9 ECOLOGY

9.1 Legislation, Standards and Guidelines

9.1.1.1 The ecological assessment has been conducted in accordance with the requirements stated in Annexes 8 and 16 of the Technical Memorandum on Environmental Impact Assessment Ordinance (TM-EIAO).

9.1.1.2 Reference to the following local legislation, guidelines and standards, and international conventions and guidance which are applicable to the present study was made:

- Forests and Countryside Ordinance (Cap.96) and its subsidiary legislation, the Forestry Regulations;
- Wild Animals Protection Ordinance (Cap. 170);
- Environmental Impact Assessment Ordinance (Cap. 499) and the associated TM Annexes 8, 11, 16, 20 and 21;
- Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) and its subsidiary legislation;
- Town Planning Ordinance (Cap. 131);
- TPB Guidelines for Application for Developments within Deep Bay Area under Section 16 of the Town Planning Ordinance (TPB PG-No. 12C);
- EIAO Guidance Note No. 6/2010 – Some Observations on Ecological Assessment from the Environmental Impact Assessment Ordinance Perspective;
- EIAO Guidance Note No. 7/2010 – Ecological Baseline Survey for Ecological Assessment;
- EIAO Guidance Note No. 10/2010 – Methodologies for Terrestrial and Freshwater Ecological Baseline Surveys;
- Hong Kong Planning Standards and Guidelines Chapter 10 “Conservation”;
- PELB Technical Circular 1/97 Works Branch Technical Circular 4/97 “Guidelines for Implementing the Policy on Off-site Ecological Mitigation Measures”;
- International Union for Conservation of Nature (IUCN) Red List of Threatened Species – IUCN corporate with IUCN Species Survival Commission to assess the conservation status of the flora and fauna species in a global scale in order to evaluating the risk of extinction of the species (available at http://www.iucnredlist.org/);
- United Nations Convention on Biological Diversity – this convention requires parties to regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use. It also requires parties to promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings. The People’s Republic of China (PRC) ratified the Convention on Biological

Diversity on 5th January 1993. This convention came into force in Hong Kong during 2011;

- Convention on the Conservation of Migratory Species of Wild Animals (the 'Bonn Convention'). Appendices 1 and 2 list the species covered by the Convention; and
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Appendices I, II and III list the species covered by the Convention.

9.2 Description of the Environment

9.2.1.1 This chapter is to evaluate the ecological conditions of the Assessment Area (500m from the Project Area) as well as the areas likely to be impacted by the Project. The assessment is based on a review of the available literature and site visits conducted within the assessment area to verify the information collected. The potential ecological impacts raised from the Project are identified, the significance of the identified impacts is assessed and corresponding mitigation measures are proposed to avoid, minimise and/or compensate for the significant ecological impacts identified.

9.2.1 Project Area

9.2.1.1 The proposed elevated pedestrian corridor is situated in Yuen Long Town Centre. It is an overhead walkway right above the section of Yuen Long Town Nullah (YLTN) between Long Ping West Rail Station and Kau Yuk Road. The Yuen Long Nullah is a concrete paved modified water channel constructed in the early 60s. It diverts the flow from Tai Tong and Yuen Long Town to Shan Pui River and then to Deep Bay at the downstream area where high ecological value has been recognised in such important wetland system and important foraging and roosting ground for waterbirds. During the dry season, there is small amount of flow in the nullah for most of the time. However, the flow would increase rapidly during storm events, especially during wet season. Both sides of the nullah are urbanised developments which consist of residential and commercial uses. A number of street trees were planted along the nullah.

9.2.1.2 The Project Area is distant from natural habitats, such as the natural section of the Shan Pui River and Kam Tin River, and the wetland areas and fish ponds in the further north. It does not fall within any site of conservation importance. More information is given in the following sections.

9.2.2 Within 500m Assessment Area

9.2.2.1 The 500m Assessment Area is also a highly urbanized town area with low ecological value. It covers the section of Yuen Long Nullah from the upstream of the Project in Ma Tin Pok to the downstream in Fu Yip Street.

9.2.2.2 As this section of Yuen Long Nullah is urbanised with concrete paving, it is considered to have negligible ecological value. There is no information of any ecological survey conducted in Yuen Long Nullah from previous projects, such as the approved EIA report for Widening of Yuen Long Highway between Lam Tei and Shap Pat Heung Interchange, and the public inspected EIA report for Construction of Cycle Tracks and the associated Supporting Facilities at Nam Sang Wai. Site visits have been conducted in January, March and September 2015 to

review the ecological conditions within and in the vicinity of the Project Area and the potential impacts to the 500m Assessment Area and other sensitive areas that might be potentially impacted.

9.2.2.3 Apart from the Pigeons (*Columba spp.),* Spotted dove (*Streptopelia chinensis*) and Black-collar starling (*Sturnus nigricollis*) found within the Project Area, common bird species including Little egrets (*Egretta garzetta*), Chinese Pond Heron (*Ardea bacchus*), Grey Heron (*Ardea cinerea*) and Eurasian Magpie (*Pica pica*) were also found in the upstream and downstream of Yuen Long Nullah within the 500m Assessment Area. This section of man-made watercourse is considered to be of low conservation value.

9.2.2.4 Other areas within the 500m Assessment Area are highly urbanised residential and commercial area. The ecological value in these areas is considered negligible.

9.2.3 Recognised Sites of Conservation Importance

9.2.3.1 There are a number of sites of conservation importance found in the vicinity beyond 500m of the Project Area (**Figure 9.1**). In view of the long distance from the Project Area, direct impacts to the ecology in these sensitive sites are unlikely. Nonetheless, as these sensitive sites are mostly hydrologically connected with the Project Area, indirect impact to downstream wildlife due to deteriorated water quality in YLTN during construction phase may be caused.

Wetland Conservation Area

9.2.3.2 The Wetland Conservation Area (WCA) designated by the Town Planning Board comprises the Deep Bay area, Mai Po Marshes and its adjacent wetland area which is recognised as important ecological resources. The intention of the WCA designation is to protect the ecological integrity of the Ramsar site from development and to conserve the ecological value of fishponds which form and integral part of the wetland ecosystem in the Deep Bay Area. It includes various types of habitats and support numerous and diverse fanua and flora species. The WCA is approximately 1.1km from the Project. The WCA comprises various resources including Mai Po Ramsar Site, Nature Reserve, priority sites for enhanced conservation and SSSI, which are presented below and their locations are indicated in **Figure 9.1**.

Mai Po Inner Deep Bay Ramsar Site (Priority Sites for Enhanced Conservation)

9.2.3.3 Mai Po Inner Deep Bay Ramsar Site, including Fung Lok Wai and Tai Sang Wai areas, was listed as a Wetland of International Importance under the Ramsar Convention since 1995. It comprises various types of habitats, including fish ponds, “Gei Wai”, mudflats, mangroves and marshes. It supports high diversity of birds, as well as mammals, amphibians and dragonflies. About 380 bird species, representing about 70% of the Hong Kong birds, have been recorded in the Ramsar Site. The Ramsar Site regularly supports some 100, 000 waterbirds throughout the year and some 60,000 - 80,000 waterbirds in winter. It is an important feeding and resting ground for wintering and migratory birds, including a number of globally threatened species such as Black-faced Spoonbill, Saunders's Gull and Imperial Eagle. The Ramsar Site is approximately 2.7km away from the Project Area.

Deep Bay Wetland Outside Ramsar Site (Priority Sites for Enhanced Conservation)

9.2.3.4 The site comprises Nam Sang Wai, Fung Lok Wai and the confluence of Kam Tin River and Shan Pui River. The majority of the areas are fish ponds. The habitats in Fung Lok Wai support a wide range of bird species, with records of several conservation importance species including Black-faced Spoonbill, Greater Spotted Eagle, Imperial Eagle and Red-billed Starling (CH2M HILL, 2008). Nam Sang Wai is also an important habitat for bird species. Moreover, the endemic Bent-winged Firefly was recorded at the mangroves/ marsh habitats at Shan Pui River. The site is approximately 1.1km away from the Project Area. In view of the long distance from the Project Area, direct impact to the ecology in Deep Bay Wetland Outside Ramsar Site is unlikely.

Mai Po Nature Reserve

9.2.3.5 The Mai Po Nature Reserve (about 380 ha) has been under the management of World Wide Fund for Nature Hong Kong since 1983 in partnership with the HKSAR Government. It is located within the Mai Po Marshes SSSI and is also important to wintering waterbirds including globally threatened species. The Nature Reserve is located at more than 3.5km from the Project Area.

Mai Po Marshes and Inner Deep Bay SSSIs

9.2.3.6 The Mai Po Marshes and Inner Deep Bay were designated as SSSIs in 1976 and 1986 respectively. They are also listed as Ramsar Site in 1995 and listed as priority sites for enhanced conservation under the local New Conservation Policy. The two SSSIs support a high diversity of species, especially serve as an important foraging and roosting ground for migratory wetland birds. The Mai Po Nature Reserve was established within the Mai Po Marsh SSSI in 1983 and has been managed by WWF-HK with the aim to conserve biodiversity in the Mai Po Marshes. The two SSSIs are more than 2.7km away from the Project Area.

Tsim Bei Tsui and Tsim Bei Tsui Egretry SSSIs

9.2.3.7 Tsim Bei Tsui SSSI was designated in 1985 for the presence of the mangrove tree species *Bruguiera gymnorhiza* and the mangrove snail *Ellobium polita*. The Tsim Bei Tsui Egretry designated in 1989, is an important habitat for nesting and breeding of egrets and herons. The two SSSIs are more than 3.5km away from the Project Area.

Confluence of Kam Tin River and Shan Pui River

9.2.3.8 Kam Tin and Shan Pui Rivers are under the influence of tidal action and the confluence of these two rivers provides intertidal mudflat habitat for foraging birds during low tide. This area, located in close proximity to the fish pond area of Deep Bay, attracts a diversity of wetland dependent bird species. The riparian vegetation (dominated by mangrove and associate species) along the Rivers also provide habitat for roosting birds and other wildlife. The confluence of these two Rivers is located about than 2.6km from the Project Area.

<u>Wetland Buffer Area</u>

9.2.3.9 The Wetland Buffer Area designated by the Town Planning Board, is an area of about 500m along the landward boundary of the WCA to protect the ecological resources within the WCA. It includes some degraded fish pond areas due to the

presence of open storage and filling in the past. Limited development is allowed within the Wetland Buffer Area. The Wetland Buffer Area is about 660m downstream from the Project Area.

Hong Kong Wetland Park Special Area

9.2.3.10 The Hong Kong Wetland Park Special Area falls within the Wetland Buffer Area. It has been designated since 2005. Any activities within the Park are under the control of the Country Parks and Special Areas Regulations (Cap. 208A). This designation provides a legal framework to protect and manage the Park while conserving the ecosystem and providing education to the public as a tourism hotspot. Due to its proximity to the Deep Bay Area, the Park also attracts a variety of wetland fauna. This Special Area is located about 2.5km from the Project Area.

Conservation Area

9.2.3.11 A Conservation Area (CA) zone in Kai Shan (OZP No. S/YL-PS/16 - Ping Shan) is located to the northwest of the Assessment Area. It is intended to protect and retain the existing natural landscape, ecological or topographical features of the area for conservation, educational and research purposes. There is a general presumption against development in this zone. Another CA (OZP No. S/YL-NSW/8 - Nam Sang Wai) is zoned at the south of Nam Sang Wai, at the northeast of the current Project and Assessment Area. The "CA" zone is intended to conserve the ecological value of wetland fish ponds which form an integral part of the wetland ecosystem in the Deep Bay Area. The "no-net-loss in wetland" principle is adopted for any change in use within this zone. The primary intention is to discourage new development unless it is to support the conservation of the ecological integrity of the wetland ecosystem or the development is an essential infrastructure project with overriding public interest. The CA in Kai Shan is about 600m from the Project Area and at a higher level than the Project, impact to the CA is unlikely. The CA in Nam Sang Wai including the old Kam Tin River is more than 1km away from the Project. The area is hydrologically linked with the current Project Area.

9.2.4 Consideration of Planned and Concurrent Projects

9.2.4.1 As mentioned in **Section 3.5**, the tentative programme of the Project starts from 2018 to 2022. Other large-scale projects, which are concurrent, under proposal or investigation in the surroundings are also relevant for the impact assessment of the current proposed development as they may have significant cumulative impacts. The following developments as mentioned in **Chapter 3** are located within or near the Assessment Area. The cumulative impacts, if any, would be addressed based on the currently available information.

Improvement of Yuen Long Town Nullah (Town Centre Section) – Stage 1 Improvement Works

9.2.4.2 The Project involves the construction of a dry weather flow interception (DWFI) system to intercept the polluted dry weather flow being discharged to YLTN from the town centre section and upstream main nullah, which aims to improve the water quality and enhance the aesthetic appearance of the Yuen Long Town Nullah.

9.2.4.3 According to the information provided from DSD, the construction of the improvement works will be commenced in 3rd quarter of Year 2022 and is targeted to be completed in Year 2026. No overlapping of construction works and hence no cumulative impact during construction stage is anticipated.

Improvement of Yuen Long Town Nullah (Town Centre Section) – Stage 2 Beautification Works

9.2.4.4 The Project involves beautification and landscaping works by modifying and reconstructing the existing concrete nullah bed and wall along the 800m town centre section of the Yuen Long Town Nullah.

9.2.4.5 According to the information provided by DSD, the construction of the development will be commenced in Year 2027 and is targeted to be completed in Year 2029. As the construction period of the development will not overlap with the Project, no cumulative environmental impact is anticipated during the construction phase. During the operational phase, cumulative impact to water quality should be considered.

West Rail Long Ping Station (North) Property Development

9.2.4.6 The construction of the development has commenced in Year 2013 and is targeted to be completed in Year 2018. As the construction period of the development will overlap with the Project, the cumulative construction impact to water quality due to site run-off should be considered.

West Rail Long Ping Station (South) Property Development

9.2.4.7 The construction of the development has commenced in Year 2014 and is targeted to be completed in Year 2019. As the construction period of the development will overlap with the Project, the cumulative construction impact to water quality due to site run-off should be considered.

9.3 Assessment Methodology

9.3.1 Literature Review

9.3.1.1 As the Project Area is highly urbanised, the ecological value is considered low and limited information on the ecological condition is available. Besides, studies in the ecological sensitive areas in the downstream of the Project Area have been conducted in various projects. The following studies are reviewed to evaluate the ecological condition of the Project Area, Assessment Area and the areas which may be impacted by the current Project.

EIA Report for Agreement No. CE 30/2007 (HY) Construction of Cycle Tracks (CCT) and the associated Supporting Facilities at Nam Sang Wai, Yuen Long (SFNSW) (Application withdrawn on 1 April 2016)

9.3.1.2 The project area and assessment area for the proposed cycle tracks locate just to the north of the current Assessment Area without overlapping. Yet, it provides information on the ecological condition of the ecological sensitive areas at the downstream of the current Project. Ecological surveys including bird, herpetofauna, butterflies and dragonflies, freshwater fish and mammal surveys were conducted in Nam Sang Wai under the project. Though the EIA has been withdrawn in April 2016, the ecological surveys were conducted and considered to provide a valid account for the most updated ecological conditions of the habitats in the vicinity of the current Project.

EIA Report for Proposed Development Fung Lok Wai, Yuen Long Lot 1457 R.P. in D.D. 123

9.3.1.3 The EIA study for the proposed development at Fung Lok Wai was conducted in 2008. Though there is no overlapping area between this study and the current Project, this study provides information on the ecological condition of the northwest area of the current Project, which is considered an important constituting part of the wetland habitats in Deep Bay area.

Hong Kong Bird Report 2011

9.3.1.4 The Hong Kong Bird Watching Society published bird reports annually/biannually to present the records of bird species identified over Hong Kong. The seasonal and spatial distribution of birds species during the year were observed and recorded. The report for 2011 is available online and it has been reviewed for the records of species observed in Nam Sang Wai.

Monthly Waterbird Monitoring Biannual Report 1 (April to September 2015), Mai Po Inner Deep Bay Ramsar Site Waterbird Monitoring Programme 2015-16/ Monthly Waterbird Monitoring Biannual Report 2 (October 2014 to March 2015), Mai Po Inner Deep Bay Ramsar Site Waterbird Monitoring Programme 2014-15

9.3.1.5 The Bird Watching Society has prepared the reports for AFCD to present the findings of the Mai Po Inner Deep Bay Ramsar Site Waterbird Monitoring Programme. Nam Sang Wai and Shan Pui River are two of the bird counting areas of the monitoring programme. The report has been reviewed for the waterbird records in Nam Sang Wai and Shan Pui River, which are the nearest natural habitats located in the downstream of the Yuen Long Town Nullah.

9.3.2 Site Visit

9.3.2.1 Site visit to the Project Area and the 500m Assessment Area has been conducted twice during dry season and once during wet season to make observations on the habitats and general ecological conditions, especially for the downstream area of the Project Area which is an important habitat for waterbirds.

9.3.2.2 The Project and the entire 500m Assessment Area is a developed and urbanised area. It does not fall within any sites of conservation importance, such as the priority sites for enhanced conservation in the Ramsar Site and the Deep Bay Wetland Outside Ramsar Site, nor the Wetland Buffer Area where limited development is allowed. The nearest habitat with high conservation value is the natural section of Shan Pui River, which is about 700m downstream of the Project. Other sites of conservation importance including the priority sites for enhanced conservation and SSSI in Inner Deep Bay and the adjacent wetland are more than 1.2 km away from the Project. A number of EIA studies had collected comprehensive data on the ecological resources at these sites of conservation importance and therefore there is no information gap identified.

9.3.2.3 In view of the degree of urbanisation in the Project Area and within 500m Assessment Area of the Project, the long distance between the Project and the sites of conservation importance, as well as with the proposed best practices on construction method and mitigation measures in place to control site runoff from directly discharged into the nullah, associated water quality impact on the ecological resources downstream is unlikely and ecological survey is not necessary.

9.3.3 Impact Assessment

9.3.3.1 The potential terrestrial and aquatic ecological impacts (including direct, indirect, cumulative and residual impacts etc.) arising from the Project were assessed in accordance with the TM-EIAO Annexes 8 and 16.

9.4 Ecological Characteristics of the Survey Area

9.4.1 General

9.4.1.1 The proposed elevated pedestrian corridor will be situated in a highly urbanized town area. There is no site of conservation importance within the Project Area or the 500m Assessment Area. The Yuen Long Nullah beneath the proposed elevated pedestrian corridor is a modified open water channel with concrete paved throughout the nullah.

9.4.1.2 The Project Area is highly urbanised and limited information on the ecological condition is available. Site visits were conducted in January, March and September 2015 to identify any ecological resources within the Project Area and 500m Assessment Area.

9.4.1.3 This section presents the ecological data collected through the review of the relevant available literature and site visits conducted for this Study.

9.4.2 Habitat and Vegetation

9.4.2.1 The habitat types identified within the 500m Assessment Area included major channelized watercourse, wet agricultural land, floodwater storage pond and developed area. These habitats are mapped in **Figure 9.2**.

Major Channelised Watercourse

9.4.2.2 Yuen Long Town Nullah is the major channelized watercourse fall within the Project Area and the 500m Assessment Area. It flows from the south of Yuen Long, directing the flow from various contributing village areas and the town centre north to Shan Pui River and eventually the Deep Bay Area. The proposed elevated pedestrian corridor is planned over the Long Ping – Kau Yuk Road section of the Yuen Long Town Nullah. The vegetation along the sides of the nullah included *Ficus microcarpa*, *Bombax ceiba*, *Lagerstroemia speciosa*, *Dimocarpus longan*, and *Bauhinia x blakeana*.

Wet Agricultural Land

9.4.2.3 There is one piece of wet agricultural land located to the east of the Project Area, which is dominated by lotus. This area of wet agricultural land is located to the south of the Long Ping West Rail Station and is fragmented from other similar habitats in the far north by the surrounding urban developments. Apart from the lotus patch, the area is surrounded by some common plants species including *Macaranga tanarius* var. *tomentosa*, *Ficus microcarpa*, *Ravenala madagascariensis*, *Ligustrum sinense* and *Leucaena leucocephala*.

Floodwater Storage Pond

9.4.2.4 A floodwater storage pond is located at about 300m to the southwest of the Project Area. It is managed by Drainage Services Department (DSD). The area is fenced-off, with the bed lined with concrete and grasscrete lining. The area was dry at the time of site visit. The vegetation included *Senna surattensis* and *Acacia confusa*.

Developed Area

9.4.2.5 Most of the area within the Project Area and Assessment Area is developed. It mainly consists of urban and rural residential developments. There are road-side planting and plantations in rural residential area within the Assessment Area. Their species mainly comprises *Ficus microcarpa*, *Bombax ceiba*, *Lagerstroemia speciosa*, *Dimocarpus longan*, *Bauhinia x blakeana*, *Acacia confusa*, *Melaleuca cajuputi* and *Celtis sinensis*. Flora recorded in the area are mainly common horticultural species, including the herbs *Bidens alba*, and climber *Ipomoea cairica*, and flora *Duranta repens*.

9.4.3 Species

Birds

9.4.3.1 Upon literature review and observation during site visit, no species of conservation importance is identified within the Project Area. A few common bird species including Pigeons (*Columba spp.*), Spotted dove (*Streptopelia chinensis*) and Black-collar starling (*Sturnus nigricollis*) were found in the Yuen Long Nullah and the developed area within the Project Area during site visit. They are common species categorised as "Least Concern" in the IUCN Red List.

9.4.3.2 Some other common species are found within the 500m Assessment Area, especially to the north of the Project where less disturbance exist. The species observed included common waterbirds such as Little Egrets (*Egretta garzetta*), Chinese Pond Heron (*Ardeola bacchus*), Grey Heron (*Ardea cinerea*), Black-winged Stilt (*Himantopus himantopus*), Black-headed Gull (*Chroicocephalus ridibundus*), Common Redshank (*Tringa tetanus*) which mainly found in the downstream of the Project Area.

9.4.3.3 Other observed bird species are commonly found in developed areas. They included Crested Myna (*Acridotheres cristatellus*), Oriental Magpie Robin (*Copsychus saularis*), Barn Swallow (*Hirundo rustica*), Eurasian Magpie (*Pica pica*) and Japanese White-eye (*Zosterops japonicas*).

9.4.3.4 In general, the bird species found within the Project Area and the 500m Assessment Area are common species, as the area is highly disturbed by human activities. The species observed in the Project Area and the 500m Assessment Area are all categorised as "Least Concern" in the IUCN Red List. However, two species observed in the 500m Assessment Area are rated as "Potential Regional Concern" by Fellowes *et al*. (2002). They are Grey Heron and Black-headed Gull. Also, four species including Chinese Pond Heron, Little egret, Black-winged Stilt, and Common Redshank are rated as "Regional Concern" by Fellowes *et al*. (2002). Only a few number of less than 5 individuals of each bird species of conservation concern were sighted during each site visit, and they were only found at the north of the Project beyond Long Ping Station and/or at the upstream tributary near Ma Tin Tsuen at the south of the Project. The location of the species being observed and their conservation status are summarised in the following table.

Table 9.1 Bird species observed within the Project Area and Assessment Area

Species Name	Conservation Status		Project Area	500m Assessment Area
	IUCN [1]	Fellowes *et al.* (2002) [2]		
Columba spp. Pigeons	-	-	√	√
Streptopelia chinensis Spotted dove	-	-	√	√
Sturnus nigricollis Black-collar starling	-	-	√	√
Acridotheres cristatellus Crested Myna	-	-	-	√
Ardea cinerea Grey Heron	-	PRC	-	√
Ardeola bacchus Chinese Pond Heron	-	RC	-	√
Chroicocephalus ridibundus Black-headed Gull	-	PRC	-	√
Copsychus saularis Oriental Magpie Robin	-	-	-	√
Egretta garzetta Little egrets	-	RC	-	√
Himantopus himantopus Black-winged Stilt	-	RC	-	√
Hirundo rustica Barn Swallow	-	-	-	√
Motacilla alba White Wagtail	-	-	-	√
Motacilla cinerea Grey Wagtail	-	-	-	√
Pica pica Eurasian Magpie	-	-	-	√
Pycnonotus jocosus Red-whiskered Bulbul	-	-	-	√
Tringa tetanus Common Redshank	-	RC	-	√
Zosterops japonicas Japanese White-eye	-	-	-	√

Note:
[1] "-" These species are classified as "Least Concern" in IUCN Red List
[2] PRC = Potential Regional Concern, RC = Regional Concern

9.4.3.5 Beyond the 500m Assessment Area, rich and diverse bird species has been recorded in the confluence of Shan Pui River and Kam Tin River, Nam Sang Wai, as well as the wetland habitats in downstream of Shan Pui River. Based on literatures review, typical waterbird species such as Little Egret (*Egretta garzetta*), Chinese Pond Heron (*Ardeola bacchus*) and Black Kite (*Milvus migrans*) are commonly found in these wetland habitats. Foraging and roosting activities of ardeid, wader and duck species were recorded in Shan Pui River and Kam Tin River (Mott MacDonald, 2012). A number of species of conservation importance such as Black-faced Spoonbills (*Platalea minor*) and Yellow-breasted Bunting (*Emberiza aureola*) are also found in Nam Sang Wai. They are classified as "Endangered" in IUCN Red List. Common Pochard (*Aythya farina*) and Greater Spotted Eagle (*Clanga clanga*) were recorded in Nam Sang Wai. They are "Vulnerable" in IUCN Red List and Greater Spotted Eagle is also categorised as "Global Concern" by Fellowes *et al*. and "Rare" in China Red Data Book. IUCN "Near Threatened" species Eurasian Curlew (*Numenius arquata*) and Collar Crow (*Corvus torquatus*) were identified in Nam Sang Wai. They are considered as "Regional Concern" and "Local Concern" by Fellowes *et al*. respectively. Red-billed Starling (*Spodiopsar sericeus*) classified as "Global Concern" by Fellowes *et al.* (2002) has been recorded in Nam Sang Wai. However, its global population is now suspected to be stable and considered not globally threatened (BirdLife International, 2016). A listing of Regional Concern (RC), based on the importance of the large roosts present near Deep Bay, is considered to be more appropriate according to the Nam Sang Wai Cycle Tracks EIA. Some other species considered as "Local Concern", "Potential Regional Concern" and "Regional Concern" by Fellowes *et al*. are identified in Nam Sang Wai and/or Shan Pui River. A summary of bird species of conservation importance identified in Nam Sang Wai and Shan Pui River in the reviewed literatures and their conservation status are listed in **Table 9.2**. These habitats in Shan Pui River, Kam Tin River and Nam Sang Wai are more than 1km from the current Project that direct ecological impacts to these areas are unlikely.

Table 9.2 Bird species of conservation importance identified in Nam Sang Wai and Shan Pui River

Species Name	Common Name	Conservation Status			Location[4]	
		IUCN [1]	Fellowes *et al.* (2002) [2]	China Red Data Book [3]	Shan Pui River	Nam Sang Wai
Ardea cinerea	Grey Heron	-	PRC	-	√	√
Ardea alba	Great Egret	-	RC	-	√	√
Egretta intermedia	Intermediate Egret	-	RC	-	√	√
Egretta garzetta	Little Egret	-	RC	-	√	√
Ardea purpurea	Purple Heron	-	RC	-		√
Ardeola bacchus	Chinese Pond Heron	-	RC	-	√	√
Bubulcus coromandus	Eastern Cattle Egret	-	LC	-	√	
Bubulcus ibis	Cattle Egret	-	LC	-		√
Butorides striata	Striated Heron	-	LC	-	√	
Ixobrychus sinensis	Yellow Bittern	-	LC	-	√	√
Nycticorax nycticorax	Black-crowned Night Heron	-	LC	-	√	√
Platalea minor	Black-faced Spoonbill	EN	PGC	EN	√	√
Phalacrocorax carbo	Great Cormorant	-	PRC	-		√
Tachybaptus ruficollis	Little Grebe	-	LC	-		√
Calidris temminckii	Temminck's Stint	-	LC	-		√
Himantopus himantopus	Black-winged Stilt	-	RC	-	√	√
Recurvirostra avosetta	Pied Avocet	-	RC	-	√	√
Tringa erythropus	Spotted Redshank	-	RC	-	√	√
Tringa stagnatilis	Marsh Sandpiper	-	RC	-	√	√
Tringa nebularia	Common Greenshank	-	RC	-	√	√
Tringa glareola	Wood Sandpiper	-	LC	-	√	√
Numenius arquata	Eurasian Curlew	NT	RC	-		√
Charadrius alexandrinus	Kentish Plover	-	RC	-	√	
Charadrius dubius	Little Ringed Plover	-	LC	-	√	√
Glareola maldivarum	Oriental Pratincole	-	LC	-		√
Vanellus cinereus	Grey-headed Lapwing	-	LC	-		√

Species Name	Common Name	Conservation Status			Location[4]	
		IUCN [1]	Fellowes *et al.* (2002) [2]	China Red Data Book [3]	Shan Pui River	Nam Sang Wai
Anthus rubescens	Buff-bellied Pipit	-	LC	-		√
Ceryle rudis	Pied Kingfisher	-	LC	-	√	√
Halcyon pileata	Black-capped Kingfisher	-	LC	-	√	
Halcyon smyrnensis	White-throated Kingfisher	-	LC	-	√	√
Luscinia svecica	Bluethroat	-	LC	-		√
Motacilla citreola	Citrine Wagtail	-	LC	-		√
Emberiza aureola	Yellow-breasted Bunting	EN	RC	-		√
Remiz consobrinus	Chinese Penduline-Tit	-	RC	-		√
Spodiopsar sericeus	Red-billed Starling	-	GC (RC)	-		√
Agropsar sturninus	Daurian Starling	-	LC	-		√
Sturnus cineraceus	White-cheeked Starling	-	PRC	-		√
Sturnia sinensis	White-shouldered Starling	-	LC	-		√
Ixobrychus eurhythmus	Schrenck's Bittern	-	RC	-		√
Anas penelope	Eurasian Wigeon	-	RC	-	√	√
Anas crecca	Common Teal	-	RC	-	√	√
Anas acuta	Northern Pintail	-	RC	-	√	√
Anas clypeata	Northern Shoveler	-	RC	-	√	√
Aythya ferina	Common Pochard	VU	-	-		√
Aythya fuligula	Tufted Duck	-	LC	-	√	√
Centropus sinensis	Greater Coucal	-	-	VU		√
Centropus bengalensis	Lesser Coucal	-	-	VU		√
Corvus torquatus	Collared Crow	NT	LC	-	√	√
Chroicocephalus ridibundus	Black-headed Gull	-	PRC	-	√	√
Milvus migrans	Black Kite	-	RC	-	√	√
Aquila fasciata	Bonelli's Eagle	-	RC	R		√
Clanga clanga	Greater Spotted Eagle	VU	GC	R		√
Circus spilonotus	Eastern Marsh Harrier	-	LC	-		√

Species Name	Common Name	Conservation Status			Location[4]	
		IUCN [1]	Fellowes *et al.* (2002) [2]	China Red Data Book [3]	Shan Pui River	Nam Sang Wai
Pandion haliaetus	Osprey	-	RC	R		√
Spilornis cheela	Crested Serpent Eagle	-	LC	VU		√
Falco subbuteo	Eurasian Hobby	-	LC	-		√

Note:
[1] IUCN Red List: "-"= Least Concern, Near Threatened = NT, Vulnerable = VU, Endangered = EN
[2] Fellowes *et al.* (2002): Local Concern = LC, Potential Regional Concern = PRC, Regional Concern = RC, Potential Global Concern = PGC, Global Concern = GC
[3] China Red Data Book: Rare = R, Vulnerable = VU
[4] The location given in this table only shows the extract of the survey results for Shan Pui River and Nam Sang Wai from the literatures *"Mai Po Inner Deep Bay Ramsar Site Waterbird Monitoring Programme 2015-16"* and *"Construction of Cycle Tracks and the Associated Supporting Facilities at Nam Sang Wai, Yuen Long EIA"*, while Hong Kong Bird Report 2011 provides information for Nam Sang Wai but did not specify survey results for Shan Pui River.

Butterflies

9.4.3.6 Upon literature review and observation during site visit, no butterfly species of conservation importance is identified within the Project Area. A few species were observed in the 500m Assessment Area during site visits. They included Lemon Emigrant (*Catopsilia Pomona)* and Banded Tree Brown (*Lethe confusa)* that are assessed as "Common" by AFCD, and Red Helen (*Papilio helenus),* Common Mormon (*Papilio polytes)* and Indian Cabbage White (*Pieris canidia)* that are assessed as "Very Common" by AFCD.

Table 9.3 Butterfly species observed within the Project Area and Assessment Area

Species Name	Common Name	AFCD Assessment
Catopsilia pomona	Lemon Emigrant	Common
Lethe confusa	Banded Tree Brown	Common
Papilio helenus	Red Helen	Very Common
Papilio polytes	Common Mormon	Very Common
Pieris canidia	Indian Cabbage White	Very Common

9.4.3.7 Beyond the 500m Assessment Area, butterfly surveys have been conducted in Fung Lok Wai and Nam Sang Wai under previous studies. Apart from the majority common species recorded in these areas, uncommon species such as Bush Hopper *(Ampittia dioscorides)*, Spotless Grass Yellow *(Eurema laeta)*, Common Jay *(Graphium doson)*, Common Nawab *(Polyura athamas)*, Grass Demon *(Udaspes folus)*, Blue Pansy (*Junonia orithya*) , Small Grass Yellow *(Eurema brigitta)* and Danaid Eggfly *(Hypolim*nas misippus*)* are identified in Fung Lok Wai and its vicinity (CH2M HILL, 2008), and Blue Pansy (*Junonia orithya*) is also record in Tai Sang Wai (Mott MacDonald, 2012).

Other faunal species

9.4.3.8 No record of species of conservation importance has been identified from literature review and observation during site visits within the 500m Assessment Area. Surveys on herpetofauna and dragonflies have been conducted under the Nam Sang Wai Cycle Track EIA, of which the assessment area is beyond the 500m Assessment Area of this Project and covers Kam Tin River, Shan Pui River, Nam Sang Wai, Tai Tseng Wai and Tai Sang Wai. The herpetofauna identified within the corresponding assessment area are of common species. A few dragonfly species of conservation importance are identified in the ponds, water ditch and mangrove within the assessment area. They included Eastern Lilysquatter (*Paracercion melanotum*), Ruby Darter (*Rhodothemis rufa*), Sapphire Flutterer (*Rhyothemis triangularis*) and Scarlet Basker (*Urothemis signata signata*) which are classified as "Local Concern" by Fellowes *et al.* (2002). Moreover, the endemic Bent-winged Firefly (*Pteroptyx maipo*) was recorded at the mangroves at the confluence of Shan Pui River and Kam Tin River (HKES, 2011). Mammal species of conservation importance including Eurasian Otter (*Lutra lutra*), Small Asian Mongoose (*Herpestes javanicus*) and Leopard Cat (*Prionailurus bengalensis*) have been recorded in Nam Sang Wai (Nam Sang Wai Development Co. Limited *et al.*, 2012). Their conservation status as evaluated in various literatures are summarised in **Table 9.4**. These species are identified in the habitats at least 1km from the current Project that direct ecological impacts to these species are unlikely.

Table 9.4 Other faunal species recorded in the vicinity

Species Name	Conservation Status				
	IUCN[1]	Fellowes *et al.* (2002) [2]	China Red Data Book [3]	AFCD Assessment [4]	Cap. 586/ CITES
Mammals					
Herpestes javanicus Small Asian Mongoose	-	-	-	Un	-
Prionailurus bengalensis Leopard Cat	-	-	VU	Un	Appendix II
Lutra lutra Eurasian Otter	NT	RC	VU	R/ SCC	Appendix I
Dragonflies					
Paracercion melanotum Eastern Lilysquatter	-	LC	-	C	-
Rhodothemis rufa Ruby Darter	-	LC	-	C	-
Rhyothemis triangularis Sapphire Flutterer	-	LC	-	C	-
Urothemis signata signata Scarlet Basker	-	LC	-	C	-

Note:
[1] "-" These species are classified as "Least Concern" in IUCN Red List
[2] PRC = Potential Regional Concern, RC = Regional Concern
[3] VU = Vulnerable
[4] Un = Uncommon, R = Rare, SCC = Species of Conservation Consern

9.5 Evaluation of Habitats and Species

9.5.1 General

9.5.1.1 Based on the above observations and using the criteria set out in Annex 8 of the TM-EIAO, ecological values of the habitats and species recorded within the Assessment Area are assessed below.

9.5.2 Evaluation of Habitats

Major Channelised Watercourse

9.5.2.1 The major channelised watercourse identified within the Project Area is the Yuen Long Town Nullah. The section fall within the Project Area and Assessment Area have concrete banks and bottom. The river bank of the upper section of Shan Pui River is grasscreted with concrete bottom. Beyond the 500m Assessment Area, the section downstream directing to the Shan Pui River has grasscreted banks or a natural bottom. As the downstream section is directing to the natural Shan Pui River and the wetland area of ecological and conservation importance, more bird species, especially waterbirds, can be found in the downstream of the Yuen Long Town Nullah. The species recorded in this habitat within the Project Area and Assessment Area are common in Hong Kong, except Grey Heron and Black-headed Gull which are rated as Potential Regional Concern (Fellowes *et al*., 2002) and the Chinese Pond Heron, Little egret, Black-winged Stilt, and Common Redshank which are rated as "Regional Concern" (Fellowes *et al*., 2002). There are trees planting along the nullah side to enhance the ecological function. They are common road-side

planting species which included *Ficus microcarpa, Bombax ceiba, Lagerstroemia speciosa, Dimocarpus longan,* and *Bauhinia x blakeana.*

9.5.2.2 A few butterfly species were observed at the planting along the nullah, including Banded Tree Brown (*Lethe confusa),* Red Helen (*Papilio helenus)* and Common Mormon (*Papilio polytes).* They are all common species.

Table 9.5 Ecological evaluation - Major channelised watercourse within the Project Area and Assessment Area

Criteria	Within Project Area	Within 500m Assessment Area
Naturalness	Man-made	Man-made
Size	Approx. 540m	Approx. 900m
Diversity	Low floral and faunal diversity	Low floral and moderate faunal diversity
Rarity	Common man-made habitat	Common man-made habitat; wetland bird species of conservation significance including Grey Heron, Black-headed Gull, Chinese Pond Heron, Little egret, Black-winged Stilt, and Common Redshank were recorded
Re-creatability	Readily re-creatable	Readily re-creatable
Fragmentation (with similar habitats)	Not fragmented	Not fragmented
Ecological Linkage	Hydrologically linked with Shan Pui River	Hydrologically linked with Shan Pui River
Potential Value	Limited potential due to the concrete structure and highly disturbed surrounding environment	Limited potential due to the concrete structure
Nursery/Breeding Ground	No known significant nursery/breeding ground	No known significant nursery/breeding ground
Age	Around 20 years	Around 20 years
Abundance/Richness of Wildlife	Low floral and faunal abundance and richness	Low floral and faunal abundance and richness
Ecological Value	**Low**	**Low**

Wet Agricultural Land

9.5.2.3 There is one piece of wet agricultural land located in Tai Kiu Tsuen to the east of the Project Area, which is dominated by lotus. This habitat type can be constantly changing due to seasonal change, natural succession and human activities. Apart from the cultivated lotus patch, the area is also surrounded by some common plants species including *Macaranga tanarius* var. *tomentosa*, *Ficus microcarpa, Ravenala madagascariensis, Ligustrum sinense* and *Leucaena leucocephala*. This area of wet agricultural land is small and highly fragmented from other similar habitats in the far north by the surrounding urban developments. A few common bird species including Pigeons, Spotted dove and Red-whiskered Bulbul are observed in this habitat.

Table 9.6 Ecological evaluation – Wet agricultural land within the Assessment Area

Criteria	Wet Agricultural Land within 500m Assessment Area
Naturalness	Man-made habitat
Size	Small area (0.13ha)
Diversity	Low floral and faunal diversity
Rarity	Common habitat in the rural area though not common in developed area
Re-creatability	Readily re-creatable
Fragmentation (with similar habitats)	Fragmented by the developed area
Ecological Linkage	Limited ecological linkage due to the fragmentation by the highly urbanised development in the surroundings
Potential Value	Limited due to the small size and fragmentation from other natural or similar habitats
Nursery/Breeding Ground	No known nursery/breeding ground of significance
Age	Unknown
Abundance/Richness of Wildlife	Low floral and faunal abundance and richness
Ecological Value	**Low**

Floodwater Storage Pond

9.5.2.4 A floodwater storage pond under the management by DSD is located to the southwest of the Project Area. The bank and the bottom is lined with both grass and concrete. The area was dry at the time of site visit. It is believed that the pond would only be filled occasionally when there is heavy precipitation. The trees planting along the pond included some common species such as *Senna surattensis* and *Acacia confusa*. Common butterfly species such as Lemon Emigrant (*Catopsilia Pomona)* and Indian Cabbage White (*Pieris canidia)* are observed near the pond. The pond is man-made for urban drainage management purpose and is fragmented from other natural habitats.

Table 9.7 Ecological evaluation – Pond within the Assessment Area

Criteria	Floodwater storage pond within 500m Assessment Area
Naturalness	Man-made habitat
Size	Small area (0.18ha)
Diversity	Low floral and faunal diversity
Rarity	Artificial ponds in urban area is common
Re-creatability	Readily re-creatable
Fragmentation (with similar habitats)	Fragmented by the developed area
Ecological Linkage	Hydrologically linked with Yuen Long Town Nullah through pipes
Potential Value	Limited as it is small and fragmented, and intensively managed for drainage purpose
Nursery/Breeding Ground	No significant nursery or breeding ground known
Age	Around 10 years
Abundance/Richness of Wildlife	Low floral and faunal abundance and richness

Criteria	Floodwater storage pond within 500m Assessment Area
Ecological Value	**Low**

Developed Area

9.5.2.5 This habitat is highly modified and disturbed by humans, and supports mainly common floral and faunal species. This habitat makes up most of the area within the Project and the Assessment Area. It mainly consists of urban and rural residential developments. There are road-side planting which mainly comprises common urban planting species such as *Ficus microcarpa, Bombax ceiba, Lagerstroemia speciosa, Dimocarpus longan, Bauhinia x blakeana, Acacia confusa, Melaleuca cajuputi* and *Celtis sinensis.* Flora recorded in the area are mainly common horticultural species, including the herbs *Bidens alba*, and climber *Ipomoea cairica*, and flora *Duranta repens.*

9.5.2.6 Common bird species including Pigeons (*Columba spp.*), Spotted dove (*Streptopelia chinensis*), Crested Myna (*Acridotheres cristatellus*), Oriental Magpie Robin (*Copsychus saularis*), Barn Swallow (*Hirundo rustica*), Eurasian Magpie (*Pica pica*), Red-whiskered Bulbul (*Pycnonotus jocosus*) and Japanese White-eye (*Zosterops japonicas*) were observed within this habitat. Most of them are found within the more rural areas and near the nullah.

9.5.2.7 A common butterfly species, Lemon Emigrant (*Catopsilia Pomona),* was observed at the road-side planting.

9.5.2.8 No species of conservation importance is recorded in this habitat.

Table 9.8 Ecological evaluation – Developed Area within the Project Area and Assessment Area

Criteria	Developed Area
Naturalness	Man-made
Size	129ha
Diversity	Low floral and faunal diversity.
Rarity	Very common
Re-creatability	Readily re-creatable
Fragmentation (with similar habitats)	Not fragmented
Ecological Linkage	No significant linkage
Potential Value	Limited due to high degree and large area of urbanisation
Nursery/Breeding Ground	No significant nursery or breeding ground known
Age	Around 30 years
Abundance/Richness of Wildlife	Low floral and faunal abundance and richness
Ecological Value	**Low**

9.5.3 Evaluation of Species

9.5.3.1 The species of conservation significance and/or protected species found in the Project and Assessment Area is addressed in this Section. All bird species are protected under Cap 170 Wild Animals protection Ordinance, hence only those of conservation significance are included for evaluation. Conservation status of species are referenced to local and international ordinances/conventions, including

IUCN Red List, China Red Data Book, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586), and other relevant scientific studies.

Bird

9.5.3.2 Six bird species recorded in the Assessment Area are identified as Potential Regional Concern or Regional Concern by Fellowes *et al.* (2002). The individuals are mainly observed in YLTN in the downstream of the Project beyond Long Ping Station. Nonetheless, these species are generally commonly found in Deep Bay Area or even throughout Hong Kong.

Table 9.9 Ecological evaluation – Bird species of conservation significance recorded within the Assessment Area

Species Name	Conservation Status		Distribution in Hong Kong
	IUCN [1]	Fellowes *et al.* (2002)[2]	
Ardea cinerea Grey Heron	-	PRC	Common winter visitor. Found in Deep Bay area, Starling Inlet, Kowloon Park, Cape D'Aguilar
Chroicocephalus ridibundus Black-headed Gull	-	PRC	Common winter visitor. Found in Deep Bay area, Tolo Harbour, Starling Inlet, Victoria Harbour
Ardeola bacchus Chinese Pond Heron	-	RC	Common resident. Widely distributed in Hong Kong
Egretta garzetta Little egret	-	RC	Common resident. Widely distributed in coastal area throughout Hong Kong
Himantopus himantopus Black-winged Stilt	-	RC	Common passage migrant. Found in Deep Bay area, Long Valley, Kam Tin
Tringa totanus Common Redshank	-	RC	Common passage migrant. Found in Deep Bay area

Note:
[1] "-" These species are classified as "Least Concern" in IUCN Red List
[2] PRC = Potential Regional Concern, RC = Regional Concern

Other faunal species

9.5.3.3 No record of species of conservation importance has been identified from literature review and observation during site visits within 500m Assessment Area. Other faunal species including herpetofauna, butterflies, dragonflies, fireflies and mammals are mostly identified in the habitats beyond the Assessment Area of the current Project and mainly of common species. A few species of conservation importance including the dragonflies Eastern Lilysquatter and Ruby Darter of Local Concern (Fellowes *et al.*, 2002), the endemic Bent-winged Firefly, the near-threatened Eurasian Otter (IUCN, 2015), and uncommon Small Asian Mongoose and Leopard Cat (AFCD, 2016) were identified in the Nam Sang Wai area in the downstream of the Project. However, as these habitats are located at least 1km away from the Project, direct ecological impact to these species is not anticipated.

9.6 Identification and Evaluation of Impacts

9.6.1 Direct Impact

Potential temporary/ permanent loss of major channelized watercourse during construction phase and operational phase

9.6.1.1 The section of Yuen Long Town Nullah within the Project Area may be temporarily affected as construction works take place inside the nullah. However, the works will be carried out during dry season when flow in the nullah is mostly limited to the low-flow channel. Therefore, the potential impact during construction phase is considered to be low.

9.6.1.2 The proposed pedestrian corridor would be elevated over this man-made water channel with 2 footbridge columns and 6 box culverts located within the nullah. The construction of columns and box culvert will lead to a total of approximately 180m permanent loss of open section of the nullah at the pedestrian interchanges. However, given the man-made nature of the concrete-lining nullah, it has low ecological value and the Project will not cause any direct impact to natural habitat and species during operational phase.

Table 9.10 Potential direct impact to the major channelized watercourse

Criteria	Impact to the major channelized watercourse
Habitat Quality	Low ecological value.
Species	Low abundance and diversity.
Size/Abundance	Very small in a Hong Kong context (540m).
Duration	Temporary habitat loss at the works area during construction stage; permanent loss of approximately 180m of open section of the nullah in total.
Reversibility	Reversible in construction phase; irreversible in operational phase.
Magnitude	Low as the construction works would take place during dry season when the flow is limited; and the nullah is of man-made nature with low ecological value that the loss of open section will not have significant impact on the existing ecology.
Overall Impact Severity	**Low**

9.6.2 Indirect Impact

Potential disturbance to fauna species due to noise, dust, increased traffic and other human activities during construction and operational phases

9.6.2.1 During construction phase, the nullah and the nearby areas might be temporarily occupied by the construction works. Noise, dust and other disturbance would be increased significantly during the period. There are several common birds such as Pigeons and Spotted dove observed in the area. The disturbance caused by the construction activities would affect their existing living habits and environment. During operational phase, the increased pedestrian flow may cause disturbance to the avifauna. However, since the species observed in the area are well adapted to human disturbance in developed area, the impact is considered to be low.

Table 9.11 Potential indirect impact to nearby fauna species

Criteria	Impact to nearby fauna species
Habitat Quality	Low ecological value.
Species	Low abundance and diversity.
Size/Abundance	Very small in a Hong Kong context.
Duration	Temporary disturbance in construction phase; permanent in operational phase.
Reversibility	Reversible in construction phase; irreversible in operational phase.
Magnitude	Low as the species observed in the area are well adapted to human disturbance in developed area.
Overall Impact Severity	**Low**

Potential impact to downstream wildlife due to deteriorated water quality in Yuen Long Town Nullah during construction phase and operational phase

9.6.2.2 The water quality of the Yuen Long Town Nullah may be affected by the surface run-off from the construction works area. The dust and excavated earth materials may lead to increase in suspended solid which affects the aquatic lives in the downstream, and any spillage of chemicals and oils into the nullah may lead to poisoning or suffocation of aquatic lives. Organisms of higher trophic level would also be at risk if their prey are poisoned due to bioaccumulation. The habitats downstream including the Shan Pui River, Nam Shan Wai, and the ponds and wetlands in Deep Bay area are ecologically sensitive to the water quality decline in the Yuen Long Town Nullah. Though the construction works would be carried out in dry season where flow in the nullah would be limited, certain impact to water quality is anticipated from the run-off generated by the construction works. Thus the impact is considered to be low to moderate. Precautionary measures and action plan for run-off and any leakage of chemicals should be implemented to prevent and treat any pollution of the water in the YLTN.

9.6.2.3 Surface runoff from the elevated pedestrian corridor is the only source of the water pollution from the Project during operational phase. The runoff may contain grit, oil and debris from the pedestrians. Proper drainage system including gratings at the gully inlets will be provided to remove grit and debris before the runoff discharge to the Yuen Long Town Nullah and hence no adverse water quality impact is anticipated with the provision of the drainage system.

Table 9.12 Potential indirect impact to the downstream wildlife due to deteriorated water quality

Criteria	Impact to the downstream wildlife due to deteriorated water quality
Habitat Quality	The downstream habitats extending to Deep Bay and Mai Po which are hydrologically connected with YLTN are of high ecological value.
Species	High abundance and diversity including various species of conservation importance.
Size/Abundance	Large in size and in continuity as a collective of fish ponds, wetlands and water bodies in a Hong Kong context.
Duration	Temporary impact due to deterioration of water quality in the YLTN during construction phase; permanent impact in operational phase.
Reversibility	Reversible.

Criteria	Impact to the downstream wildlife due to deteriorated water quality
Magnitude	Low to moderate, as certain impact to water quality is anticipated from the surface run-off generated from the construction works, despite the works would take place during dry season when the flow is limited. Low during operational phase with provision of proper drainage system.
Overall Impact Severity	**Low to Moderate in construction phase; Low in operational phase.**

Potential impact to downstream wildlife due to hydrological change in Yuen Long Town Nullah during construction phase and operational phase

9.6.2.4 The construction works will be carried out during dry season when flow in the nullah is mostly limited to the low-flow channel. Therefore, the potential impact on hydrology during construction phase is considered to be low.

9.6.2.5 During operational phase, the capacity of the nullah is estimated to be reduced by 720m^3 due to the construction of the supporting columns of the pedestrian corridor and box culverts at the pedestrian interchanges. The potential impact due to reduction in capacity which leads to rise in water level will be addressed by the installation of parapet wall along the two sides of the nullah as mentioned in **Section 6.7**. Nonetheless, the flow and velocity of the whole watercourse would not have significant change after the implementation of the Project. Thus hydrological impact to the downstream habitat is not significant.

Table 9.13 Potential indirect impact to the downstream wildlife due to hydrological change

Criteria	Impact to the downstream wildlife due to hydrological change
Habitat Quality	The downstream habitats extending to Deep Bay and Mai Po which are hydrologically connected with YLTN are of high ecological value.
Species	High abundance and diversity including various species of conservation importance.
Size/Abundance	Large in size and in continuity as a collective of fish ponds, wetlands and water bodies in a Hong Kong context.
Duration	Permanent alteration of the nullah capacity.
Reversibility	Irreversible.
Magnitude	Low as the flow and velocity of the whole watercourse would not have significant change after the implementation of the Project.
Overall Impact Severity	**Low**

9.6.3 Cumulative Impact

9.6.3.1 A number of potential concurrent projects in the vicinity of the Project Area have been identified. The construction of the elevated corridor is anticipated from 2018 – 2022 in phases. The following sections evaluate any cumulative impacts caused by these concurrent projects.

Improvement of Yuen Long Town Nullah (Town Centre Section) – Stage 1 Improvement Works

9.6.3.2 This project comprises improvement works to the Town Centre Section of the Yuen Long Town Nullah by the installation of Dry Weather Flow Interception (DWFI) System. The DWFI system will collect part of the flow and direct to the Yuen Long Sewage Treatment Works for treatment. As the construction work is scheduled to

commence in 3rd quarter of 2022, which is after the anticipated completion date of the elevated corridor, no overlapping of construction works and hence no cumulative impact during construction stage is anticipated.

9.6.3.3 During operational phase, the improvement of YLTN is anticipated to have a net beneficial impact on water quality in the nullah and hence in the downstream area. This would cause a net positive impact on the ecology of the Deep Bay ecosystem. Hence, no adverse cumulative ecological impact of this nullah improvement works is anticipated.

Improvement of Yuen Long Town Nullah (Town Centre Section) – Stage 2 Beautification Works

9.6.3.4 The Project involves beautification and landscaping works by modifying and reconstructing the existing concrete nullah bed and wall along the 800m town centre section of the Yuen Long Town Nullah.

9.6.3.5 According to the information provided by DSD, the construction of the development will be commenced in Year 2027 and is targeted to be completed in Year 2029. As the construction period of the development will not overlap with the Project, no cumulative ecological impact is anticipated during the construction phase. During the operational phase, the concrete wall of the nullah would be beautified by installations of boulders and plants, which may enhance the ecological performance when compare to the existing concrete wall. Hence a net positive impact of the ecology of the section of nullah with landscaping works is anticipated.

West Rail Long Ping Station (North) Property Development

9.6.3.6 For the West Rail Long Ping Station (North) Property Development, the construction period will overlap with the Project in Year 2018.

9.6.3.7 The major sources of the potential ecological impact to the ecological sensitive areas in the downstream of YLTN would be contributed by the deterioration of water quality in the nullah. Good site practices should be implemented in both the property development and the current Project to reduce site run-off and prevent accidental spillage of chemical from releasing to the nullah. Also, wastewater from the construction site will be collected and treated before discharging into drainage system. Hence, potential water quality impact and thus the ecological impact from the project is not anticipated.

West Rail Long Ping Station (South) Property Development

9.6.3.8 For the West Rail Long Ping Station (South) Property Development, the construction period will overlap with the Project in Year 2018 and Year 2019.

9.6.3.9 The major sources of the potential ecological impact to the ecological sensitive areas in the downstream of YLTN would be contributed by the deterioration of water quality in the nullah. Good site practices should be implemented in both the property development and the current Project to reduce site run-off and prevent accidental spillage of chemical from releasing to the nullah. Also, wastewater from the construction site will be collected and treated before discharging into drainage system. Hence, potential water quality impact and thus the ecological impact from the project is not anticipated.

9.6.4 Summary of Potential Ecological Impacts

9.6.4.1 **Table 9.14** summarises the potential ecological impacts arising from construction and operational phases of the Project, and whether mitigation is required. Impacts assessed as whether low or negligible are not considered to require mitigation, and are not taken further in this section.

Table 9.14 Summary of Potential Ecological Impacts

Potential Impact	Impact Severity	Mitigation Required
Direct Impact		
Potential temporary/ permanent loss of major channelized watercourse during construction and operational phases	Low	No
Indirect Impact		
Potential disturbance to fauna species due to noise, dust, increased traffic and other human activities during construction and operational phases	Low	No
Potential impact to downstream wildlife due to deteriorated water quality in YLTN during construction and operational phases	Low – Moderate in construction phase; Low in operational phase	Yes during construction phase
Potential impact to downstream wildlife due to hydrological change in YLTN during construction and operational phases	Low	No
Cumulative Impact		
Potential water pollution in YLTN and its tributary during construction and operational phases	Low	No

9.7 Mitigation Measures

9.7.1 Construction phase

9.7.1.1 According to the current preliminary design intent, the footbridge will be supported on pile foundations. The construction of foundation and columns is targeted to be carried out and completed in the dry seasons during which the water flows would mostly in the low-flow channel except during occasional rainfall events. The following mitigation measures will be provided during construction phase in order to prevent any discharges or construction waste from entering into Yuen Long Nullah:

- Cofferdams should be installed prior to demolition of existing nullah structures or excavation in dry season for pile cap construction. One of the purposes of installing the cofferdams is to provide a confined work environment that can be isolated from the surrounding water during demolition and excavation. Hence water pollution from site runoff would be adequately controlled with the standard site drainage measures in place. The excavation works within nullah for the foundation will be programmed to be carried out as far as practicable to minimise impacts to water quality. Similarly, this measure will also be adopted for the construction of the supports for the temporary platform when necessary.
- Closed grabs or sealed grabs should be used and the mechanical grabs would need to be tightly sealed.
- The excavation operation should be carefully controlled to avoid splashing

excavated materials or wastes into the surrounding water during the transportation. Dump truck will be used to transport the excavated materials or wastes immediately so as to minimise the possibility of splashing on nullah.

- The works such as excavation for the foundation construction within nullah will be carried out in accordance with the approved method statement by the Engineer to minimise the impact to water quality
- Toe boards along both edges of the footbridge deck will be provided in order to avoid construction materials falling into the nullah.
- Open stockpiles susceptible to erosion will be covered with tarpaulin or similar fabric and provided with sand bag barriers or equivalent measures, especially during the wet season (April – September) or when heavy raining is predicted.
- Temporary storage of materials should be located away from the nullah during carrying out of the construction works.
- Surface run-off and sewage from construction should be treated via adequately designed silt removal facilities such as sand traps and silt traps.
- All workers should be regularly briefed to avoid water pollution from site runoff to the nullah and supervisory staff should be assigned to station on site to closely supervise and monitor the works.

9.7.2 Operational Phase

9.7.2.1 During operational phase, the increased pedestrian flow may cause disturbance to the avifauna. However, since the species observed in the area are well adapted to human disturbance in developed area, the impact is considered to be low and no mitigation measures are required.

9.7.3 Implementation of Mitigation Measures

9.7.3.1 The mitigation measures recommended in **Section 9.7.1** should be implemented during the construction phase of the Project, so as to strictly prevent deterioration of water quality in the nullah which would in turn impose risk to the ecology downstream.

9.8 Residual Impacts

9.8.1 Construction phase

9.8.1.1 The major impact during construction phase is the potential water quality decline due to run-off from the works area to the nullah, which in turn flow to the recognised sites of conservation importance in the downstream, such as Nam Sang Wai and the ponds and wetland in Deep Bay area. With proper implementation of mitigation measures recommended in **Section 9.7.1**, the generation of pollutants and their release to the nullah would be minimised. Thus no significant adverse residual impact is anticipated after implementation of mitigation measures.

9.8.2 Operational Phase

9.8.2.1 No mitigation measure is required and no significant adverse residual impact is anticipated.

9.9 EM&A Requirement

9.9.1.1 Ecological impact during construction phase would be mainly caused by the potential water quality impact to the YLTN, which would in turn cause adverse impacts to the ecosystem downstream. Hence mitigation measures and EM&A requirement should follow those formulated for water quality impact. Specific EM&A requirement in ecological aspect is considered not necessary.

9.10 Conclusion

9.10.1.1 The Project is located over the major channelized watercourse, Yuen Long Town Nullah, in the highly urbanised and populated area in Yuen Long. No habitat or species of conservation importance is identified within the Project Area. Due to the highly developed and disturbed status, the ecological value of the Project Area and within 500 m Assessment Area is considered low. However, the major construction works would take place in the Nullah. The Nullah is connected to Shan Pui River, which is hydrologically linked to the ecological sensitive area further downstream, including various habitats in the Wetland Buffer Area and Wetland Conservation Area. Therefore, mitigation measures during construction phase should be strictly followed to prevent deterioration of water quality of the Nullah, which may lead to adverse impact to the ecological sensitive areas downstream. With proper implementation of mitigation measures, the generation of pollutants and their release to the Nullah would be minimised and no significant adverse residual impact is anticipated. Significant adverse ecological impact during operational phase is not anticipated.

9.11 Reference

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