new tunnel portal structure and slope formation works in LRT portal area, and construction of new ventilation building and associated slope formation works to the south west of the LRT portal. There are also widening and realignment of slip roads in Lung Cheung Road and Waterloo Road, as well as construction of a new vehicular bridge in LRTR crossing Lung Cheung Road (refer to **60604728/R42b/Figure 8.4.1** for the affected area and **60604728/R42b/Figure 2.5** for the works layouts). No sites of conservation importance were identified within Project footprint at Kowloon side.

8.8.25 The road widening works and construction of new vehicular bridge would be largely carried out along the existing road alignments (i.e. developed area), but a short section of two modified watercourses WC4 and WC5 of low ecological value (10 m and 20 m respectively) that adjacent to the LRTR would be directly affected. The widening and realignment of slip road in LRTR to the north of Lung Cheung Court would affect 0.12 ha of roadside plantation. While another road widening work in Lung Cheung Road to the southwest of Lion Rock Park would affect 0.04 ha of roadside plantation.

8.8.26 The construction of new tunnel portal structure and associated slope formation works would cause permanent loss of 0.36 ha of plantation on an engineered slope, 0.06 ha of hillside mixed woodland and 0.29 ha of hillside shrubland right above the existing tunnel portal. The construction of a new ventilation building and associated slope formation works next to the LRTR northbound tunnel entrance would cause permanent loss of 0.22 ha of roadside plantation on a man-made slope as well 0.09 ha of the adjoining mixed woodland.

8.8.27 The potentially affected plantation, shrubland and woodland habitats are located close to the LRTR and Lung Cheung Road that situated in a highly urbanised area. These habitats have already subjected to continuous disturbance from heavy traffic road, the impact of permanent loss of these wooded areas is considered as minor, if unmitigated. As the affected sections of modified watercourses (WC4 and WC5) are channelized and only support limited plant species, the impact of loss is considered as minor, if unmitigated.

8.8.28 Temporary habitat loss at Kowloon side would occur at woodland, shrubland, plantation and developed area situated at the margin of permanently affected areas. These temporary works would only result in limited disturbance given vegetation clearance and tree felling would be avoided/ minimized as far as possible. Three mature individuals and six young individuals of the widely planted Rhodoleia were recorded near the Lung Cheung Road Park. They are located within the temporarily affected area for slip road widening and realignment, but potential impact on this species could be avoided. Considered that potentially affected area in these habitats is relatively small and they will be reinstated after the completion of the construction, the impact on these habitats is anticipated to be minor. The reinstatement of temporarily affected area by woodland mix planting would be carried out.

Construction of Natural Terrain Hazard Mitigation Measures

8.8.29 As stated in **Section 2.5**, potential slope failure and natural terrain hazards were identified at the natural terrains east and west to the Hung Mui Kuk Barbecue Area (within LRCP or partially within LRCP) as well as west to Sha Tin Tau New Village (outside LRCP). For the sake of public safety, NTHMMs are proposed (refer to **60604728/R42b/Figure 2.3** and **60604728/R42b/Figure 2.4** for the works locations). In order to avoid and minimize potential impacts on LRCP and the natural habitats there, the footprint of the NTHMMs including the proposed rigid barrier and flexible barriers have been minimized and be located outside LRCP as far as practicable during the design stage. However, as slope failure and hazards are identified within LRCP, some NTHMMs would unavoidably be located at developed / paved areas at LRCP. Tree felling and vegetation trimming would be further avoided and minimized as far as possible by careful design of the locations and orientation of foundation/anchors.

8.8.30 The construction of two rigid barriers at LRCP west and east to Hung Mui Kuk Barbecue Area would be carried out by either small drilling rig or pre-bored H pile drilling rig and only small-scale excavation works is anticipated. This would only affect small area of developed area (0.02 ha), which only supported limited vegetation. These impacted habitats were next to the LRTR and subject to human disturbance (e.g. heavy traffic noise, regular vegetation trimming due to road safety). No flora species of conservation importance were recorded at the Project footprint of the rigid barriers within LRCP while one Chinese Hackberry, which is a common native tree, would unavoidably be affected during the construction of the rigid barriers. Potential impacts on individual trees within LRCP and recommended mitigation are presented in **Section 10**. No water flow was observed at the nearby seasonal watercourses SW1 and SW3. Culvert 3 was observed to receive water occasionally, however, no freshwater fauna was recorded during the survey. Given the proposed rigid barriers would not encroach into SW1, SW3 and Culvert 3, no direct impact to these two watercourses and culvert is anticipated. To minimize potential impact to natural habitat within LRCP (e.g. woodland), no temporary access path or temporary storage would be constructed within LRCP. Considered the scale of the proposed NTHMMs in LRCP are small, and located at developed area currently subjected to continuous disturbance, the impact on LRCP and the habitats there are considered as minor.

8.8.31 Four flexible barriers would be constructed outside LRCP, either located at the existing shotcrete slope or at the woodland margin near the slope fringe. The erection of flexible barriers mainly involves limited drilling works for anchors installation including manual construction of footing for the supporting of steel posts, which would only affect small area of woodland (0.01 ha) and developed area (0.01 ha) habitats. Most of the understorey vegetation within the potentially affected area was common shrub/herb species, such as Wild Coffee, Chinese Privet and Oriental Blechnum. No flora species of conservation importance were recorded within the footprint of flexible barriers. The location and orientation of anchors and footings would be designed carefully to avoid unnecessary tree felling and minimize vegetation trimming as far as practicable. Also, the existing maintenance access of the slope features would be used as the temporary site access for the construction of the flexible barriers while the temporary storage area would be located distantly away from natural habitats (e.g. woodland) in order to further minimize the disturbance. Thus, the impact of habitat loss is considered as minor.

8.8.32 Five flora species of conservation importance were recorded in close proximity to the footprint of proposed rigid barriers and flexible barriers. Three flora species of conservation importance (one seedling of Incense Tree, one individual of Ailanthus and three clumps of Luofushan Joint-fir) were recorded outside the footprint of the proposed rigid barrier. Three flora species of conservation importance (four individuals of Butulang Canthium, one individual of Hong Kong Pavetta and three individuals of Ailanthus) were recorded adjacent to the footprint of proposed flexible barriers outside LRCP. As all of the above species of conservation importance were located outside the footprint of the rigid barriers and flexible barriers, no direct impact would be expected on these species. To protect these species of conservation importance, special attention would be paid to avoid unwanted encroachment to these species of conservation importance during construction phase. Precautionary measures such as no trimming of the flora species of conservation importance (e.g. Luofushan Joint-fir, Incense Tree) and erection of hoardings to clearly demarcate the project footprint and the access for workers would be adopted. All the flora species of conservation importance would be retained with provision of

plant protection zones with sturdy fencing and warning signs. In case in-situ preservation is found to be impractical during the later design phase, appropriate alternative mitigation measures (e.g. transplantation / compensatory planting) should be considered and addressed in the Final PPTP, where necessary. Landscaping works such as planting of native shrubs in pits of rigid barriers and flexible barriers and provision of subdued colour paint would be undertaken to reinstate the affected area upon the completion of works.

Impact to Recognized Sites of Conservation Importance and Species of Conservation Importance

8.8.33 The proposed underground tunneling works under the Project are designed to avoid direct impacts on LRCP, Beacon Hill SSSI and other natural habitats. As detailed in **Section 2.5**, although the aboveground works under the Project are also designed to avoid the LRCP, Beacon Hill SSSI and natural habitats as far as possible, direct encroachment upon the fringe of the LRCP at and near the existing tunnel toll plaza and along the LRTR near Hung Mui Kuk Interchange is inevitable. Given no construction works would be proposed within Beacon Hill SSSI, no direct habitat loss and fragmentation would be resulted at Beacon Hill SSSI.

8.8.34 In total, approximately 1.14 ha aboveground works and 7.42 ha underground tunneling works would fall within the LRCP boundary. Permanent loss of habitats within LRCP would only occur at aboveground Project footprint and a majority of which (about 71%) are located within the developed areas (refer to **Table 8.12**), works within this habitat (e.g. road widening, construction of lay-by) would not directly affect adjacent trees within the LRCP. A total of about 0.16 ha woodland habitats of moderate to high ecological value within LRCP would be permanently affected (Refer to the below table). The three small pieces of woodlands within LRCP are all located at Shatin side. The potentially affected roadside woodland within LRCP mainly located at a man-made slope at the west of the Hung Mui Kuk Barbecue Area (about 0.15 ha). The vegetation on slope were a mixture of common plantation and native species. Two flora species of conservation importance, Incense Tree and Butulang Canthium, were recorded in this woodland. The slope would be affected by the proposed road widening works at the southbound lane of LRTR. The second area involves a very small area (<0.01 ha) of woodland near the eastern side of the LRT Shatin portal. It would be lost due to the slope formation works to be carried out to form the tunnel launching area at Shatin portal. Another very small area (<0.01 ha) of woodland to the south of Kak Tin Village would also be lost due to the road widening works of LRTR at the southbound traffic lane. The potentially impacted woodland comprised common/very common native plant species. Given the above affected areas are situated immediately adjacent to the LRTR, the woodland habitat of moderate to high ecological value has exposed to continuous anthropogenic disturbance (e.g. dust, traffic noise and traffic emission, littering, etc.). About 0.09 ha woodland within the LRCP near Hung Mui Kuk Barbecue Area and Shatin Portal would also be temporary occupied as storage/works area during the construction phase. Considered the small size and continuous disturbed nature of these affected woodlands, the direct impact to these roadside woodland areas is expected to be minor to moderate, if unmitigated.

Table 8.13 Area of Woodland Loss within LRCP

Location	Permanent Loss (ha)	Temporary Loss (ha)
Shatin Portal	<0.01	0.01
Near Hung Mui Kuk Barbecue Area	0.15	0.07
South of Kak Tin Village	<0.01	<0.01
Total	**0.16**	**0.09**

8.8.35 Permanent loss of some plantations (about 0.17 ha) of low to moderate ecological value along LRTR west to Hung Mui Kuk Barbecue Area, and near LRT Sha Tin Portal within LRCP would be occurred under the Project footprint. These plantations were located on roadside engineered slope and comprised common plantation species. Human disturbance such as traffic noise and

regular vegetation management works were frequently recorded. The direct impact of habitat loss to these plantations is considered as minor.

8.8.36 A small area of developed area (about 0.8 ha) within LRCP along LRTR would be permanently lost. This potentially affected habitat was located near the LRT toll plaza, on engineered slope immediate adjacent to the LRTR or along existing LRTR, which subjected to human disturbance (e.g. traffic noise and regular maintenance). This habitat is of low ecological value and only supported very limited vegetation. Considered the small size and already highly disturbed nature under current condition, the direct impact to this habitat is considered as minor.

8.8.37 A small section of modified watercourse (WC3) (less than 0.01 ha and 60 m) south to LRT toll plaza within LRCP would be permanent lost under the Project footprint. No water flow was observed at this modified watercourse. Given this modified watercourse was small and already modified in nature, the impact of habitat loss is considered as minor.

8.8.38 The construction of the two rigid barriers east and west to Hung Mui Kuk would affect approximately 0.02 ha of developed area at LRCP (as detailed in **Section 8.8.30**). No water flow was observed at the nearby seasonal watercourse SW1 and SW3. Given both affected habitats were relatively small in size and highly disturbed in nature, the impact of habitat loss is considered as minor.

8.8.39 The temporarily affected areas are largely located at the margins of the permanently affected areas, which provide essential spaces required for erection of site hoardings, placement of equipment and maneuvering of machinery, material storage and stockpiling, etc. About 0.59 ha temporary loss of habitats (including 0.09 ha woodland, 0.16 ha plantation and 0.33 ha developed area) within LRCP would be anticipated. The majority of temporarily affected areas located along LRTR immediate adjacent to the proposed Project footprint would be affected due to temporary erection of hoardings during construction phase. Other temporarily affected area (e.g. developed area and plantation near Hung Mui Kuk Barbecue Area, woodland near the eastern side of the LRT Shatin portal, and developed area east to LRT Office) would be affected due to temporary material/equipment storage during the construction phase. These temporarily affected habitats were relatively small and the affected woodland and plantation would be reinstated upon the completion of construction works. The reinstatement of temporarily affected area by woodland mix planting would be carried out, thus, the impact of temporary habitat loss is considered as minor.

8.8.40 A total of five flora, one avifauna and one mammal species of conservation importance were recorded in or immediately adjacent to the Project boundary of aboveground works within LRCP. As mentioned in **Section 2.5.34**, it is recommended to adopt the downhill option for the Project and carry out the road widening works downhill of the existing LRT Road as far as practicable. However, the need of uphill works west to Hung Mui Kuk Barbecue Area is required for the road widening works to avoid direct encroachment into existing buildings of World-wide Gardens. Thus, two flora (one seedling of Incense Tree and seven young individual of Butulang Canthium) recorded within the Project footprint west to Hung Mui Kuk Barbecue Area within LRCP would be potentially directly impacted. All the above recorded flora species of conservation importance likely could not be preserved in-situ due to the road widening works, and thus suitable mitigation measure (e.g. transplantation or compensation) would be required. Considered both Butulang Canthium and Incense Tree are locally common plant species and only small number of individuals would be affected, the impact to these flora species of conservation importance is anticipated to be minor to moderate, if unmitigated. The impact to the one mammal species (Lesser Bamboo Bat) outside Project footprint would be described in the **Section 8.8.43** below. Given the remaining three flora species of conservation importance (i.e. Luofushan Joint-fir, Lamb of Tartary and Ailanthus) and one avifauna were recorded outside the proposed Project footprint (refer to **60604728/R42b/Figure 8.4.3** and **60604728/R42b/Figure 8.4.4**), they would not be directly impacted by the proposed works. However, in order to avoid/minimise unwanted impacts to these species of conservation importance, precautionary measures such as erection of hoardings to confine the project footprint and the access by workers would be adopted. Outside LRCP, three flora species of conservation importance including Rhodoleia (nine individuals) found at plantation near Lung Cheung Road Park and Ailanthus (19 individuals) and Butulang Canthium (two individuals) recorded along the LRTR are located within Project

footprint. All Rhodoleia and one individual of Ailanthus recorded in the south of Kak Tin Village would be preserved in-situ, thus no direct impact is anticipated to these species. The remaining 18 individuals of Ailanthus and two individuals of Butulang Canthium likely could not be preserved in-situ due to the road widening works, and thus suitable mitigation measure (e.g. transplantation or compensation) would be required. Hence, the direct impact to these species would be moderate, if unmitigated.

8.8.41 No flora species of conservation importance were located within the footprint of rigid barriers and flexible barriers. However, five flora species of conservation importance were recorded in close proximity to the footprint, i.e. one seedling of Incense Tree, one individual of Ailanthus and three clumps of Luofushan Joint-fir near the rigid barriers within LRCP; and four individuals of Butulang Canthium, one individual of Hong Kong Pavetta and three individuals of Ailanthus near the proposed flexible barriers outside LRCP (as detailed in **Section 8.8.32**). As the construction works would be strictly confined within the proposed footprint of rigid barriers and flexible barriers, direct encroachment within habitats where these flora species situated in (i.e. woodland and mixed woodland) is not anticipated. Hence, no direct impact on flora species of conservation importance due to proposed NTHMMs is expected.

8.8.42 In general, the aboveground works of the Project would lead to permanent and temporary loss of small amount of woodland with moderate to high ecological value, plantation with low to moderate ecological value and developed area and modified watercourse with low ecological value within LRCP (The area of loss on each habitat can refer **Table 8.12**). The associated vegetation on each habitat within LRCP, including two flora species of conservation importance (one seedling of Incense Tree and seven young individuals of Butulang Canthium), would also be directly impacted (as discussed in **Section 8.8.40** above). The potentially affected habitats are currently exposed to continuous anthropogenic disturbance (e.g. dust, traffic noise and traffic emission, littering, etc.) and unlikely to be significant habitats for wildlife. Considered the majority of the aboveground works within LRCP are located in developed area and only small area of woodland (about 0.25 ha) and small number of flora species of conservation importance would be impacted, the direct impact to the LRCP is anticipated to be minor to moderate, if unmitigated.

Direct Harm/Mortality to Wildlife

8.8.43 Construction phase activities (e.g. site clearance and formation) may cause potential direct injury/mortality to wildlife. An individual of Little Egret was recorded at the modified watercourse WC1 within the Project footprint of underground works within LRCP. Given the underground works would not involve any aboveground works, no direct impact on Little Egret is anticipated. A majority of the aboveground Project footprint within LRCP are located on developed area and other habitats immediately adjacent to the LRTR which would unlikely serve as important habitats for wildlife. Species with higher mobility are not anticipated to be significantly impacted, but fauna with lower mobility would be subjected to higher risk of injury or mortality by construction activities. Orange-bellied Leafbird was recorded at the woodland within Project footprint outside LRCP i.e. east to STSFWSR. Lesser Bamboo Bat was south to LRT toll plaza outside Project footprint. Bird species is mobile and likely to move and utilize alternative habitats outside the Project site (e.g. woodland within LRCP or south to STWTW), thus Orange-bellied Leafbird is unlikely to be significantly impacted and direct injured. Given Lesser Bamboo Bat was recorded only once during the survey and no physical sightings of this bat nor its roost were observed within the Project footprint (as **Section 8.6.50**), direct impact on the roost of Lesser Bamboo Bat is not anticipated. The natural section of S7 which may serve as a potential breeding/nursery ground of Small Clubtail (nymph) and Lesser Spiny Frog (tadpoles) is located outside the Project footprint and no construction works would be carried out at this habitat. Hence loss of feeding and breeding ground of wildlife at S7 due to the construction of the Project is not anticipated. Given no proposed works would be undertaken at any permanently flowing watercourses, minor impact is anticipated to the species with relatively lower mobility (e.g. tadpoles, nymph and freshwater crab) which are dependent and restricted to the watercourse habitat. Moreover, the Project footprint for road improvement works would mainly follow the existing LRTR which is already highly disturbed due to heavy traffic under the current condition. The road is less likely utilized by fauna species than the natural woodland habitats at the hillside region. No prominent wildlife movement path was observed across the existing LRTR during the literature review and current survey. Thus, the potential impact of road-kill is not anticipated

to be significant to wildlife. Furthermore, given that no wildlife of conservation importance was recorded within the proposed footprint of NTHMMs and scale of these proposed works are small, hence direct impact on fauna species due to the construction of NTHMMs is not anticipated.

Bird Collision

8.8.44 During construction phase, temporary construction structures using transparent / reflective materials (e.g. noise barrier) may increase the potential of bird collision. The proposed locations of the aboveground construction structures occur mainly along LRTR. Under the current condition, the existing LRTR is highly disturbed due to traffic noise and emission. No prominent flight paths of avifauna were observed during the literature review and current survey. The road is less likely utilized by fauna species than the natural woodland habitats at the hillside region. The impact is anticipated to be minor, if unmitigated.

Indirect Impacts

Habitat Fragmentation

8.8.45 Given the proposed aboveground works would largely take place along the existing LRTR networks and natural/semi-natural habitats immediate adjacent to the LRTR, no habitat discontinuity will be resulted from the construction. Hence, fragmentation is unlikely to be significant due to the proposed works.

Disturbance Impacts on Recognized Sites of Conservation Importance

8.8.46 Construction disturbances (including dust, construction noise and vibration, water quality deterioration, glare) to the recognized sites of conservation importance LRCP and Beacon Hill SSSI may be arising from the proposed works. The disturbance impacts are described in **Sections 8.8.47** to **8.8.52** below.

Disturbance Impacts on Terrestrial Habitat, Vegetation and Fauna

8.8.47 The construction activities of aboveground works would increase temporary disturbance including construction noise and vibration and result in indirect impacts to nearby natural habitats (i.e. woodland, mixed woodland and natural watercourses) and the associated fauna, and cause reduction of species abundance or diversity. Under the current condition, the majority of natural habitats next to the proposed Project site along LRTR was already highly disturbed. Hence, the disturbance impact is considered as minor to moderate if unmitigated, and the reduction of species abundance or diversity is expected to be minor as the existing disturbance level along LRTR would not be significantly increased by the construction of the Project.

8.8.48 According to **Section 4**, potential ground-borne noise impact during construction phase of the Project would arise mainly from the PME (such as hydraulic breaker, drill rig and hand-held breaker and tunnel boring machine (TBM)) to be operated inside the tunnels for rock breaking/drilling works. Construction works using a TBM takes place mainly underground, which could significantly reduce noise, dust and disruption to nearby noise sensitive receivers (EPD, 2016). The predicted overall noise levels at most of the noise sensitive receivers (including LRCP) at Shatin side under the with-Project mitigated scenario would comply with the respective noise criteria

8.8.49 Dust generated during construction phase (e.g. from construction machinery, improper storage) could affect the flora at nearby habitats (including LRCP, Beacon Hill SSSI). Construction dust could cover the leaves of plants in adjacent habitats and may in turn affect photosynthesis, respiration, transpiration and deteriorate their health. Given the LRTR is a busy road with heavy traffic flow, the flora species immediate adjacent to the LRTR has already exposed to high level of disturbance due to traffic emission. The impact is anticipated to be minor to moderate if unmitigated. As stated in **Section 3**, the predictions showed that daily and annual averages of respirable suspended particulates and fine suspended particulates, hourly and annual averages of NO_2 at representative ASRs would comply with the AQOs.

8.8.50 Artificial lighting (glare) may affect light sensitive wildlife (e.g. mammal, nocturnal avifauna) at nearby habitats including woodland and mixed woodland within LRCP. This could result in disorientation and attraction of light sensitive / nocturnal fauna to artificial light, and disruptive effects on their light-sensitive cycles. This can affect migration, foraging / predation and breeding success of these species. However, given that most of the habitats at and near the Project footprint were already subjected to glare disturbance from existing traffic and residential buildings, and the construction works of the Project is unlikely to significantly increase the existing glare disturbance level, hence the glare impacts is expected to be minor.

8.8.51 As stated in **Section 5**, wastewater generated from land-based construction works and site runoff could potentially pose indirect impacts on the water quality at adjoining watercourses. Wastewater, site run-off and accidental spills are generally characterized by high concentrations of suspended solid (SS) and turbidity. Various construction works may also generate debris and rubbish such as packaging, construction materials and refuse. Uncontrolled discharge of site effluents, rubbish and refuse generated from the construction works could lead to water quality deterioration. Some natural watercourses (i.e. S3, S4, S5, S6, S7, and S8), modified watercourse WC2, and seasonal watercourses (SW1 and SW3) are located near the LRTR Project footprint. It is expected WC2, S4, S5, SW1, SW3 and the downhill sections of S3, S6 and S8 may subject to water quality disturbance. For natural watercourse S7 which is located above the LRT Shatin portal, no water quality disturbance is anticipated as it is situated in uphill area and maintain a considerable distance from the Project footprint at Shatin portal.

8.8.52 Construction activities (e.g. site formation, set up of hoarding) may hinder the movement and create significant barrier effect to mobile fauna within the Project site. However, given the existing LRTR is a heavy traffic road and highly disturbed, the utilization of this area as an important movement corridor by fauna species is considered to be unlikely under the current condition. No prominent flight path of avifauna and other wildlife movement path were observed during the literature review and current survey. Thus, the barrier effect and the disturbance impact on the movement of mobile species within the Project site is considered as minor.

Disturbance Impacts on Ardeid Night Roost Site and Ardeid Flight Path

8.8.53 The ardeid pre-roosting and night roost site recorded at SMRC was approximately 630 m away from the nearest proposed Project boundary. Thus, the disturbance impacts are unlikely to be significant to the ardeid pre-roosting and night roosting site. Moreover, no night roosting ardeid flight paths were recorded from the direction of Project site during the current ecological surveys. Thus, no significant disturbance impact on flight path of night roosting ardeids due to the proposed works is anticipated.

Groundwater Infiltration

8.8.54 The underground works of this Project (about 1.4 km long) would be carried out along the existing LRT alignments. The works include enlargement of Kowloon bound tunnel tube by using drill and break method, rehabilitated Shatin bound tunnel tube and construction of new middle tunnel tube by using TBM method (refer to **60604728/R42b/Figure 8.4.1** to **60604728/R42b/Figure 8.4.2** for the affected area and **60604728/R42b/Figure 2.4** to **60604728/R42b/Figure 2.5** for the works details). Majority of the underground works would be conducted beneath the LRCP. The Beacon Hill SSSI is situated in the immediate west of the LRT. The underground works would pass through habitats including woodland, mixed woodland, shrubland, modified watercourse and developed area. No permanently-flowing natural watercourse was found above the underground Project footprint.

8.8.55 As stated in **Section 5.6**, underground works may result in infiltration of groundwater if uncontrolled. The major concern from underground construction activities would be the increase in site runoff and the associated potential drawdown of groundwater in any soil and aquifer layers. Groundwater infiltration would affect the construction works and infiltrated water would carry away silt and other contaminants from site into the site drainage. Consideration should be taken at the early design stage to minimize the infiltration of groundwater. Underground development may also drawdown groundwater in any soil and aquifer layers if uncontrolled. Practical

groundwater control measures should be followed to minimize the potential groundwater infiltration.

Operation Phase

Direct Impacts

No Additional Habitat Loss and Habitat Fragmentation

8.8.56 There would be no additional habitat loss during the operation phase of the Project. Thus, no direct impact on the recognized sites of conservation importance (i.e. LRCP and Beacon Hill SSSI) and natural habitats within the assessment area is anticipated. No habitat fragmentation is expected during operation phase.

Direct Harm/Mortality to Wildlife

8.8.57 The traffic flow along the proposed LRT during operation phase may cause potential direct injury/mortality to wildlife (e.g. road-kill). However, given the proposed works would mainly follow the existing LRTR which is already highly disturbed due to heavy traffic under the current condition. The road is less likely utilized by fauna species than the natural woodland habitats at the hillside region. No prominent wildlife movement path was observed across the existing LRTR during the literature review and current survey. Given the proposed LRT during the operation phase would be similar to the current condition which would also be a heavy traffic road, the potential impact of direct harm including road-kill to wildlife during the operation phase is considered as minor.

Bird Collision

8.8.58 There will be no high-rise buildings under the Project footprint during operation phase. Increased risk of bird collision with transparent noise barriers along LRTR (e.g. near Worldwide Garden and Fung Shing Court) is anticipated during the operation phase. More than half of the recorded species of conservation importance were recorded within the less disturbed woodland habitat at the hillside region. Other recorded avifauna species were generalists that adapted to man-made structures and vehicles by alternating their flight paths and flight height. Potential bird collision due to noise barriers along LRTR during operation phase would be minor to moderate, if unmitigated.

Indirect Impacts

Disturbance Impacts on Terrestrial Habitat, Vegetation and Fauna

8.8.59 The operation of LRT could result in disturbance to the nearby recognized sites of conservation importance (i.e. LRCP), natural habitats (e.g. woodland, mixed woodland, natural watercourse) and associated fauna and flora in the vicinity of Project boundary. These disturbance impacts include glare, noise, surface runoff and traffic emission. However, as the directly affected areas (including habitats within LRCP) are already located in the vicinity of the existing LRTR of similar levels of disturbance, the magnitude of change is considered as minor to moderate, if unmitigated. Considered Beacon Hill SSSI is located at uphill area about 220 m away from the LRT Shatin portals, it is unlikely to be significantly impacted by the disturbance generated from the LRT operation.

8.8.60 The proposed Project site largely follows the existing LRTR, therefore, it is anticipated the traffic condition would be similar to the current condition. Given the existing LRTR is a road with heavy traffic flow, the utilization of the Project site as a movement corridor by fauna is considered to be minimal under the baseline condition. The disturbance impact on the movement of mobile species within the Project site during operation phase is considered as minor.

8.8.61 For the NTHMMs, although routine maintenance inspection may be required, the level of disturbance is considered minimal given the inspection would be occasional and temporary.

Disturbance Impacts on Ardeid Night Roost Site and Flight Path

8.8.62 Given the night roosting site is located approximately 630 m away from the nearest Project boundary, the disturbance impacts are unlikely to be significant to the ardeid night roost site. Moreover, no night roosting ardeid flight paths were recorded from the direction of Project site, it is anticipated the proposed LRT alignment would not lead to significant disturbance impact on the flight path of night roosting ardeids during operation phase.

8.9 Evaluation of Ecological Impact

8.9.1 Potential ecological impacts on the identified habitats within the assessment area associated with the construction and operation of the Project have been evaluated in accordance with the Annex 8 of the EIAO-TM, as presented in **Table 8.14** to **Table 8.19**.

Woodland and Mixed Woodland

8.9.2 The major impact on woodland within assessment area includes permanent (0.24 ha) and temporary (0.13 ha) habitat loss by road widening and associated works, construction of new car parking space and car deport and vehicular cross-over bridge, slope formation works and proposed NTHMMs (i.e. flexible barrier). Part of the permanently affected woodland (0.16 ha) is located within the LRCP (as stated in **Table 8.13**) to the west of the Hung Mui Kuk Barbecue Area, Shatin Portal and South of Kak Tin Village. The affected woodland patches within LRCP were considered as of moderate to high ecological value. However, it should be noted these woodlands are located in the margin of the habitat and situated next to developed areas (e.g. LRTR and LRT Poral), and are currently exposed to relatively high disturbance compared with the uphill woodlands within LRCP. The significance of the small area of permanent woodland loss at LRCP is evaluated as minor to moderate. Similarly, given that the temporarily affected habitats within woodland habitat were relatively small (total 0.13 ha, 0.09 ha within LRCP) and the affected habitats would be reinstated upon the completion of construction works by woodland mix planting and compensatory planting, minor ecological impact is anticipated from the temporary loss and indirect disturbance impact.

8.9.3 Within woodland habitat, two flora species of conservation importance (Incense Tree and Butulang Canthium) were recorded within the Project footprint. Mitigation measures would be required to mitigate potential direct impact to the plant species.

8.9.4 The major impact to mixed woodland is the permanent (0.62 ha) and temporary loss (0.33 ha) of habitat due to road widening and associated works, and slope formation works outside LRCP. These affected mixed woodland patches were mainly situated in the margin of mixed woodland which already surrounded by developed area or village/orchard, hence subject to certain level of existing disturbance. Considering the affected habitat only support moderate floral and low fauna diversity, as stated in **Sections 8.6.13** and **8.6.14**, the overall ecological value and already subject to disturbance, minor to moderate ecological impact is anticipated from the habitat loss. Given that the temporarily affected habitats within mixed woodland habitat were relatively small (0.33 ha) and the affected habitats would be reinstated upon the completion of construction works by woodland mix planting. Hence, the indirect disturbance impact on this habitat is also expected to be minor.

Table 8.14 Potential Ecological Impacts to Woodland and Mixed Woodland Habitats

Criteria	Woodland	Mixed Woodland
Habitat quality	Moderate to high – for contiguous woodland within LRCP Moderate – for remaining isolated woodland	Low to Moderate – for remaining mixed woodland
Species	High floral and moderate faunal diversity 14 flora, 16 avifauna, nine butterfly, three odonate, one reptile and 13 mammal species of conservation importance were recorded in current and previous studies.	Moderate floral and low faunal diversity Seven flora, one avifauna, one butterfly, one reptile and three mammal species of conservation importance were recorded in current and previous studies.
Size/Abundance	Permanent loss (0.24 ha in total): – 0.16 ha within LRCP (i.e. <0.01 ha near LRT Shatin portal, 0.15 ha roadside woodland at an engineered slope near Hung Mui Kuk Barbecue Area and <0.01 ha south of Kak Tin Village) – 0.07 ha outside LRCP near Shatin portals Temporary loss (0.13 ha in total): – 0.09 ha within LRCP (i.e. 0.01 ha near Shatin portal and 0.07 ha near Hung Mui Kuk Barbecue Area) – 0.04 ha of woodland outside LRCP near LRT Shatin and Kowloon portals	Permanent loss (0.62 ha) and temporary loss (0.33 ha) of mixed woodland habitat outside LRCP are anticipated
Duration	Direct impact (habitat loss) within the Project footprint would be permanent. Temporary habitat loss would be reversible. Indirect impact (noise and vibration, air/dust, glare) during construction phase would be temporary. Indirect impact (glare, noise, increase in human disturbance) during operation phase would be permanent.	Direct impact (habitat loss) within the Project footprint would be permanent. Temporary habitat loss would be reversible. Indirect impact (noise and vibration, air/dust, glare) during the construction phase would be temporary. Indirect impact (noise, increase in human disturbance) during operation phase would be permanent.
Reversibility	Permanent habitat loss within LRCP and LRT Shatin portals would be irreversible. Temporary habitat loss and construction phase indirect impacts (air/dust, noise, glare) would be reversible. Operation phase indirect impacts (air/dust, disturbance, increase in human activities) would be irreversible.	Permanent habitat loss would be irreversible. Temporary habitat loss and construction phase indirect impacts (disturbance, increase in human activities) would be reversible. Operation phase indirect impacts (air/dust, disturbance, increase in human activities) would be irreversible.
Magnitude	Low to moderate – for woodland within LRCP low – for remaining woodland outside LRCP	Low to moderate
Overall Impact Evaluation	**Minor to moderate** – for woodland within LRCP **Minor** – for remaining woodland outside LRCP	**Minor to moderate** – for mixed woodland near Kak Tin Village, east to Lion Rock High Level No. 2 Fresh Water Primary Service Reservoir **Minor** – for remaining patches

Plantation and Shrubland

8.9.5 The major impact to plantation is the permanent loss (3.40 ha) of habitat due to road widening and associated works, construction of new footbridge, vehicular cross-over, bridge tunnel portal structure, ventilation building and slope formation works. Temporary loss (0.98 ha) on this habitat is also anticipated. Plantation habitat within the assessment area is subject to certain level of existing disturbance. Small areas of plantation on engineered slopes near LRT toll plaza, near LRT Shatin portals and east and west to Hung Mui Kuk Barbecue Area are located within LRCP and continuously subject to disturbance such as traffic noise and emission. Considering

the nature of the affected plantation and the fact that they only support low or low to moderate floral diversity and with simple flora structure, as stated in **Section 8.6.20** and **8.6.21**, and the overall ecological value, minor ecological impact is anticipated from the loss of plantation under the project. Indirect disturbance impact on this habitat is also expected to be minor.

8.9.6 Within plantation habitat, three flora species of conservation importance (Ailanthus, Butulang Canthium and Rhodoleia) were recorded within the Project footprint. Given the affected Rhodoleia would be preserved in-situ, no direct impact is anticipated. Mitigation measures would be required to mitigate potential direct impact to the plant species Ailanthus and Butulang Canthium.

8.9.7 While a small proportion of shrubland (0.29 ha) north to the LRT portals at Kowloon would be permanently loss due to slope formation works, a majority of shrubland habitats are unlikely to be directly or indirectly impacted due to their relatively far distance from the Project footprint. Considering the low to moderate ecological value and low to moderate flora and low fauna diversity supported by this shrubland, as stated in **Section 8.6.23**, minor/negligible ecological impact is anticipated from the habitat loss and indirect disturbance impact.

Table 8.15 Potential Ecological Impacts to Plantation and Shrubland Habitats

Criteria	Plantation	Shrubland
Habitat quality	Low to moderate – for plantation within LRCP Low – for remaining plantation	Low to moderate
Species	Low to moderate floral and low faunal diversity – for the plantation on engineered slope along LRTR (within LRCP) Low floral and faunal diversity – for the plantation south to portals at Sha Tin, north to portals at Kowloon, along roadside, on engineered slope or interspersed with developed areas Five flora, one avifauna, one butterfly, one odonate and two mammal species of conservation importance were recorded in current and previous studies.	Low to moderate floral and low faunal diversity. Two flora and one avifauna species of conservation importance were recorded.
Size/Abundance	Permanent loss (3.40 ha) and temporary loss (0.98 ha) of this habitat are anticipated. Permanent loss (3.40 ha in total): – 0.17 ha within LRCP (i.e. 0.1 ha near LRT toll plaza, 0.02 ha near LRT Shatin portals and 0.05 ha west Hung Mui Kuk Barbecue Area) – 3.23 ha outside LRCP near LRT Shatin portals, LRT toll plaza, Kowloon portals and Hung Mui Kuk Barbecue Area and along LRTR Temporary loss (0.98 ha in total): – 0.16 ha within LRCP (i.e. 0.06 ha near Shatin portal and 0.1 ha near Hung Mui Kuk Barbecue Area) – 0.82 ha of plantation outside LRCP near LRT toll plaza, LRT Kowloon portals, Hung Mui Kuk Barbecue Area and along LRTR	Permanent loss (0.29 ha) and temporary loss (0.04 ha) of this habitat outside LRCP are anticipated
Duration	Direct impact (habitat loss) within the footprint of the proposed works would be permanent. Temporary habitat loss would be reversible. Indirect impact (noise and vibration, air/dust) during construction phase would	Direct impact (habitat loss) within the footprint of the proposed works would be permanent. Temporary habitat loss would be reversible. Indirect impact (noise and vibration, air/dust) during construction phase would

Criteria	Plantation	Shrubland
	be temporary. Indirect impact (air/dust, noise, increase in human activities) during operation phase would be permanent.	be temporary. Indirect impact (air/dust, noise, increase in human activities) during operation phase would be permanent.
Reversibility	Permanent habitat loss would be irreversible. Temporary habitat loss and construction phase indirect impacts (air/dust, noise, glare) would be reversible. Operation phase indirect impacts (air/dust, noise, increase in human activities) would be irreversible.	Permanent habitat loss would be irreversible. Temporary habitat loss and construction phase indirect impacts (air/dust, noise, glare) would be reversible. Operation phase indirect impacts (air/dust, noise, increase in human activities) would be irreversible.
Magnitude	Low	Low
Overall Impact Evaluation	**Minor** – for plantation along LRTR and at LRT portals in Shatin (including those within LRCP) and LRT portals at Kowloon **Negligible** – for remaining plantation	**Minor** – for shrubland north to the LRT portals at Kowloon **Negligible** – for remaining shrubland

Active and Abandoned Agricultural Land

8.9.8 No direct impact is anticipated in both active and abandoned agricultural land habitats. Given the relatively far distance between these habitats and the Project footprint, indirect disturbance impact on these habitats would be considered as negligible as summarised below.

Table 8.16 Potential Ecological Impacts to Active and Abandoned Agricultural Land Habitats

Criteria	Active Agricultural Land	Abandoned Agricultural Land
Habitat quality	Low	Low
Species	Low floral and faunal diversity. No species of conservation importance was recorded.	Low floral and faunal diversity. One butterfly, one reptile and one mammal species of conservation importance were recorded in current and previous studies.
Size/Abundance	No direct loss of this habitat is anticipated.	No direct loss of this habitat is anticipated.
Duration	Indirect impact (noise and vibration, air/dust) during construction phase would be temporary. Indirect impact (air/dust, noise, increase in human disturbance) during operation phase would be permanent.	Indirect impact (noise and vibration, air/dust) during construction phase would be temporary. Indirect impact (air/dust, noise, increase in human disturbance) during operation phase would be permanent.
Reversibility	Construction phase indirect impacts (air/dust, noise, glare) would be reversible. Operation phase indirect impacts (air/dust, noise, increase in human activities would be irreversible.	Construction phase indirect impacts (air/dust, noise, glare) would be reversible. Operation phase indirect impacts (air/dust, noise, increase in human activities) would be irreversible.
Magnitude	Negligible	Negligible
Overall Impact Evaluation	**Negligible**	**Negligible**

Village/Orchard and Developed Area

8.9.9 No direct impact is anticipated in village/orchard habitat, while area adjacent to the Project footprint would be subjected to potential disturbance impact (air/dust, noise, glare). However, as this habitat only supported low floral and faunal diversity and already subjected to high levels of human disturbance. The indirect impact to this habitat is considered as minor.

8.9.10 Majority of Project footprint is covered by developed area. About 10.24 ha of developed area would be encroached upon by proposed infrastructural/ road works and proposed NTHMMs (i.e. rigid barrier and flexible barrier), while about 1.26 ha of developed area would be temporary loss

due to temporary works and storage. As this habitat is entirely man-made and disturbed, and only supports low faunal diversity of common species and variety of introduced or horticultural flora species, impact of redevelopment in this habitat is considered to be minor as summarised below.

Table 8.17 Potential Ecological Impacts to Village /Orchard and Developed Area

Criteria	Village/Orchard	Developed Area
Habitat quality	Low	Low
Species	Low floral and faunal diversity. Two avifauna and two mammal species of conservation importance were recorded.	Moderate to high floral and low faunal diversity, but most flora are introduced or horticultural species Five flora, four avifauna, one odonate, one reptile, four mammal species of conservation importance were recorded in current and previous studies.
Size/Abundance	No direct loss of this habitat is anticipated.	Permanent loss (10.24 ha) and temporary loss (1.26 ha) of this habitat are anticipated.
Duration	Indirect impact (noise and vibration, air/dust) during construction phase would be temporary. Indirect impact (air/dust, noise, increase in human disturbance) during operation phase would be permanent.	Direct impact (habitat loss would be permanent. Indirect impacts (air/dust, noise, glare) during construction phase would be temporary. Indirect impacts (air/dust, noise, increase in human activities) during operation phase would be permanent.
Reversibility	Construction phase indirect impacts (air/dust, noise, glare) would be reversible. Operation phase indirect impacts (air/dust, noise, increase in human activities would be irreversible.	Permanent habitat loss would be irreversible. Temporary habitat loss and construction phase indirect impacts (air/dust, noise, glare) would be reversible. Operation phase indirect impacts (air/dust, noise, increase in human activities) would be irreversible.
Magnitude	Low	Low
Overall Impact Evaluation	**Minor**	**Minor**

Pond and Natural Watercourse

8.9.11 No direct impact is anticipated in pond habitat. Given that this habitat is isolated and highly disturbed (by traffic, human activities, etc.), and only support low floral and faunal diversity of common species. Indirect disturbance impact on this habitat would be considered as negligible.

8.9.12 No direct impact is anticipated in natural watercourse habitat. No diversion and modification of natural watercourses, including S5 and any other watercourses located within and immediately adjacent to the Project footprint) is anticipated. Potential water quality related impact including construction site runoff, road runoff and accidental spills would potentially affect natural watercourses adjacent to the Project site and lead to lethal / sublethal impacts to associated flora and fauna. However, given that majority of natural watercourses with higher ecological value (e.g. S3 (upper section), S5, S6 (upper section), S7 and S8 (upper section)) are situated in uphill area to the southeast of LRTR or far from the Project footprint (S1), it is expected that runoff and accidental spills would not affect these watercourses. While natural watercourses situated in downhill to the northwest of LRTR would subject to indirect disturbance impact. Given these affected sections of watercourses supported low to moderate floral and low faunal diversity, the impact is considered to be minor as summarized below.

Table 8.18 Potential Ecological Impacts to Pond and Natural Watercourse Habitats

Criteria	Pond	Natural Watercourse
Habitat quality	Low	Moderate to high – for S1, S2, S3, S5, S6, S7, S8 Low to moderate – for S4, SW1, SW2, SW3 and SW4
Species	Low floral and faunal diversity No species of conservation importance were recorded.	Moderate floral and low faunal diversity – for S1, S2, S3, S5, S6, S7, S8 Low to moderate floral and low faunal diversity – for S4, SW1, SW2, SW3 and SW4 Eight flora, one avifauna, five odonate, four amphibian, three reptile, one freshwater fish, and three freshwater fauna species of conservation importance were recorded in current and previous studies.
Size/Abundance	No direct loss of this habitat is anticipated.	No direct loss of this habitat is anticipated.
Duration	Indirect impact (noise and vibration, air/dust) during the construction phase would be temporary. Indirect impact (air/dust, noise, increase in human activities) during operation phase would be permanent.	Indirect impact (construction site runoff, groundwater infiltration) during the construction phase would be temporary. Indirect impact (road runoff) during operation phase would be permanent.
Reversibility	Construction phase indirect impacts (air/dust, noise, glare) would be reversible. Operation phase indirect impacts (air/dust, noise, increase in human activities) would be irreversible.	Construction phase indirect impacts (construction site runoff, groundwater infiltration) would be reversible. Operation phase indirect impacts (road runoff) would be irreversible.
Magnitude	Negligible	Low, not directly affected
Overall Impact Evaluation	**Negligible**	**Minor**

Modified Watercourse

8.9.13 Majority of modified watercourse within the assessment area would be retained, except part of WC3 within LRCP, which would be permanently loss (less than 0.01 ha and 60 m) due to the construction of new car parking space and car depot and vehicular cross-over bridge. Short section of WC4 and WC5 (approximately <0.01 ha and 30 m in total) would be permanently affected due to road widening works. Given that WC3 was concreted and no water flow was observed during the survey, the impact of habitat loss is considered as minor as no flora and fauna species would be affected. As the proposed elevated highway structure will span over and no construction works would be encroached into the channel bed of Culvert 1, Culvert 1 within LRCP would not be directly affected. Culverts 1 to 3 located within or adjacent to the Project boundary within LRCP would not be directly affected under the Project. Indirect disturbance including construction site runoff and accidental spills would potentially affect the water quality of modified watercourses and lead to lethal / sublethal impacts to associated flora and fauna, however, the impact would be considered as minor since these modified watercourses adjacent to the LRTR are currently subject to disturbance and only support low floral and faunal diversity.

Table 8.19 Potential Ecological Impacts to Modified Watercourse Habitat

Criteria	Modified Watercourse
Habitat quality	Low
Species	Low floral and faunal diversity. Two avifauna, one butterfly, two odonate, two amphibian, two reptiles, two mammal and one freshwater fish species of conservation importance were recorded. Among them, only one avifauna was recorded within Project footprint of underground works; the other species were recorded outside Project footprint.

Criteria	Modified Watercourse
Size/Abundance	Direct loss of part of WC3 within LRCP and section of WC4 and WC5 (<0.01 ha) near LRT Kowloon portals are anticipated.
Duration	Permanent habitat loss within LRCP and near LRT Kowloon portals would be irreversible. Indirect impact (construction site runoff, groundwater infiltration) during construction phase would be temporary. Indirect impact (road runoff) during operation phase would be permanent.
Reversibility	Permanent habitat loss within LRCP and near LRT Kowloon portals would be irreversible. Construction phase indirect impacts (construction site runoff, groundwater infiltration) would be reversible. Operation phase indirect impacts (road runoff) would be irreversible.
Magnitude	Low
Overall Impact Evaluation	**Minor**

8.10 Mitigation of Adverse Ecological Impacts

General

8.10.1 According to the *Annex 16* of *EIAO-TM* and *EIAO Guidance Note. 3/2010*, ecological impacts on important habitats and the associated wildlife caused by the proposed Project should be mitigated, in order of priority, avoidance, minimization, and compensation approaches to the maximum practical extent.

Avoidance

Avoidance of Adverse Impacts to Recognized Sites of Conservation Importance and Natural Habitats

Optimisation of Project Footprint

8.10.2 The Project has avoided (as the first priority) recognized sites of conservation importance, consider and recommend practicable alternatives such as modification of alignment, design and/or construction methods, to avoid direct encroachment upon the sites. There would be no aboveground works within the Beacon Hill SSSI and direct impacts on LRCP and the natural habitats there are largely avoided. As detailed in **Section 2.5**, in order to fulfill the tunnel operational and public transport requirements, the future tunnel administration area (i.e. tunnel administration building, car park, vehicular crossover bridge and pedestrian footbridge have to be located southwest of the reprovisioned ADB. Although alternative options were also explored to avoid direct impacts on LRCP, a small portion of the project footprint will unavoidably be located within the fringe of the LRCP mainly at developed areas and habitats of limited ecological values. Nevertheless, part of the associated facilities such as the workshops, depots and car parks will make use of the existing tunnel support areas as far as possible to avoid/minimize additional space needed and any further encroachment into LRCP (refer to **Sections 2.5.15 to 2.5.19**).

8.10.3 Two ventilation buildings will be provided under the Project, one at each the Shatin and Kowloon Portals. Consideration was previously given to provide dedicated ventilation buildings to each tunnel tubes. Nevertheless, it is currently proposed to combine the ventilation buildings at each portal to allow better tunnel operation and reduce the required footprint, which in turn reduces the extent of woodland and plantation loss. Also, the two proposed ventilation buildings will not encroach LRCP.

8.10.4 The construction of the new middle tunnel and the enlargement of the existing Kowloon bound tunnel are expected to generate significant amount of excavated spoils and a temporary stockpiling area is required. Having reviewed the above and taken into account the need to avoid direct encroachment upon natural habitats within LRCP, the proposed area for temporary

stockpiling is now located at the north of the existing toll plaza near downhill side within the footprint of the permanent works (i.e. no additional ecological impacts) and away from the LRCP (refer to **Sections 2.6.10** to **2.6.13**).

8.10.5 As stated in **Sections 2.5.36 to 2.6.3**, potential slope failure and natural terrain hazards were identified at some natural terrains along LRTR (i.e. east and west to Hung Mui Kuk Barbecue Area (within LRCP or partially within LRCP), and west to Sha Tin Tau New Village (outside LRCP)). In order to avoid and minimize the potential impacts to LRCP, natural habitats and associated vegetation, NTHMMs of smaller footprint (rigid barriers and flexible barriers) are proposed for the sake of public safety. In order to avoid and minimize potential impacts on LRCP and the natural habitats there, the footprint of the NTHMMs including the proposed rigid barrier and flexible barriers have been minimized and be located outside LRCP as far as practicable during the design stage. However, as slope failure and hazards are identified within LRCP, some NTHMMs would unavoidably be located at developed / paved areas at the margin of the LRCP.

Adjustment of Road Alignment

8.10.6 Different road alignments were explored and the downhill option (i.e. area north of LRTR) is generally adopted wherever applicable to avoid/minimise encroachment upon LRCP, woodland habitats, watercourses, flora and fauna there to the maximum practicable extent (**Sections 2.5.26** to **2.5.35** refer).

Ecological Considerations in Widening of LRTR

8.10.7 Extensive environmental considerations have been taken into account during the evaluation of design and construction options in order to avoid and minimize environmental impacts and maximize environmental benefits as far as possible. The uphill option would encroach within the LRCP as compared to the downhill option and would also lead to the direct loss of wooded areas, watercourses and impact to wildlife. As such, it is recommended to avoid uphill option as far as practicable (**Sections 2.5.26** to **2.5.35** refer).

8.10.8 Road widening works along LRTR would mainly comprise construction of slopes and retaining walls. The construction of the road widening roads mainly in the downhill area significantly replaced the need for massive equipment for bored piling works uphill to relatively much smaller filling and retaining structures downhill that require simpler and more environmentally friendly equipment (refer to **Section 2.6.15** for the engineering considerations in the design of road widening works along LRTR).

8.10.9 Given the proximity to the LRTR, there is currently minimal buffer space between the uphill slopes and the carriageway of LRT (refer to **Sections 2.5.28** to **2.5.32**). When avoidance through adoption of downhill option is technically not feasible, some sections of road widening works would inevitably be required at uphill of LRTR. Due to the steepness of the uphill slopes, extensive slope cutting for the road widening works which will possibly result in the loss of country park area is not preferred. Hence, slope stabilization in the form of retaining structures would be adopted, as far as practicable, so as to avoid/minimise the extent of potential direct impact to the upslope area (e.g. at LRCP near Hung Mui Kuk Barbecue Area).

Ecological Considerations in Tunnel Alignment Options

8.10.10 The alignment of the new tunnel is proposed to be conducted in the middle of the existing LRT tubes under the current study. This middle tunnel alignment is shorter than the west and east options (about 1.4 km), and is also further away from the inferred fault to the west of the existing LRT, hence the risk of excessive groundwater drawdown (and therefore the potential adverse impacts to the ecology of the important ecological resources of LRCP and Beacon Hill SSSI) is much smaller than the other two tunnel alignment options.

8.10.11 The middle alignment option will also require the least site formation works at the portal areas and therefore envisaged to have significantly less tree felling and disturbance to the natural

hillside than the east and west option. Unlike the east alignment option, no excavation within LRCP and Beacon Hill SSSI is envisaged due to the middle tunnel alignment. Adoption of the middle alignment option also avoided direct impact to the hillside vegetation at the LCRP and Tei Lung Hau. Moreover, as the middle alignment is situated between the two existing tunnels where the construction works will only take place at the disturbed slopes with plantation (refer to **section 2.5.12**).

Minimization

Minimisation of Adverse Impacts to Recognized Sites of Conservation Importance and Natural Habitats

8.10.12 As mentioned in **Section 2.5**, under the scheme development, detailed evaluation of different alignments and structural forms was undertaken to arrive at the optimal layouts for the LRT. This included evaluation of the potential ecological impacts arising from various road alignment and construction options.

8.10.13 Through careful design consideration (as discussed in **Sections 8.10.2** to **8.10.11**), the majority parts of the recognized sites of conservation importance (e.g. Beacon Hill SSSI and LRCP at hillside region) and natural habitats (e.g. woodland, natural watercourse) were excluded from the proposed footprints. While the works under the Project are designed to avoid the LRCP and natural habitats as far as possible, encroaching into the LRCP is inevitable near the existing tunnel toll plaza and along LRTR near the Hung Mui Kuk Interchange. The works will lead to habitat loss and impact to site and species of conservation importance, as such, implementation of appropriate mitigation measures is deemed necessary.

8.10.14 Provision of screening (e.g. by erection of hoarding) during construction phase is recommended to confine the proposed Project footprint to avoid any unnecessary encroachment of construction works into the adjacent sensitive natural habitats. Precautionary measure (erection of hoarding at Project footprint near natural watercourse) should also be implemented to prevent unintended access or use of natural watercourses within or in the vicinity of Project footprint (i.e. S2 to S8) by workers to avoid or minimize potential disturbance impacts to natural watercourses.

8.10.15 Potential slope stabilization works may be undertaken at woodland, mixed woodland and plantation habitats at portals at Sha Tin and along LRTR. Given some slope stabilization works would be located within LRCP (e.g. at the Sha Tin portal, along LRTR west to Hung Mui Kuk Barbecue Area), the extent of slope stabilization works should be carefully reviewed to further avoid or minimize the potential adverse ecological impact (e.g. vegetation loss, impact to LRCP) to the maximum practicable extent during the detailed design and construction stage.

8.10.16 The two proposed rigid barriers would be located at the margin of LRCP (i.e. developed area) and the flexible barriers would be located within/at the engineering slope fringe outside LRCP and closest to the LRTR as far as practicable. Also, the design of proposed rigid barriers and flexible barriers (e.g. extent, dimension, construction method) would be carefully designed and adjusted on site to avoid/minimize tree felling and vegetation trimming to the maximum practicable extent. However, as slope failure and hazards are identified within LRCP, some NTHMMs would unavoidably be located at the developed / paved areas at the margin of the LRCP. However, as slope failure and hazards are identified within LRCP, some NTHMMs would unavoidably affect the developed / paved areas and associated flora species on existing engineered slope at the margin of the LRCP. Nevertheless, tree felling should be minimized during construction of NTHMMs including those within LRCP and natural habitats (woodland) as far as possible. For trees to be affected, the potential impacts and recommended mitigation measures are addressed in **Section 10**. Tree preservation would reference to the *Guidelines on Tree Preservation during Development* (DEVB, 2015) and *Development Bureau Technical Circular (Works) No. 4/2020 Tree Preservatio*n (DEVB, 2020). Landscaping works such as planting of native shrubs in pits of rigid barriers and flexible barriers and provision of subdued colour paint would be undertaken to reinstate the affected area upon the completion of works.

8.10.17 All temporarily affected areas should be reinstated after completion of the works. A Preliminary Reinstatement Plan is presented in **Appendix 8.8** to recommend reinstatement by woodland

mix planting with tree whips or shrub at the affected areas (e.g. soil slopes, temporarily affected areas), monitoring programme and other matters of concern. The Preliminary Reinstatement Plan should be reviewed and updated by a qualified ecologist / arborist with at least 10 years relevant experience to formulate a Final Reinstatement Plan. As mentioned in **Section 10**, use of native species shall be maximized as far as possible in accordance with the *Guiding Principles on Use of Native Plant Species in Public Works Projects* to improve the habitat complexity and quality, particularly for the temporarily affected areas or engineered slopes at the margins of LRCP. Suitable native species of appropriate size and ecological function (e.g. provide appropriate food sources and habitats to local fauna including birds, mammals and insects) should be considered during the woodland mix planting.

8.10.18 Minimize unnecessary impacts on trees in woodland, mixed woodland and/or plantation habitats by implementation protection measures. Under the Project footprint, a total of about 300 trees within LRCP would be directly affected, which are described and evaluated in **Section 10**. Reference should be made to relevant guidelines and technical circulars, such as *Guidelines on Tree Preservation during Development* (DEVB, 2015) and *TC(W) No. 4/2020 Tree Preservation* (DEVB, 2020), etc. Reintroduce planting to any disturbed wooded habitats to minimize the impact arising from the temporary habitat loss as recommended in Preliminary Reinstatement Plan (refer to **Appendix 8.8**).

Protection of Plant Species of Conservation Importance

8.10.19 Flora species of conservation importance recorded within assessment area and Project boundary but outside project footprint would be preserved in-situ. To avoid and protect the five flora species of conservation importance recorded in close proximity to the footprint of NTHMMs (i.e. one seedling of Incense Tree, one individual of Ailanthus and three clumps of Luofushan Joint-fir near the rigid barriers within LRCP; and four individuals of Butulang Canthium, one individual of Hong Kong Pavetta and three individuals of Ailanthus near the proposed flexible barriers outside LRCP) near the flexible barriers outside LRCP) during the construction of the rigid barriers and flexible barriers, a qualified ecologist / botanist with at least 10 years relevant experience should be deployed to conduct vegetation survey to identify, tag and demarcate any floral species of conservation importance located near the footprint of NTHMMs prior to site clearance. All the identified flora species of conservation importance above shall be preserved on site with provision of plant protection zones with sturdy fencing. Plant protection zones of at least 1.5 m setback from the trunk of the individual tree or flora species of conservation importance would be set up as far as possible during the construction phase. No trimming of the flora species of conservation importance would be allowed. No access and construction activities would be allowed within the plant protection zones. In case in-situ preservation is found to be impractical during the later design phase, appropriate alternative mitigation measures (e.g. transplantation / compensatory planting) should be considered and addressed in the Final PPTP, where necessary.

8.10.20 A total of four flora species of conservation importance (including one individual of Incense Tree, nine individuals of Butulang Canthium and 19 individuals of Ailanthus along LRTR, and nine individuals Rhodoleia near Lung Cheung Road Park) were recorded within the Project footprint. To mitigate the potential adverse impacts to these species, mitigation measures (e.g. preserve in-situ, transplant, mitigation planting to be provided at recipient site) are recommended in the Preliminary Plant Preservation and Transplantation Proposal (PPTP) based on the best available information (**Appendix 8.7** refers). To minimize impacts, a detailed vegetation survey should be conducted within the Project footprint prior to the commencement of construction activities by qualified ecologist / botanist with at least 10 years relevant experience to ascertain the presence, update the conditions and determine the abundance and locations of the flora species of conservation importance. All identified species of conservation importance should be labelled and fenced off on site for preservation, or in case of unavoidable loss, for transplantation as far as possible. In case plant preservation or transplantation is not practical as recommended by the qualified ecologist / botanist (e.g. due to poor health and low survive rate of the plant), other mitigation measures (e.g. compensation by seedling planting) should be considered.

8.10.21 A Preliminary PPTP is prepared in **Appendix 8.7** to recommend the suitable mitigation measures (e.g. preservation, transplantation or seedling compensation) monitoring programme and other matters of concern to mitigate the potential adverse impacts to the identified flora species of conservation importance. The Preliminary PPTP will serve as a guide to facilitate the formulation of a Final PPTP and the implementation of the mitigation and monitoring works. The Final PPTP should be prepared by a qualified ecologist / botanist with at least 10 years relevant experience. Reference should be made to "EIAO Guidance Note No. 3/2010 – Flexibility and Enforceability of Mitigation Measures Proposed in an EIA report" for the preparation of the PPTP. The Final PPTP should include but not limited to the followings:

- describe and review the findings of detailed vegetation surveys (e.g. latest condition, location and abundance of potentially impacted plant species of conservation importance);
- identify and recommend suitable mitigation measures (e.g. preservation, transplantation or compensation); and
- design and recommend implementation methods (e.g. transplantation methodology and schedule), management requirements and post-transplantation monitoring programme.

The Final PPTP should be submitted to and approved by AFCD via EPD prior to the commencement of any construction activities. The Project Proponent and/or the Contractor(s) should implement the mitigation measures, maintenance works and post-transplantation monitoring programme as approved in the PPTP. Transplantation works is recommended to be carried out prior to commencement of construction activities as far as possible. The implementation of the mitigation measures and post-transplantation monitoring programme as recommended in the PPTP should be carried out by a qualified ecologist / botanist with at least 10 years relevant experience in transplanting flora species of conservation importance of similar size and species.

Protection of Fauna Species of Conservation Importance

8.10.22 The section of natural watercourse S7 outside the Project footprint may serve as a potential breeding/nursery ground of Small Clubtail (nymph) and Lesser Spiny Frog (tadpoles). Another reptile species of conservation importance (Tokay Gecko) was recorded at developed area near LRT portals at Shatin outside the Project footprint. No direct impact on these species is anticipated as no construction works would be carried out at their recorded habitats. A Pre-construction Fauna Survey Report (PCFSR) prepared by a qualified ecologist with at least 10 years relevant experience would be submitted to relevant government authorities (e.g. AFCD and EPD). In case any fauna species of conservation importance recorded during the pre-construction survey would be directly impacted, protection/translocation should be proposed and carried out to avoid potential direct impact. A Protection and Translocation Proposal (PTP) should be prepared by a qualified ecologist, where appropriate, to present detailed findings of potentially affected fauna within the impacted habitats (e.g. species and number of affected individuals), propose protection and translocation methodology (e.g. protection measure, timing of the translocation, implementation programme) and maintenance programme.

8.10.23 The PTP should be submitted to and approved by relevant government authorities (e.g. AFCD and EPD) prior to commencement of construction works. The Project Proponent and/or the Contractor(s) should implement the mitigation measures and maintenance works as approved in the PTP. Translocation works, if necessary, is recommended to be carried out prior to commencement of construction activities as far as possible. The implementation of the mitigation measures as recommended in the PTP should be carried out by a qualified ecologist with at least 10 years relevant experience.

Minimizing Disturbance Impacts on Natural Habitats and Fauna

8.10.24 To avoid excessive cumulative environmental impacts, the proposed widening works along LRTR are divided into four work zones, and with major site formation and foundations works of adjacent work zones sequenced to be constructed at different phases under the construction programme (refer to **Section 2**).

8.10.25 To further minimize disturbance impacts, provision of screening (e.g. site hoardings, noise barriers) during construction phase and planting of peripheral screening plants during operation phase is recommended. The following standard good site practices should also be implemented throughout the construction phase:

- Placement of equipment or stockpile in designated areas and access routes selected on existing disturbed land to minimize disturbance to natural habitats;
- Construction activities should be restricted to clearly demarcated construction areas;
- Collect general refuse and construction wastes properly and dispose of in a timely and appropriate manner.

Measures to Minimize Glare, Air Quality, Noise, Water Quality and Disturbance Impacts

8.10.26 The glare from construction works should be controlled and minimized taking into account the presence of natural habitats, especially those within LRCP and Beacon Hill SSSI. Proper implementation of mitigation measures, such as good site practices, restriction of construction hours from 07:00 to 19:00 outside country park areas, night-time lighting control and lining hoarding at the Project boundary should minimize any potential impacts. Within country park area, construction works between the hours of 18:00 to 08:00 and on Sundays and Public Holidays should be avoided. The intensity of artificial light from construction activities should also be controlled to the lowest possible level. Unnecessary lighting should be turned off outside the working hours of the construction sites. A balance between lighting for safety and avoiding excessive lighting can be achieved by using directional lighting.

8.10.27 Proper implementation of the dust suppression measures stipulated in the *Air Pollution Control (Construction Dust) Regulation (Cap. 311R)* would avoid and minimize impacts to the surrounding habitats and the associated wildlife arising from the construction activities. Good site practices (refer to **Section 3.8**) should also be adopted, such as:

- Regular spraying of haul roads;
- Proper storage of construction materials; and
- Covering trucks or transporting wastes in enclosed containers to minimize windblown litter and dust during transportation of waste.

8.10.28 The relevant noise control standards stipulated in the Annex 5 of the EIAO-TM should be implemented as recommended in **Section 4.6**. The provision of movable noise barriers or enclosures would be erected to provide screening from the construction plant. The implementation of noise control requirements stated in the "*Recommended Pollution Control Clauses for Construction Contracts*" is also recommended (EPD, 2019). In order to reduce the disturbance to the ecologically sensitive habitats adjacent to the Project footprint, the noise impact during construction phase should be avoided and minimized by the use of Quality Powered Mechanical Equipment (QPME) and orientating noisy machines / plant away from these habitats.

8.10.29 To avoid any adverse water quality impacts to surrounding habitats, the good site practices described in the ETWB Technical Circular (Works) No. 5/2005 Protection of Natural Streams/Rivers from Adverse Impacts arising from Construction Works and the ProPECC PN 1/94 Construction Site Drainage should also be adopted, where applicable (refer to **Section 5.7**).

8.10.30 As stated in **Sections 8.8.59** to **8.8.60**, the operation of the Project would not significantly increase the existing disturbance level on natural habitats adjacent to the Project boundary. The Project footprint is located outside and away from the LRCP as far as practicable. Nevertheless, measures including installation of noise barrier (refer to **60604728/R42b/Figure 4.4.2** to **60604728/R42b/Figure 4.4.4**) would be adopted. The intensity of light during the operation stage (e.g. at LRT administration building) should also be controlled to the lowest possible level. A balance between lighting for safety and avoiding excessive lighting can be achieved through

the use of directional lighting (i.e. direct lighting away from the natural habitats and LRCP during operation phases).

8.10.31 Mitigation measures for water quality impacts during construction and operation phases are suggested in **Section 5.7**. During construction phase, surface runoff from construction sites should be discharged into storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sedimentation basins. Channels or earth bunds or sandbag barriers should be provided on site during construction works to properly direct stormwater to such silt removal facilities. Perimeter channels should be provided on site boundaries where necessary to intercept storm runoff from outside the site so that it will not wash across the site. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks. During operation phase, Best Management Practices (BMPs) for stormwater discharge are recommended to reduce stormwater pollution arising from the Project. Screening facilities such as standard gully grating and trash grille, with spacing which is capable of screening large substances such as fallen leaves and rubbish should be provided at the inlet of drainage system. Road gullies with standard design and silt traps and oil interceptors should be incorporated during the detailed design to remove particles present in stormwater runoff.

8.10.32 Moreover, habitat discontinuity and fragmentation are unlikely during the operation phase as the proposed works would largely take place along the existing LRTR networks. Under the baseline condition, utilization of the Project site as a movement corridor by fauna is unlikely due to heavy traffic flow. Hence, provision of wildlife crossing (e.g. establishment of ecological corridors, buffer zones) within the Project site is unlikely to be necessary.

Measures to Minimize Groundwater Infiltration

8.10.33 Based on the available geological profile, it is envisaged that the tunnelling works will be mostly carried out in good quality granite rock masses. As stated in **Section 5**, underground development may result in infiltration of groundwater. Appropriate groundwater control measures including grouting and installation of waterproof lining presented in Section 5.7, which are proven technologies and have been extensively applied in other past projects, would be implemented to minimize the groundwater infiltration during the tunnel construction. With proper design of works and implementation of the recommended measures, no adverse residual impacts on water quality impact are anticipated.

Measures to Minimize Impacts from Noise Barriers

8.10.34 Although no prominent flight paths of avifauna were recorded, considered the Project site is located immediately adjacent to the existing LRTR and natural habitats, mitigation measure on noise barrier is proposed to further avoid / minimize the potential bird collision. During operation phase, the installation of noise barrier/enclosure would be carefully designed. The use of tinted materials and superimposing dark patterns or strips on the barrier, as per *Guidelines on Design of Noise Barriers* (EPD & HyD, 2003) and *Practice Notes No. BSTR/PN/003 (Revision E) Noise Barriers with Transparent Panels* (HyD, 2020), would be employed to avoid and minimize bird mortality from collision.

Compensation

Compensatory Planting for Unavoidable Woodland Loss

8.10.35 To compensate for the ecological impact resulting from unavoidable loss of woodland within LRCP, habitat compensation would be provided in a “like for like” basis to the extent that this is practicable, as stated in Clauses 5.4.3 to 5.4.5 of Annex 16 of the EIAO-TM. Compensatory planting to mitigate unavoidable woodland loss have been adopted and implemented under precedent approved EIA Projects, such as Housing Sites in Yuen Long South, Tung Chung New Town Extension, Sha Tin Cavern Sewage Treatment Works and Liantang / Heung Yuen Wai Boundary Control Point and Associated Works. Compensatory planting works were proposed on areas that are considered suitable for woodland reprovision, such as hillside shrubland, plantation, grassland and engineered slope. For this project, to mitigate the permanent loss of

woodlands within LRCP, compensatory planting of a ratio not less than 1:1 in terms of area (i.e. about 0.16 ha) would be provided. As mentioned in **Section 8.10.25**, reinstatement of temporary woodland loss will be conducted upon completion of works at the temporarily affected areas. Consider some of the woodland within LRCP to be temporarily affected (0.09 ha) is relatively mature and is ecologically linked to other woodlands within LRCP, provision of additional compensatory planting of a ratio not less than 1:1 in terms of area is also recommended as an enhancement measure. However, given the limited space within the Project site, on-site woodland compensation is considered not practicable. Justification of the need of off-site woodland compensation is presented in **Appendix 8.9**.

8.10.36 After considering various requirements (such as the existing vegetation coverage, accessibility for planting, future maintenance, and etc.), the provision of compensatory planting area of at least 0.25 ha is recommended. An agricultural land west to STSFWSR and near the Project boundary, of size approximately 0.3 ha, relatively flat and with good soil condition is preliminarily identified (**60604728/R42b/Figure 8.5.1** refers) as a potential compensatory planting area. The site is sparsely vegetated with crop species such as Sweet Potato (*Ipomoea batatas*) and *Benincasa* spp.

8.10.37 As suggested in **Section 10**, a mix of native tree species will be proposed with reference to the *Guiding Principles on Use of Native Plant Species in Public Works Projects promulgated by the Development Bureau* with an aim to improve the vegetation diversity, enhance ecological value and re-create vegetation habitat. Native plant species directly affected under the Project would also be included in the woodland mix planting.

8.10.38 **Table 8.20** presented some native flora species that are considered for compensatory planting. At maturity, the compensatory planting areas would create a woodland habitat with different layers (e.g. canopy, middle layer and understorey), which provide nectar and fruit for local wildlife and promote habitat complexity and in turn enhancing the ecological value.

Table 8.20 Native Flora Species Proposed for Compensatory Planting

Potential Species	Growth Form
Aporosa (*Aporosa dioica*)	Tree
Castanopsis (*Castanopsis fissa*)	Tree
Chinese Alangium (*Alangium chinense*)	Tree or shrub
Chinese Elaeocarpus (*Elaeocarpus chinensis*)	Tree or small tree
Hance's Syzygium (*Syzygium hancei*)	Tree
Hong Kong Gordonia (*Polyspora axillarisI*)	Shrub or small tree
Ivy Tree (*Schefflera heptaphylla*)	Tree
Lance-leaved Sterculia (*Sterculia lanceolata*)	Tree
Myrobalan (*Phyllanthus emblica*)	Tree or shrub
Pop-gun Seed (*Bridelia tomentosa*)	Shrub or small tree
Pond Spice (*Litsea glutinosa*)	Tree
Schima (*Schima superba*)	Tree
Strawberry Tree (*Myrica rubra*)	Tree
Sweet Gum (*Liquidambar formosana*)	Tree
Yellow Cow Wood (*Cratoxylum cochinchinense*)	Tree or shrub
Chinese Hackberry (*Celtis sinensis*)	Tree
Incense Tree (*Aquilaria sinensis*)*	Tree
Butulang Canthium (*Canthium dicoccum*)*	Tree
Ailanthus (*Ailanthus fordii)**	Tree

* Potential plant species of conservation importance recommended to be transplanted or compensated as identified in this Study. The woodland compensation area (WLCA) also serves as the recipient site for the flora species of conservation importance to be transplanted or reprovisioned under the Project. For the compensation, the ratio shall meet the minimum compensation ratio of 1:1 in terms of quantity. The species and exact number of plant species of conservation importance to be transplanted or compensated

are subject to review and verify according to Final Plant Preservation and Transplantation Proposal and Tree Survey Report in the detailed design phase of this Project.

8.10.39 Prior to the implementation of the compensatory planting, a detailed vegetation and tree survey should be conducted to verify the condition and vegetation composition of the proposed compensatory planting area. The woodland compensation shall be carried out as early as possible once the Project commences, to allow time for the woodland to reach a level of maturity and perform its mitigation role. The Project Proponent shall take up the maintenance in the condition of possession of the WLCA during the establishment period. The Project Proponent shall properly establish the WLCA before the ecological plantings recommended by the EIA Report be fully established (which normally takes at least 9 years) and before hand over of the established woodland to the long-term maintenance party, which is identified and agreed in accordance with the DEVB TCW No. 6/2015 Maintenance of Vegetation and Hard Landscape Features, for ad-hoc maintenance. The Project Proponent shall be responsible to provide necessary recurrent cost for the maintenance and monitoring works. A Preliminary Woodland Compensation Plan (WCP) is presented in **Appendix 8.10** to form the basis to guide the establishment of the proposed compensatory planting area and that information provided in the plan is subject to the findings of the detailed vegetation and tree surveys to be conducted and shall be reviewed and finalized by a qualified ecologist / arborist with at least 10 years relevant experience during the detailed design phase of this Project. The Final WCP should be submitted to and approved by relevant authorities including AFCD and EPD before the commencement of any construction activities.

8.10.40 With the implementation of the proposed compensatory planting, ecological impact arising from the permanent loss of woodland habitat within LRCP evaluated as of low to moderate significance would be compensated.

8.11 Cumulative Impacts

8.11.1 The construction activities of the Project are tentatively scheduled in 2025 with the widening of Lion Rock Tunnel Road at Sha Tin beginning in December 2028. The tentative completion year for the Project is 2034. According to **Section 2**, the following projects in the vicinity are likely to be constructed/operated concurrently with the LRT Project:

- Revised Trunk Road T4 in Sha Tin (T4);
- Relocation of Diamond Hill Fresh Water and Salt Water Service Reservoirs to Cavern; and
- In-situ Reprovisioning of Sha Tin Water Treatment Works – South Works.
- The Proposed Drainage Improvement Works at Chui Tin Street and Chui Tin Street Soccer Pitch

8.11.2 The proposed works of Revised Trunk Road T4 in Sha Tin would involve widening of Sha Tin Road from dual 2-lane to dual 4-lane (approximately 150 m long). The tentative construction period of the "Revised Trunk Road T4 in Sha Tin" would be partially overlapped with this Project from 2025 to 2028; however, the Project works in the vicinity of Revised Trunk Road T4 in Sha Tin would be commenced in December 2028, i.e. no programme overlapped would be anticipated between the Project and Revised Trunk Road T4. Under the current Project, about 0.16 ha woodland habitat at the engineered slope within the LRCP would be permanently affected unavoidably, while only a very small area of woodland (13 m^2) and mixed woodland (153 m^2) within LRCP at Mau Tsai Shan south to Sha Tin Road would be permanently affected by the proposed natural terrain hazard mitigation works (flexible barrier) under the Revised Trunk Road T4 Project. To minimize potential impact to LRCP, the location of flexible barrier is proposed at the fringe of LRCP closest to Sha Tin Road as far as practicable under Revised Trunk Road T4. Tree felling and disturbance to understorey vegetation would be minimized as far as possible by adjusting the proposed flexible barrier (e.g. orientation of anchors/footings). Considered the total area of the affected woodland and mixed woodland within LRCP is relatively small in size, already subject to disturbance and that the level of unmitigated impacts under the Projects are evaluated as of low and low to moderate significance, it is anticipated that this small

affected woodland and mixed woodland area would not incur any unacceptable cumulative loss of woodlands/mixed woodlands within LRCP. Potential cumulative indirect impacts arising from the projects, including dust, traffic noise, surface runoff, glare impacts on developed area near Sha Tin Tau Village and Fung Shing Court, as well as the woodland and mixed woodland habitat situated within the LRCP were evaluated. Given potentially impacted habitats were mainly urbanized (i.e. along existing traffic road), already highly disturbed and that the construction period of the proposed works along Sha Tin Road do not overlap, no unacceptable cumulative impacts are anticipated. Proper mitigation and enhancement measures including those recommended in **Sections 8.10.24** to **8.10.32** above would be implemented to further minimize the cumulative indirect impact arising from the construction and operation of the Project.

8.11.3 Another concurrent project "Relocation of Diamond Hill Fresh Water and Salt Water Service Reservoirs to Cavern" would relocate two service reservoirs, including Diamond Hill Fresh Water Service Reservoir and Diamond Hill Salt Water Reservoir, into caverns for releasing the existing Diamond Hill service reservoir sites for housing and/or other compatible and beneficial uses. The construction period is tentatively scheduled to commence in mid-2022 for completion by about 2027. The proposed Diamond Hill Fresh Water and Salt Water Service Reservoirs will be located inside caverns and only a limited area of the proposed works (i.e. improvement of access road, installation of water mains) would be overlapped with the current assessment area near the Lion Rock Park. Given potentially impacted habitats were mainly developed area or plantation, the proposed works are small in scale, no unacceptable adverse cumulative impacts are anticipated.

8.11.4 Another concurrent project "In-situ Reprovisioning of Sha Tin Water Treatment Works (STWTW) – South Works" would aim to increase the treatment capacity of the South Works of STWTW to meet the anticipated increase in fresh water demand due to new public and private housing developments and to reprovision the aged water treatment facilities of the South Works. The proposed works would be conducted within the STWTW and would not overlap within the current Project site. Moreover, given the STWTW project would be completed by January 2025 before the commencement of the construction works at Sha Tin Portal in May 2025 under this Project, the construction programme of these two projects would not overlap with each other according to the latest work plan. Mitigation measures (such as implementation of good site practices, transplantation of flora species of conservation importance, etc.) were proposed to mitigate the potential ecological impacts arising from the project. Hence no unacceptable adverse cumulative impact is anticipated.

8.11.5 Based on the best available information, some of the construction works (e.g. road breaking, excavation, backfilling, etc.) of the concurrent project "The Proposed Drainage Improvement Works at Chui Tin Street and Chui Tin Street Soccer Pitch" would be carried out along Chui Tin Street and Kak Tin Street from Year 2023 – 2031. The commencement of the construction works near Fung Shing Court in December 2028 under this Project. Only a small portion of the concurrent Project footprint would fall within the assessment area of the LRT Project, but it would not overlap with the footprint of the LRT Project. Based on the available information at the time of this EIA Study, the works will include stormwater pumping storage schemes, box culverts and drainage upgrading works. Considering only small-scale construction works would be involved for the drainage improvement works at developed area habitat and the associated work site would be located far away from the LRT Project boundary (>200m) and would not overlap with the footprint of the LRT Project, no unacceptable adverse cumulative impacts are anticipated.

8.12 Evaluation of Residual Ecological Impacts

8.12.1 With the implementation of mitigation measures and enhancement measures suggested in **Section 8.10**, no unacceptable residual direct impact and indirect impacts during construction and operation phases are anticipated.

8.13 Environmental Monitoring and Audit

8.13.1 The implementation of the recommended mitigation measures described in **Section 8.10** should be subjected to monthly site audit throughout the construction phase. In case of non-compliance, the Contractor should be informed to strengthen the proposed mitigation measures

accordingly. Details of environmental monitoring and audit (EM&A) requirements are discussed in the EM&A Manual.

Monitoring of Mitigation Measures on Avoidance of Adverse Impacts to Recognized Sites of Conservation Importance and Natural Habitats

8.13.2 To avoid unnecessary habitat loss and minimize the disturbance impact to sites of conservation importance and natural habitats, the implementation of the mitigation measures recommended in **Section 8.10** should be subjected to regular site audit. Site audit should be carried out at least once per week throughout the construction phase by the Environmental Team (ET). In case of non-compliance, the Contractor should be informed to strengthen the proposed mitigation measures accordingly, follows the procedures stated in **Section 11** of the EM&A Manual. Regular site inspections covering the Project boundary within Lion Rock Country Park (LRCP) and the ecological compensatory plantings should be conducted as early as possible once the Project commences to ensure that all construction activities are confined within the Project footprint and that the proposed mitigation measures are implemented appropriately and effectively. In case there are any unwanted and unforeseen ecological impacts arising from the project (e.g. unwanted construction activities or access by workers into LRCP), remedial actions (e.g. immediately stop and removal of construction activities/unintended access away from LRCP) should be recommended, where appropriate, in consultation with relevant authorities (e.g. EPD).

8.13.3 All temporarily affected areas should be reinstated after completion of the works. Reinstatement by woodland mix planting with tree whips at the affected areas (e.g. soil slopes, temporarily affected areas) according to Preliminary Reinstatement Plan should be implemented. Use of native species shall be maximized as far as possible in accordance with the Guiding Principles on Use of Native Plant Species in Public Works Projects to improve the habitat complexity and quality, particularly for the temporarily affected areas or engineered slopes at the margins of LRCP. Suitable native species of appropriate size and ecological function (e.g. provide appropriate food sources and habitats to local fauna including birds, mammals and insects) should be considered during the woodland mix planting. The reinstatement planting should be monitored regularly during the 1-year establishment period for area outside LRCP and 3-year establishment period for areas within LRCP by a qualified local ecologist / arborist with at least 10 years relevant experience. Details of post-transplantation monitoring programme such as monitoring frequency and parameters, maintenance works and possible remedial measures in case of exceedance of compliance are presented in Preliminary Reinstatement Plan (**Appendix 8.8**), and would be reviewed and updated in Final Reinstatement Plan by a qualified ecologist / arborist with at least 10 years relevant experience during the detailed design phase of the Project. Agreement / approval of the Final Reinstatement Plan shall be obtained from relevant government authorities (e.g. AFCD and EPD) prior to commencement of any construction activities.

Monitoring of Mitigation Measures of Glare, Air Quality, Noise, Water Quality and Disturbance Impacts on Recognized Sites of Conservation Importance, Natural Habitats and Associated Wildlife

8.13.4 To minimize the indirect disturbance impact (e.g. glare, air quality, noise and water quality and disturbance) to sites of conservation importance and natural habitats and associated wildlife, the implementation of the mitigation measures for minimization of glare, air quality, noise, water quality and disturbance impact recommended in **Section 8.10** should be subjected to regular site audit. Site audit should be carried out at least once per week throughout the construction phase by ET. In case of non-compliance, the Contractor should be informed to strengthen the proposed mitigation measures accordingly, follows the procedures stated in **Section 11** of the EM&A Manual. Regular site inspections covering the Project boundary within LRCP and the ecological compensatory plantings should be conducted as early as possible once the Project commences to ensure that all construction activities are confined within the Project footprint and that the proposed mitigation measures are implemented appropriately and effectively. In case there are any unwanted and unforeseen ecological impacts arising from the project (e.g. water quality criteria are exceeded), remedial actions (e.g. rectify unacceptable practice, check all plant and equipment) should be recommended, where appropriate, in consultation with relevant

authorities. Details of monitoring programme of mitigation measures to minimize indirect impacts (e.g. locations, parameters, frequency and duration for baseline, impact and compliance monitoring, event and action plans with division of work) are presented in **Sections 2, 3, 4** and **5** of the EM&A Manual.

Monitoring of Mitigation Measures on Protection of Flora Species of Conservation Importance

8.13.5 Four flora species of conservation importance were recorded within the Project footprint (one individual of Incense Tree, nine individuals of Butulang Canthium and 19 individuals of Ailanthus along LRTR, and nine individuals Rhodoleia near Lung Cheung Road Park). A detailed vegetation survey within latest available Project footprint shall be conducted by a qualified ecologist / botanist with at least 10 years relevant experience to identify and update the conditions of any flora species of conservation importance, including but not limited to the species recorded in the EIA Report, before the commencement of works and to refine the PPTP in **Appendix 8.7**. As proposed in the Preliminary PPTP, some of the affected flora species of conservation importance would be preserved in-situ, relevant measures (e.g. setting up plant protection zone) stated in **Appendix 8.7** should be implemented, and monthly monitoring of the conditions of the preserved plants and site audit of the recommended protection measures should be conducted by a qualified ecologist / botanist with at least 10 years relevant experience. In case of unavoidable loss of flora species of conservation importance, transplantation and provision of compensation plantings should be conducted. A monitoring programme to review the health conditions of the transplanted and compensated plants at the recipient site should be by a qualified local ecologist / botanist with at least 10 years relevant experience to monitor the health conditions of the transplanted and compensated plants at the recipient site, which the health conditions of the transplanted and compensated plants should be monitored during the 3-year and 9-year establishment period respectively. In case of need and if there is any unwanted / unforeseen impacts identified during the monitoring and site audit, additional mitigation and remedial measures (such as provision and establishment of replacement plantings) should be recommended and implemented, where appropriate, in consultation with relevant authorities under the Project. Details of monitoring programme such as monitoring frequency and parameters, maintenance works and recommended remedial measures are presented in Preliminary PPTP in **Appendix 8.7,** and would be reviewed and updated in Final PPTP by a qualified ecologist / botanist with at least 10 years relevant experience during the detailed design phase of the Project. Agreement / approval of the Final PPTP shall be obtained from relevant government authorities (e.g. AFCD and EPD) prior to commencement of any construction activities.

Monitoring of Mitigation Measures on Protection of Fauna Species of Conservation Importance

8.13.6 Although no direct impact on fauna species of conservation importance is anticipated, pre-construction survey should be conducted by a qualified ecologist with at least 10 years relevant experience to identify if any fauna species of conservation importance is presented within and in the surrounding of the Project footprint (e.g. section of S7 near the Shatin portal area). In case any fauna species of conservation importance recorded during the pre-construction survey would be directly impacted, protection/translocation should be proposed and carried out to avoid potential direct impact. A Protection and Translocation Proposal (PTP) should be prepared by a qualified ecologist with at least 10 years relevant experience, where appropriate, to present detailed findings of potentially affected fauna within the impacted habitats (e.g. species and number of affected individuals), propose protection and translocation methodology (e.g. protection measure, timing of the translocation, implementation programme) and monitoring and maintenance programme. The PTP should be submitted and approved by relevant government authorities (e.g. AFCD and EPD) prior to commencement of any construction activities.

Monitoring of Compensatory Planting for Unavoidable Woodland Loss

8.13.7 To mitigate unavoidable impacts on the woodlands within LRCP, woodland compensatory planting would be provided and potential woodland compensation area is preliminary identified at an agricultural land habitat west to the STSFWSR within the assessment area. The compensatory planting will comprise native plant species directly affected under the Project. Upon completion of the woodland compensatory planting works, a maintenance and monitoring

programme on the woodland compensatory plantings at woodland compensation area should be undertaken during the planting and establishment period which normally takes at least 9 years according to the Preliminary Woodland Compensation Plan (WCP) in **Appendix 8.10**. The Contractor should regularly maintain the planted individuals, including watering, weeding and pest control. Subject to the health condition and the survival of the woodland compensatory plantings, replanting works should be conducted by the Contractor to replace the dead or poor health individual with same species, where necessary. A monitoring programme would be conducted by qualified ecologist / arborist with at least 10 years relevant experience to monitor the health condition and survival of the woodland compensatory planting should be monitored. The management and maintenance of the established woodland compensation area will be regulated by the *DEVB TCW No. 6/2015 Maintenance of Vegetation and Hard Landscape Features*, and should be continue until the plantings are fully established (which normally takes at least 9 years) and before hand over of the established woodland to the long-term maintenance party identified and agreed in accordance with the *DEVB TCW No. 6/2015* after the establishment period for ad hoc maintenance. Details of monitoring programme such as monitoring frequency and parameters, and maintenance works would be recommended in the are presented in Preliminary WCP in **Appendix 8.10**, and would be reviewed and updated in Final WCP by a qualified ecologist / arborist with at least 10 years relevant experience during the detailed design phase of the Project. Agreement / approval of the Final WCP shall be obtained from relevant government authorities (e.g. AFCD and EPD) prior to commencement of any construction activities.

Monitoring on Mitigation Measures on Groundwater Infiltration

8.13.8 As stated in **Section 5**, it is anticipated that the underground tunnel improvement works would not have adverse groundwater infiltration impacts with proper implementation of groundwater infiltration minimization measures. Nonetheless, as an additional precautionary measure, surface water level monitoring at natural watercourses within LRCP, Beacon Hill SSSI and in the vicinity of the tunnelling works would be conducted during the construction and operation stages. In particular, monthly monitoring should be conducted at watercourses S6 to S8 to monitor parameters (including water depth and water velocity) to record and evaluate if any abnormal significant decrease of the water level i.e. which is unlikely associated with changes in weather patterns, is arising from the Project. In case of any abnormal significant decrease of the water level is arising from the Project, The Contractor should recommend and implement remedial measures (e.g. review and strengthen groundwater water control strategies), where necessary, in consultation with relevant authorities (e.g. EPD). The preliminary recommended monitoring locations is presented in the **Figure 7.1** of the EM&A Manual.

8.14 Conclusion

8.14.1 Literature review and ecological field surveys have been conducted. Eleven habitat types, including woodland, mixed woodland, plantation, shrubland, village/orchard, active agricultural land, abandoned agricultural land, developed area, pond, natural watercourse and modified watercourse, were identified within the 500 m ecological impact assessment area. Direct impacts arising from the proposed aboveground works include permanent loss (14.80 ha) and temporary loss (2.75 ha) of habitats. Over 69% permanent habitat loss would be largely located at Shatin side and along the existing Lion Rock Tunnel Road. Direct impacts on recognized sites of conservation importance (e.g. Beacon Hill SSSI and LRCP) are largely avoided. About 0.16 ha woodland, 0.17 ha plantation, <0.01 ha modified watercourse and 0.81 ha developed area at LRCP would be permanently affected. About 0.09 ha woodland, 0.16 ha plantation, and 0.33 ha developed area also at LRCP would be temporarily affected. The affected woodland within LRCP of moderate to high ecological value (about 0.25 ha) would be mitigated by provision of compensatory woodland according to the Final Woodland Compensation Plan. Temporarily affected area within the Project footprint, including those within LRCP, would be reinstated by woodland mix planting according to the Final Reinstatement Plan.

8.14.2 To avoid and protect the five flora species of conservation importance recorded in close proximity to the footprint of NTHMMs (including one seedling of Incense Tree, one individual of Ailanthus and three clumps of Luofushan Joint-fir near the rigid barriers within LRCP; and four individuals of Butulang Canthium, one individual of Hong Kong Pavetta and three individuals of

Ailanthus near the proposed flexible barriers outside LRCP) near the flexible barriers outside LRCP) during the construction of the NTHMMs, all the identified flora species of conservation importance above shall be preserved on site with provision of plant protection zones with sturdy fencing during the construction phase.

8.14.3 A total of four flora species of conservation importance (including one individual of Incense Tree, nine individuals of Butulang Canthium and 19 individuals of Ailanthus along LRTR, and nine individuals Rhodoleia near Lung Cheung Road Park) were recorded within the Project footprint. To mitigate potential impacts on these flora species, a detailed vegetation survey would be conducted and a Final Plant Preservation and Transplantation Proposal should be prepared accordingly prior to the commencement of construction works to identify potentially affected flora species of conservation importance and recommend appropriate mitigation measures to be implemented under the Project.

8.14.4 The section of natural watercourse S7 outside the Project footprint was likely to be a potential breeding/nursery ground of Small Clubtail (nymph) and Lesser Spiny Frog (tadpoles). Another reptile species of conservation importance (Tokay Gecko) was recorded at developed area near LRT portals at Shatin outside the Project footprint. No direct impact on these species is anticipated as no construction activities would be carried out at their recorded habitats. Precautionary measure such as a pre-construction survey in natural habitats within and in the surrounding of the Project footprint is recommended (e.g. woodland, mixed woodlands and natural watercourse within and near the Project footprint) to verify the findings of ecological field surveys prior to the commencement of construction activities. In case any fauna species of conservation importance recorded would be directly impacted, a Protection and Translocation Proposal should be prepared to recommend suitable mitigation measures.

8.14.5 Other potential direct impacts may include direct harm / mortality to wildlife and bird collision, while potential indirect impacts may include dust, noise, site runoff, groundwater infiltration and glare to natural habitats and wildlife in the vicinity. Implementation of good site practices (e.g. provision of screening, control of glare / lighting, groundwater infiltration minimization measures, water quality impact control measures, etc.) would minimize the potential indirect impacts. Carefully design of noise barriers (e.g. location, use of tinted materials and superimposing dark patterns or strips) would minimize the potential impact of bird collision.

8.14.6 Site audit and inspection for the implementation of the mitigation measures for minimization of indirect impact (e.g. glare, air quality, noise) should be carried out at least once per week throughout the construction phase by ET. Regular site inspections covering the Project boundary within LRCP and the ecological compensatory plantings should be conducted as early as possible once the Project commences to ensure that all construction activities are confined to the Project footprint and that the proposed mitigation measures are implemented appropriately and effectively.

8.14.7 Upon completion of the woodland compensatory planting works, a maintenance and monitoring programme should be undertaken during the planting and establishment period which normally takes at least 9 years. The Contractor should regularly maintain the planted individuals, including watering, weeding, pest control and replanting works, where necessary. A monitoring programme would be conducted to monitor the health condition and survival of the woodland compensatory planting. The management and maintenance of the established woodland compensation area will be regulated by the *DEVB TCW No. 6/2015*, and should be continue until the plantings are fully established (which normally takes at least 9 years) and before hand over of the established woodland to the long-term maintenance party identified and agreed in accordance with the *DEVB TCW No. 6/2015* after the establishment period for ad hoc maintenance.

8.14.8 Surface water level monitoring of natural watercourse in the vicinity of the underground tunnel improvement works area should be conducted during the construction stage. Post-construction monitoring of surface water level of natural watercourse in the vicinity of the underground tunnel improvement works area, including those within the LRCP and Beacon Hill SSSI, for one year should also be carried out. Monthly monitoring should be conducted at watercourses S6 to S8 to monitor parameters (including water depth and water velocity) and remedial measures should

be recommended, where necessary, if any abnormal significant decrease of the water level is arising from the Project.

8.14.9 With the implementation of the recommended mitigation measures along with EM&A activities, no unacceptable adverse residual impacts would be expected during construction or operation phases.

8.14.10 Four projects, including "Revised Trunk Road T4 in Sha Tin", "Relocation of Diamond Hill Fresh Water and Salt Water Service Reservoirs to Cavern", "In-situ Reprovisioning of Sha Tin Water Treatment Works – South Works" and "The Proposed Drainage Improvement Works at Chui Tin Street and Chui Tin Street Soccer Pitch" are likely to be constructed/operated concurrently with the LRT Project. Given the scale of impacts on natural habitats under the concurrent projects are minor and a majority of the project sites are urbanised and relatively disturbed, with the implementation of the proposed mitigation measures (e.g. staggered construction works period, adoption of good site practices, transplantation of flora species of conservation importance, etc.) under the projects, no unacceptable adverse cumulative impacts are anticipated.

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